



世界知名TESOL专家论丛

Foreign Language Teacher Education and Development -  
Selected Works of Renowned TESOL Experts

Series Editor: Yilin Sun

# 第二语言发展：不断扩展

## Second Language Development: Ever Expanding

Diane Larsen-Freeman



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丛书每种致力于教师教育发展的一个研究专题，集萃了作者在该领域的研究成果，既有丰富的理论知识，又有鲜活的课堂实例，从国际范围的广阔视野对英语教师的教学、科研和职业发展等领域的热点问题进行了探讨，展现了该研究领域的发展历程和研究成果。

丛书注重理论联系实际，具有很强的实用性和指导性，可供高校外语教师自学阅读，也可作为教师培训机构的辅助教材或参考读物。相信本套丛书的出版将从教学、科研、职业发展等角度为国内高校外语教师的教育和发展提供切实有效的理论指导和实践借鉴。

# Preface

This book, ***Second Language Development: Ever Expanding***, written by Diane Larsen-Freeman, is part of the book series *Foreign Language Teacher Education and Development — Selected Works of Renowned TESOL Experts* published by Shanghai Foreign Language Education Press.

As we have witnessed, the field of TESOL has transformed itself over the last 50 years, especially in the last two decades. It is diverse, complex, multifaceted and “glocal”. The increasing demand for global English has resulted in an expanded landscape of ever-diversifying profiles of users, uses and contexts.

This series features a selection of the works of a number of leading researchers and educators in the TESOL field, aiming to exemplify the diversity and complexity of the English language teaching (ELT) field.

Each book in this series focuses on a specific area in the ELT field. Topics include critical approaches to English language teaching, second language acquisition research, second language writing research and practice, second language reading research and practice, World Englishes, teacher education, corpus based grammar/lexical studies, English for specific purposes (ESP), language assessment, bilingual/multicultural education and language policy, to name a few.

The purpose of each book is to bring together both earlier and recent articles to show the development of the author’s work over his/her academic career. The articles have been selected to address both theoretical issues and practical implications in English language teaching for in-service and pre-service ELT professionals, as this series is intended to not only help foreign language teachers develop professionally, but also serve as textbooks or recommended reading in teacher training institutes in China and other parts of Asia.

Following the trajectory of each author’s own research and teaching career (an entire lifetime in some cases), each book provides readers with a vivid snapshot of the development in the author’s perspectives on the issues addressed, reflecting the changes in theory, research and practice that have occurred in the specific area of inquiry over a period

of time. It is our hope that this series will contribute to a more extensive knowledge base and constructive disciplinary growth for the ELT field.

This book by Diane Larsen-Freeman contains a representative collection of the author's major works in her splendid career of half a century as a pioneering and leading researcher and scholar who is devoted to the research and praxis of second language acquisition (SLA).

In this book, the author shares with the readers the story of her intellectual journey, which started as a young university graduate working as a U.S. Peace Corps volunteer teaching English in a secondary school in Malaysia to children whose mother tongue was Hakka Chinese; the story includes how her initial EFL teaching experience inspired her to pursue graduate studies at the University of Michigan, and how the "cognitive revolution" in the 70's aroused her curiosity about L2 learners' interlanguage. She recalled how her research challenged the "established" ideology of grammar teaching and the understanding of development of SLA, and how other scholars' work on psycholinguistic, sociolinguistic and critical awareness of language and power reinforced her belief that the SLA field needed a more dynamic, adaptive and non-linear view of language and language learning. She continues to tell the readers how many of the complex, unanswered questions that arose from numerous SLA research studies compelled her to continue breaking new grounds, in exploring and eventually advancing a new theory — Complexity Theory (CT). Ultimately, she talks about how she gained further insights into language development as a creative act and the importance of respecting the creativity of all language users, including language learners. The book ends with a chapter where she sums up her most current perspectives on CT and the impact of multilingual and translanguaging on second language development (SLD). Using Larsen-Freeman's words, "what I have perceived as an expanding scope of the field has created in me the desire for a more comprehensive, dynamic, multifarious, yet holistic, account of SLD" (p.452).

The 17 carefully selected articles, along with an introduction and a conclusion, arranged in a chronological order, clearly illustrate not only the evolution of the author's own perspectives on SLA, but also the ground-breaking, field-advancing contributions she has made to the field of Applied Linguistics, changing the lenses through which we understand

language and SLD. What is unique about this book is that each chapter ends with an engaging and thought-provoking commentary which provides a seamless connection between the critical issues discussed in the current chapter and those to be addressed in the next one. There is no better way indeed to depict the ever expanding evolution of the SLD!

Over the past 50 years, few scholars have contributed more to our understanding of the evolution of SLA than Diane Larsen-Freeman. Larsen-Freeman's five-plus decades of field-advancing research and publications have opened up a whole new way of investigating second language development. This book is indeed an inspirational manifesto to the field of SLD.

It is a true privilege to include this book in the *Foreign Language Teacher Education and Development — Selected Works of Renowned TESOL Experts* as part of its growing list of valuable teacher development resources for our readers.

Yilin Sun  
Seattle  
October 2017



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# Chapter I

## Introduction

I am grateful for this opportunity to reflect on my long intellectual journey as it is captured in this selection of 17 of my publications. I have had a very satisfying career for five-plus decades now. My career began in 1967 when, after graduating from a university, I became an English as a Foreign Language teacher in Sabah, Malaysia. I was a U.S. Peace Corps Volunteer, and as such, I was given a two-year assignment. Mine was to teach English in the Government Secondary School of Tawau, East Malaysia. Every morning, I taught English to children who were studying it as one of their school subjects. The children spoke Hakka Chinese as their home language.

In the afternoon, I taught English to a “bridge class”. It was given this name because the students in this class were bridging from Chinese-medium instruction to English-medium instruction. It is worth noting that due to Malaysia’s legacy as a former British colony, my students in Borneo were destined to take the Cambridge Overseas exams, for which I, along with other teachers, worked to prepare them. To this end, I also taught precis-writing to an upper-level advanced class.

I was given two textbooks to use with the younger students. We teachers called them the “red book” and the “green book”, and they were part of the University of Michigan’s Rainbow Series. The books were meant to support teaching dialogues through mimicry-memorization and conducting drills of various sorts. Teaching the “bridge class” involved giving much more attention to reading and writing. The upper-level class practiced writing precis, again and again, with the aim of earning a good mark on the Cambridge Overseas Examination.

I had an exceptional time in Malaysia, and I will be ever grateful that my intercultural experience there launched me on my international career. I returned home with another gift — the gift of many questions: Had all my efforts drilling my students paid off? What about their efforts? What had my students learned? How had they learned? Was there a way that I could teach a language that would be more harmonious with my students’ natural language learning? Seeking answers to these questions prompted

me to enter graduate school. I chose to matriculate at the University of Michigan, not because the textbooks that I had taught from were published there, but because of its reputation in the area of applied linguistics. Its reputation was in part due to the fact that its English Language Institute was established by Charles Carpenter Fries as the first of its kind in my country. I entered a Master's program in linguistics, with a specialization in TESOL. I also had the opportunity to teach a different audience — this time adult students living in the community.

When I arrived in Ann Arbor, Michigan at the beginning of the 1970s, there was a great deal of political unrest in my country. Aside from what was happening in the outside world and on our campus, there was also turmoil within linguistics. Linguist Noam Chomsky had challenged the prevailing behaviorist view of language learning at the time — that language is acquired through conditioning: the association of a particular stimulus with a particular response through reinforcement. First, Chomsky pointed out that speakers of a language were able to create new utterances and to understand them. Therefore, they had to have the mental “competence” to generate and understand novel utterances. Such competence, Chomsky asserted, must consist of a set of rules, later termed a “universal grammar”, which was said to capture the regularities underlying all languages spoken in the world. Second, he argued that because it appeared that children acquired their native language relatively quickly while being exposed to less-than-optimal input and without having their errors corrected, it must be that such a grammar was innate.

In short, it was the time of the “cognitive revolution”, and I found it exhilarating. I was thrilled by the possibility of there being an innate or “built-in syllabus”, which S. Pit Corder (1967) had speculated to exist. If this were so — I thought — if we could align our course syllabi to it and teach in a way that was consistent with the natural language acquisition process, I might be able to accomplish my goal of teaching more harmoniously with my students' learning. My enthusiasm blossomed with the findings of first language (L1) acquisition researcher Roger Brown (1973). Brown's research showed that there was a common acquisition order for 14 English grammatical morphemes across the three children he studied. Then, too, about this time, publications such as Nemser's approximative systems (1971) and Selinker's interlanguage (1972) emphasized that second language learners had their own system of language, one apart from the native language and the target language. No

longer was learning thought to be the result of mimicry and behavioral reinforcement; learners were said to be discovering for themselves the grammar of the language to which they were exposed. Errors were not perceived in a negative light; instead, errors were seen to be evidence of learners' testing hypotheses about the rules of the language they were learning.

Excited by this turn of events, I decided to devote my doctoral dissertation research to studying the interlanguage of second language (L2) learners of English. Specifically, I sought to determine if my research findings would replicate the acquisition order of grammatical morphemes that had been found for young ESL learners (Dulay & Burt, 1974) or whether the reported order was simply an artifact of the instrument that was used for most of the studies at the time, the Bilingual Syntax Measure (BSM). When you read the first article in this collection, you will see that I did find a positive correlation with the oral production tasks in my study, but clearly there was also a task effect, as illustrated by the learners' different performance on the reading and writing tasks. Stephen Krashen (1978) explained the uneven performance by saying that with the reading and writing tasks, learners can monitor their performance and therefore, the order on these tasks was not the spontaneous, natural one. In addition, I found that the L1 had some influence, so the order was clearly not universal. There was also individual variability — not everyone performed identically. Nevertheless, while correlation cannot be equated with causality, the positive correlation between the BSM and my oral production tasks, what I came to call an accuracy order rather than an acquisition order, warranted an explanation.

After considering many explanations, I found a significant positive correlation between the oral production order and the frequency order in English native speaker speech. There were no electronic corpora available in those days, so for the morpheme count for native speaker speech, I turned to the morpheme frequencies in the parental speech from Brown's study. I later found a positive correlation by analyzing the speech of two ESL teachers speaking to their students (Larsen-Freeman, 1976). What caused me some consternation, however, was my finding that there was a significant positive correlation between the accuracy order and the frequency of morpheme use in adult native speaker speech. Frankly, I did not know what to do with this finding. On the one hand, it could easily have been seen to be evidence in support of behaviorism and stimulus-response conditioning. On the other hand, it could be said to support

cognitivism. In other words, it could be that frequently-occurring morphemes give learners greater opportunity to figure out the rules. In either case, due to the variability, it seemed that L2 acquisition could not be seen to be the product of an innate syllabus. My work taught me an important lesson. Frequency effects may be important, but we still need a theory in order to interpret our findings. I will return to this lesson later in this book.

A related endeavor at this time, following the example of L1 acquisition researchers, involved looking for developmental sequences in second language learners. Developmental sequences differ from acquisition orders in that they are concerned with single areas of syntax. For example, a significant project was undertaken by Cazden, Cancino, Rosansky, and Schumann (1975), who investigated English negation development in six Spanish speakers learning English. In the intellectual spirit of the day, researchers sought to identify universal sequences of development, in some cases more successfully than in others. Another significant study, this time conducted in Germany (Meisel, 1977) on the interlanguage of guest workers learning German naturalistically, also established a common order of acquisition of certain structures in German.<sup>1</sup>

What I learned from the morpheme research was that there was a clear interaction between the learner and the environment. While the morpheme research was not very sophisticated — unacceptably so by today's standards — at the time, the notion that we should look to characteristics of the linguistic environment to explain learners' performance was renewed. Evelyn Hatch was one of the leading proponents of the need to do this. Writing in 1978 (p.409), Hatch observed, "one learns how to do conversation, one learns how to interact verbally and out of this interaction syntactic structures are developed". Such comments inspired me to edit my first book, *Discourse Analysis and Second Language Research* (Larsen-Freeman, 1980), and Michael Long to conduct research for his dissertation on the role of input and interaction in second language acquisition (SLA) (1980). Many other scholars have followed, of course, and the nature of the input and interaction in SLA has been fertile ground to plow.

Earlier, I mentioned variability in learner performance. Starting from its earliest days, there has been a bifurcation in the field (Hatch, 1974), with some researchers focusing on the process of SLA and others on second language learners, especially on the question of their differential success, i.e. why second language learners differed from the first in their level of achievement and why second language learners differed among

themselves. Over the years, there has been abundant research reporting on learner individual difference factors, such as age, aptitude, attitude, motivation, personality, strategies, and cognitive style. It is, of course, beyond what I can do in this brief introduction to discuss what we have learned from such important research here. What I can say, though, is that individual differences are usually studied as group phenomena. One group of learners, e.g. highly motivated learners, are compared with another group of lesser motivated students. In addition, there have been a number of important case studies in the field, focusing on learners as individuals. I believe that we especially need more of the latter to act as “correctives” on leading theories of the day. I will return to this point later.

One other important influence in the evolution of SLA research, which I should call attention to in this Introduction, is the increased attention given to the social dimension of language acquisition. As I have already mentioned, the modern study of SLA began in the 1970s and was born out of the cognitive revolution. Certainly, there have been researchers who were trying to direct the field to more socially-situated positions (e.g. Tarone, 1979), but much of the original research and much carried out since then has focused on the cognitive or psycholinguistic understanding of SLA. However, beginning in the 1980s and expanding in the 1990s and beyond, attention has been given to more socially relevant matters. For example, researchers have attempted to understand changes in learners’ social participation in the L2-speaking communities to which they aspire to belong as they move in from a marginal status to a less-peripheral one. Along with these foci has come a heightened “critical awareness”. This awareness concerns issues of power and ideology — e.g. which languages are recognized and taught and which are not — and inequitable practices — e.g. denying certain populations access to instructed language study where their L1 is used before they are L1-literate — can have profound consequences for language learning success. I will discuss these powerful influences in the field in more detail later in this book.

As time went on, I personally wrestled with other professional issues as well. I was concerned that simply multiplying the number of factors we had to take into account of was not getting us closer to understanding the SLA process. Moreover, experimental attempts to find statistical significance by controlling all but one of the factors yielded findings of suspect ecological validity. Besides, I decried the reductionism implicit in such attempts, i.e. that we could unravel the mysteries of the SLA

process one by one and then add them up to come up with an overall understanding. I was also convinced, especially given the individual variability in the process I observed, that language learning was not a matter of finding or replicating a universal L2 system in the head, nor was language teaching a matter of transposing such a system from the teacher's head to that of the learner's. At the very least, I reasoned, we needed a more dynamic view of language and its learning. Ultimately, these concerns led me to consider and commit to a new theory, Complexity Theory, about which I will have much to write in this book.

Following this Introduction is one of my early publications — on my attempt to explain the morpheme “acquisition” order. After it, and after every other article in this volume, I will comment in order to show what I have learned and how my thinking has evolved. As you read, I ask that you attempt to understand each article in its own time. It is not difficult to read an article published decades ago and to find fault with it using today's consciousness. However, attempting to understand what motivated a particular position at a particular time is a good scholarly practice, I think.

I should add one other caveat to this Introduction. The study of SLA was initiated to investigate the study of “natural”, i.e. untutored language acquisition. It was recognized early on that instruction introduced a number of other variables that made understanding a complex process even more complicated. Much later, an offshoot to this central tendency was established, which was called “instructed second language acquisition”. Much of the current review, however, deals with natural SLA while recognizing that the effects of instruction cannot just be layered on after we figure out the natural process. That said, I, personally, have always been interested in teaching. Thus, in some of my writings and in some of my commentary in this book, pedagogical implications of SLA research will be identified.

Perhaps the subtitle to this book is already clear: the journey of my development as an SLA researcher and theoretician has been one of continuous expansion, in parallel with the field. We have come to realize that the SLA process is multidimensional and that no simple explanation will suffice. I will return to this theme of expansion throughout the remainder of this book.

## **Notes**

1. There is a geographic limitation in what I present in this book, as initially



much of the work that was conducted as SLA research was done in Canada, the United States, and Western Europe. This has changed, and now more SLA research is being carried out across the world.

## References

- Brown, R. (1973). *A First Language*. Cambridge, MA: Harvard University Press.
- Cazden, C., E. Cancino, E. Rosansky & J. Schumann. (1975). *Second language acquisition sequences in children, adolescent and adults*. Final report submitted to the National Institute of Education. Washington, D.C.
- Corder, S. P. (1967). The significance of learner's errors. *International Review of Applied Linguistics*, 5(4): 161–170.
- Dulay, H. & M. Burt. (1974). Natural sequences in child second language acquisition. *Language Learning*, 24: 37–53.
- Hatch, E. (1974). Second language learning-universals? *Working Papers on Bilingualism*, 3: 1–17.
- Hatch, E. (1978). Discourse and second language acquisition. In E. Hatch (Ed.), *Second Language Acquisition: A Book of Readings* (pp.402–435). Rowley, MA: Newbury House.
- Krashen, S. (1978). Individual variation in the use of the monitor. In W. Ritchie (Ed.), *Second Language Acquisition Research* (pp.175–183). New York, NY: Academic Press.
- Larsen-Freeman, D. (1976). Teacher speech as input to the ESL learners. *UCLA Workpapers in TESL*, 10: 45–49.
- Larsen-Freeman, D. (Ed.). (1980). *Discourse Analysis in Second Language Research*. Rowley, MA: Newbury House.
- Long, M. (1980). Input, interaction and second language acquisition. Unpublished Ph.D. dissertation, University of California at Los Angeles.
- Meisel, J. (1977). The language of foreign language workers in Germany. In C. Molony, H. Zobl & W. Stölting (Eds.), *Deutsch im Kontakt mit anderen Sprachen* ("German in Contact with Other Languages") (pp.184–212). Kronberg/Ts: Scriptor.
- Nemser, W. (1971). Approximative systems of foreign language learners. *International Review of Applied Linguistics*, 9: 115–224.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10: 209–231.
- Tarone, E. (1979). Interlanguage as chameleon. *Language Learning*, 29: 181–191.



# Chapter 2

## An Explanation for the Morpheme Acquisition Order of Second Language Learners

Originally published as: Larsen-Freeman, D. E. (1976). An explanation for the morpheme acquisition order of second language learners. *Language Learning*, 26(1): 125-134.

Second language acquisition researchers Dulay and Burt (1974a) found “virtually the same” order of acquisition of 11 English morphemes by young Chinese and Spanish-speaking ESL students as measured by the children’s production of these morphemes in obligatory contexts in elicited speech.

Shortly thereafter, Bailey, Madden and Krashen (1974), utilizing the same procedure, corroborated this acquisition order<sup>1</sup> of grammatical morphemes (using eight morphemes from a 1973 Dulay and Burt study) for adult learners from disparate language backgrounds.

Speculations were made to account for the common morpheme order, but an acceptable explanation was not found.

Since these morpheme acquisition studies employed the Bilingual Syntax Measure (Burt, Dulay & Hernandez, 1973) to elicit speech data, Larsen-Freeman was prompted to carry out her own investigation to discover if:

1. the same morpheme order would be found to exist if different data collection procedures were utilized;
2. the data from other collection procedures would be useful in helping to explain the morpheme order the Bilingual Syntax Measure (hereafter the BSM) consistently elicits.

A battery of five tasks—reading, writing, listening, imitating and speaking (the BSM) was administered to 24 adult learners of ESL. There were six subjects from each of four native-language backgrounds—Arabic, Japanese, Persian and Spanish. The data elicited by these tasks were scored for morpheme suppliance in obligatory contexts (Brown, 1973).

The Group Score Method (Dulay & Burt, 1974a) was used to order the morphemes. To test for the effect of time and language instruction on morpheme ordering, this entire procedure was repeated after an interval of two months.

The results of this study showed individual variability and native language background to exert some influence on the way morphemes were ordered by language groups within a task. Despite these influences, significantly high Kendall's co-efficients of concordance were found among the morpheme sequences produced by the various language groups for each task, thus confirming what previous researchers had reported, i.e. language background did not have a significant effect on the way ESL learners order English morphemes.

This same high degree of association determined for the morpheme orders produced by language groups within a task was not found when the morpheme sequences for the different tasks were compared. The morpheme sequences from the oral production tasks (speaking and imitating) did, however, correlate with those of Dulay and Burt (1974a) and with each other at both phases.

**Table 1: Spearman rank correlation coefficients for ten morphemes**

	Phase I	Phase II
Speaking Task/Imitating Task	.59 <sup>b</sup>	.75 <sup>a</sup>
Dulay and Burt 1974a/Speaking Task	.87 <sup>a</sup>	.72 <sup>b</sup>
Dulay and Burt 1974a/Imitating Task	.60 <sup>b</sup>	.70 <sup>b</sup>

<sup>a</sup>p<.01

<sup>b</sup>p<.05

Since some of the findings of this study have already been dealt with elsewhere (see Larsen-Freeman, 1975b), the remainder of this chapter will focus on an attempt to explain why ESL learners consistently exhibit the oral production morpheme order that they do.

In pursuit of an explanation (or explanations, as it is certainly feasible that more than one factor contributes to the morpheme acquisition order) for this common order, the data from the study just described were considered in light of conceivable determinants.

One possible explanation for the similar oral-production morpheme sequence is that learners acquire morphemes in an order of increasing

syntactic complexity. It seems reasonable to expect that the more complex the morpheme, the later its acquisition is likely to be. Thus, for this explanation to be substantiated, the first structure mastered would have to be the simplest syntactically.

In order to put this suggestion to an empirical test, some measure of syntactic complexity is required. The psycholinguistic literature is replete with studies which compare two or more structures and conclude one is more complex than the other(s) because of some quantifiable measure, most often the delay of subject response to one of two stimuli structures (for example, Wason, 1961; Miller & Isard, 1964; Gough, 1965). Rather than isolated examples, a theory of syntactic complexity is needed which can encompass all grammatical entities down to the morpheme level. Unfortunately, to my knowledge, no such theory exists. Despite this problem, a theory in Transformational Grammar designed to explain different sentence complexities, the "derivational theory of complexity", was successfully adopted and modified by Brown (1973) for analysis of morpheme complexity.

Rather than simply counting the number of transformations involved in a derivation in order to determine complexity, Brown employed a construct he termed "cumulative complexity". Cumulative complexity helps to avoid the assumption that each transformation contributes a uniform increment of complexity. Brown successfully used the notion of increasing syntactic complexity to explain the morpheme order he found for his three subjects—children learning English as their native language. Since the morpheme order Brown's subjects produced does not correlate with the second language acquisition order, syntactic complexity seems to be an inadequate explanation for our own purposes.

That the learners acquire morphemes according to increasing semantic complexity seems also to be an implausible explanation for the order in which second language learners acquire morphemes. Brown acknowledges that the evidence that enabled him to claim syntactic complexity was the cause for his subjects' morpheme acquisition order can be "alternatively interpreted as demonstrating that semantic complexity is a determinant of an order of acquisition" (1973:379).

A developing cognition in children which is manifest in their speech by their supplience of certain morphemes before others seems a reasonable explanation for the morpheme sequence first language learners exhibit. Replication of such a sequence is hardly an enticing explanation for any

order the adult second language learners produce since the orders of first and second language learners are so radically different.

Could it be, then, that the order found in second language acquisition is based on phonological complexity? This might help to account for why the different tasks, some not phonic, produced different orders. This explanation is not credible since morphemes with the same allomorphs are not clustered together, but possess diverse ranks in the morpheme sequence. Table 2 shows, for example, the short plural morpheme in the speaking task at Phase I is ranked fifth whereas the possessive morpheme (NP's), with identical phonological forms, occupies the tenth rank.

Perhaps the use of similar ESL texts among second language learners is instrumental in giving rise to the common morpheme order. The contradictory evidence here is that Bailey, Madden and Krashen found a high degree of agreement with regard to morpheme sequencing among the eight different classes from which the population sample for their study was drawn, even though *each* had a different teacher, different textbook, different syllabus and was at a different level. Thus learner experience with particular language instruction does not seem to be a satisfactory explanation either.

**Table 2: Rank order of morphemes on speaking and imitating task at both Phases**

Phase	Morpheme	Speaking	Imitating
I.	cop	2	3
	prog	1	1
	aux	4	9
	art	3	2
	s.plu	5	8
	poss	10	10
	i.past	8	4
	3rd sing	7	7
	l.plu	9	5
II.	r.past	6	6
	cop	1	1
	prog	2	2
	aux	3	4

(continued)

Phase	Morpheme	Speaking	Imitating
	art	4	3
	s.plu	5	8
	poss	6	10
	i.past	7	5
	3rd sing	8	7
	l.plu	9	6
	r.past	10	9

Even though the subjects learning ESL from the various morpheme acquisition studies represent different age groups, possibly they experienced similar affective variables. It is conceivable that shared psychological factors cause learners to exhibit a common morpheme order. But a recent study by de Villiers (1974) provides challenging evidence to this explanation, too. She examined the speech of adult non-fluent (Broca) aphasics for the occurrence of 14 grammatical morphemes. Of the eight morphemes which appeared regularly, six were identical to those Bailey, Madden and Krashen had studied in adult ESL learner speech. A highly significant correlation ( $r = .94, <.01$ ) exists between the morpheme order of these two groups of adults.

While it is not impossible that aphasic adults and adult second language learners undergo a similar psychological experience in speaking English, it is difficult to imagine that there is sufficient commonality between the two groups to allow almost identical morpheme orders, particularly since the morpheme order of ESL learners is an acquisition order whereas the aphasic adults' sequences result from a functional disorder.

Slobin (1971) has proposed "operating principles" to account for the order of acquisition of structures in children's language. He inferred these operating principles after a perusal of a vast amount of linguistic output. He alleged the operating principles existed as strategies in the minds of language learners. A typical operating principle might be: "Pay attention to the ends of words." (p.335) Although no one has as yet developed a hierarchy of operating principles (Dulay & Burt, 1974b) from which successive ones could be applied when the conditions were appropriate, if an order of application of these principles were to be developed, this might help explain an acquisition sequence. At this point, however, it is premature to rely on operating principles as a solution to our investigation since the list is inadequate to explain an entire sequence; without an

established hierarchy, a random application of the strategies would result in contradictory actions.

If underlying complexity, cognitive maturity, learner type and experience, and processing strategies all seem ineffectual by themselves to explain second language acquisition morpheme sequences, maybe an examination of the surface forms of the morphemes would be enlightening. The progressive morpheme, for instance, was ranked among the highest morphemes. One reason for this might be its [+syllable] feature which would give it a heightened saliency. Features of [ $\pm$  perceptual saliency] might influence the rank of a morpheme in the oral production tasks.

Perceptual saliency features of morphemes would include whether or not a morpheme were bound, stressed or a syllable. Other factors might be the length of a morpheme, its contractibility or whether or not any vowels it contains undergo vowel reduction in fast speech.

Finally, its position in a word if it is a bound morpheme and its position in a sentence, might affect its perceptibility. Although admittedly the amount and type of English input to the learner might vary according to the situation, there are probably stable characteristics of morphemes which would be cogent for all learners.

By now, however, the pattern should be patently clear: Perceptual saliency does not account for all the morpheme ranks. The copula, for instance, which presumably has low perceptual saliency, is ranked just after the "ing" on the speaking and imitating tasks at Phase I. There are examples from the other tasks, too, which defy an explanation based on perceptual saliency.

Another conceivable explanation based on the input to the learner is the frequency of occurrence of the various morphemes. Hatch (1975), for example, examined the English input a young ESL learner was receiving and noticed with a few exceptions, that the questions the learner was asked most frequently, he acquired first. While Hatch's observation should not be startling, it deserves attention because in the recent trend to disavow any connection between a developmental view of language acquisition and the old habit formation theory, we may have forfeited some valuable insights.

To test the frequency hypothesis, an examination was made of the number of obligatory contexts for the various morphemes in the transcripts of the subjects on the speaking task (see Table 3).

Indeed, the morphemes with the highest ranks, the article, auxiliary,



progressive and copula, all seem to occur far more frequently than the other morphemes with the exception of the short plural morpheme which on the speaking task, at least, occupies a medial rank.

The reason the morpheme ranks obtained from the speaking task correlated with the number of times the morpheme was supplied in that task could be that when a subject has more opportunities to attempt a morpheme on a given task, incremental learning can take place. As a result, a score for a certain morpheme would increase proportionate to the number of times the morpheme is attempted.

**Table 3: Number of obligatory contexts for all subjects for ten morphemes at both Phases on speaking task**

Morpheme	Phase I	Phase II
cop	108	116
prog	158	168
aux	129	147
art	397	428
s.plu	158	149
poss	59	67
i.past	91	97
3rd sing	81	82
l.plu	63	70
r.past	10	18

However, another explanation is also plausible. Perhaps the frequency counts of morphemes on the speaking task reflect their actual occurrence in real communication. Thus, if a subject encountered certain morphemes more than others, he was likely to score higher on those morphemes, all other things being equal.

Since the frequency of occurrence of the morphemes was controlled in all but the speaking task, an independent measure of morpheme frequencies was needed. As there was no general morpheme frequency count available, the morpheme frequencies Brown (1973) determined for the three sets of native English-speaking parents of the subjects in his study were used (see Table 4). Brown's counts were made from transcripts of recordings taped during the periodic visits by researchers to the subjects' homes.

**Table 4: Frequency of certain morphemes as listed  
in Brown's (1973) Table 52**

Morpheme	Adam's Parents	Sarah's Parents	Eve's Parents
Uncon. cop	57	65	53
Con. cop	164	100	126
prog	65	28	67
Uncon. aux	35	5	16
con. aux	30	13	52
art	233	157	162
plu	57	57	33
poss	25	16	30
i.past	71	45	25
3rd sing	25	19	7
r.past	28	9	7

Since the plural morpheme in Brown's study was not divided into long and short forms as it was in the present study, nine morpheme frequencies in the parents' speech were summed (see Table 5). The two auxiliary and two copula categories, were combined as they were not scored separately in this study. The morphemes were ranked in descending order of frequency and Spearman rank correlation coefficients were computed between this order and second language acquisition researchers' order.

When the frequency order of morphemes based on the speech of the parents of Brown's subjects was compared with the morpheme order of second language acquisition researchers, significant correlations were found to exist (see Table 6).

Thus, the tentative conclusion is that morpheme frequency of occurrence in native-speaker speech is the principle determinant for the oral production morpheme order of second language learners. This conclusion must remain tentative until second language acquisition orders are compared with morpheme frequency counts from the speech of a larger sample of native speakers using different registers in conversing about a variety of topics. The conclusion is believed defensible, however, because:

1. The morpheme frequencies Brown reports are probably fairly representative of their actual occurrence in native-speaker speech. Brown states that there are significantly high correlations for the morpheme frequency orders among the three sets of parents and each set had its

speech recorded independently at several different times.

2. The morphemes have disparate frequency ranks. The article, for example, occurred 552 times among the three sets of parents while the regular past tense morpheme occurred only 44 times. It is difficult to imagine these morpheme ranks being reversed, or even significantly altered, in a more general morpheme frequency count.

**Table 5: Frequency order of morphemes based on parents of Brown's subjects**

1. cop (con. and uncon.)
2. art
3. prog
4. aux (con. and uncon.)
5. plural (long and short)
6. i.past
7. poss
8. 3rd sing
9. r. past

**Table 6: Spearman rank correlation coefficients**

Second language acquisition morpheme difficulty order	Frequency order of morphemes in native-speaker speech (Brown, 1973)
Larsen-Freeman Phase I speaking task	.80 <sup>a</sup>
Larsen-Freeman Phase II speaking task	.93 <sup>a</sup>
Larsen-Freeman Phase I imitating task	.53
Larsen-Freeman Phase II imitating task	.87 <sup>a</sup>
Dulay and Burt (1974a) <sup>c</sup>	.87 <sup>a</sup>
Bailey, Madden and Krashen (1974) <sup>d</sup>	.79 <sup>b</sup>

<sup>a</sup>p < .01

<sup>b</sup>p < .05

<sup>c</sup>Dulay and Burt(1974a)

<sup>d</sup>Bailey, Madden and Krashen (1974)

- |              |              |
|--------------|--------------|
| 1. art       | 1. prog      |
| 2. cop       | 2. cont. cop |
| 3. prog      | 3. plural    |
| 4. s.plu     | 4. art       |
| 5. aux       | 5. cont. aux |
| 6. r.past    | 6. i.past    |
| 7. i.past    | 7. 3rd sing  |
| 8. l.plu     | 8. poss      |
| 9. poss      |              |
| 10. 3rd sing |              |

3. Morpheme frequencies, unlike lexical item frequencies, are probably less context-bound and would therefore be fairly stable in relation to one another so the morpheme frequencies in the parents' speech are probably indicative of overall frequencies.

If the frequency of occurrence of morphemes in native-speaker speech is confirmed as the main reason why learners acquire morphemes in a certain order, the implications are intriguing.

It would appear that the S-R theorists have been vindicated at least with regard to morpheme acquisition — the more frequently a stimulus is encountered, the more rapidly it will be acquired. However, since grammatical morphemes have limited semantic weight, perhaps it is not in morpheme acquisition where the learner's cognitive involvement is evident in the second language learning task. Perhaps the creative talent of a second language learner is reserved for more complicated structures, while the learner concentrates simply on matching native-speaker input for structures at the morpheme level.

Resolution of these speculations will have to be postponed until more evidence is accumulated. Meanwhile, the tentative explanation for the second language acquisition oral production morpheme order provided in this chapter will hopefully free us to move on and address these new issues.

## Notes

1. The term *acquisition order* is commonly used by researchers; however, the term *accuracy order* may be more precise in describing a measure of the percentage of times a subject *accurately* supplies a morpheme in an obligatory context.

## References

- Bailey, N., C. Madden & S. Krashen. (1974). Is there a "natural sequence" in adult second language learning? *Language Learning*, 24: 235–243.
- Brown, R. (1973). *A First Language: The Early Stages*. Cambridge, MA: Harvard University Press.
- Burt, M., H. Dulay & E. Hernandez. (1973). *Bilingual Syntax Measure* (Restricted Edition). New York: Harcourt Brace Jovanovich.

- de Villiers, J. (1974). Quantitative aspects of agrammatism in aphasia. *Cortex*, 10: 36–54.
- Dulay, H. & M. Burt. (1973). Should we teach children syntax? *Language Learning*, 23: 245–258.
- Dulay, H. & M. Burt. (1974a). Natural sequences in child second language acquisition. *Language Learning*, 24: 37–53.
- Dulay, H. & M. Burt. (1974b). A new perspective on the creative constructive process in child second language acquisition. *Language Learning*, 24: 253–278.
- Gough, P. (1965). Grammatical transformations and speed of understanding. *Journal of Verbal Learning and Verbal Behavior*, 4: 107–111.
- Hatch, E. (1975). Linguistic universals and second language acquisition. Paper read at Sixth Annual Conference on Applied Linguistics. University of Michigan, Ann Arbor.
- Larsen-Freeman, D. (1975a). The acquisition of grammatical morphemes by adult learners of English as a second language. Unpublished doctoral dissertation, University of Michigan, Ann Arbor.
- Larsen-Freeman, D. (1975b). The acquisition of grammatical morphemes by adult ESL students. *TESOL Quarterly*, 9: 409–430.
- Miller, G. & S. Isard. (1964). Free recall of self-embedded English sentences. *Information and Control*, 7: 292–303.
- Slobin, D. (1971). Developmental psycholinguistics. In W. Dingwall (Ed.), *A Survey of Linguistic Science*. College Park, MD: University of Maryland.
- Wason, P. (1961). Responses to affirmative and negative binary statements. *British Journal of Psychology*, 52: 133–142.

## Comment after Chapter 2

As I wrote in the Introduction to this volume, learning another language involves a great deal more than learning its grammatical morphemes. Of course, it was never the intent of those investigating the morpheme acquisition orders of L2 learners to suggest otherwise. Instead, researchers were inspired to seek universals in second language acquisition. The prospect of finding them was exciting, and it was, frankly, somewhat disappointing when I discovered that there was also variability in the order. Still, what was intriguing was that what commonality existed in learner performance could be traced to the frequency in the input to which the learners were exposed.

In the meantime, the language teaching field at large was being challenged to think about the goal of language instruction. Dell Hymes' notion (1972) of communicative competence, along with the ideas

of British functional linguists such as Michael Halliday (1973), made many in the field recommend teaching language, not only for linguistic competence, but also for communicative purposes (Widdowson, 1975).

In my mind, the combination of understanding the importance of the linguistic environment for SLA and the growing emphasis on communicative competence led me (and others, of course) to more carefully examine the nature of communicative language. In my first plenary address, at the International TESOL Conference in Detroit in 1981, I addressed this theme under the title “The ‘What’ of Second Language Acquisition”, the next chapter reprinted in this book. For my plenary address, I decided to inventory characteristics of communicative language. I began with an example of a circus ringmaster greeting his audience. The purpose of the example was to show how much the ringmaster needed to know simply to welcome his audience. It turns out, it is quite a lot.

In order to begin to address what an L2 learner needed to learn, I pointed out other “whats” that needed to be considered: the “what” of the input to which the learner is exposed, the “what” of the learner’s native language, and the “what” of any other language the learner knows. There was indeed much to account for in all these “whats” — not only linguistic structures, but also speech acts, the propositional content of an utterance, interactional patterns, and strategic competence.

I also selected and reported on some of the SLA research that was being conducted in each of these areas and then suggested 10 teaching implications. I may have overwhelmed my audience; however, certainly that was not my intention. As I say at the end of my address, my remarks were meant as an invitation to the audience to join me in “A Celebration of Language” (the theme of that year’s TESOL Convention) and importantly to urge teachers in the audience to share their enthusiasm for language with their students.

## **References**

- Halliday, M. A. K. (1973). *Explorations in the Functions of Language*. London: Edward Arnold.
- Hymes, D. H. (1972). On communicative competence. In J. B. Pride & J. Holmes (Eds.), *Sociolinguistics* (pp.269–293). London: Penguin.
- Widdowson, H. G. (1975). *Teaching Language as Communication*. Oxford: Oxford University Press.

# Chapter 3<sup>1</sup>

## The “What” of Second Language Acquisition\*

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It is becoming quite commonplace to acknowledge that the acquisition of a language involves more than the acquisition of linguistic structures. It involves learning how to use the language appropriately in a social context as well. From the vantage point that this broadened perspective affords one can't help but marvel at what an intricate, versatile phenomenon language is. And yet, despite the many factors that must be taken into consideration for language to be used appropriately within a context, skillful users are capable of transmitting the most subtle nuances of meaning through it. I have come to appreciate language as I never have before.

When I look back over my years of education, I remember with fondness a few exceptional teachers I have had. I recall that one of the qualities these few had in common was an infectious enthusiasm for their subject matter. I never will be enamored of math, but my 10th grade teacher gave me an appreciation for math that I had never before felt. His was such an accomplishment that for a brief interval I even entertained the ridiculous thought of taking more than the required math courses! My teacher made math come alive for me! What better way of celebrating language than by rekindling our own appreciation of it here and returning to our classrooms recommitted to conveying our enthusiasm to our students. I would like to contribute to this process by asking you to consider what it takes to be able to communicate. Following this, I will share with you some research that is being carried out on aspects of developing communicative competence in a second language. Finally, I will make explicit some implications that this research has for me as a teacher.

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\* Plenary Address.

## ASPECTS OF COMMUNICATION

What does a person have to know to be communicatively competent? We are told today that to be communicatively competent, one must control not only the forms of a language but also the functions of the forms, and be able to use them appropriately in a context. But what does *appropriate* mean? Let us undertake to answer this question by considering an example. The analysis of the example is my own, but I have drawn liberally upon the work of others<sup>2</sup> for their insights into communicative competence.

The ringmaster of a circus steps to the center ring under a big tent and begins: “Ladies and gentlemen and children of all ages.” What did the ringmaster have to know in order for him to utter these two phrases appropriately? At one level he had to have control of the formal properties of the language. Perhaps we can enumerate them if we follow the linguists’ heuristic of contrasting what he did say with a malformed version. He could have said: “Ladies and gentlemen and childrens of all ages.” But he didn’t. He obviously had to have control of the morphology of the language.

He could have said: “Ladies and gentlemen and children of ages all.” But he didn’t. He showed that he had a command of the syntax of this formula.

He might have said: “Ladies and gentlemen and children of all ages?” with a rising intonation, but this would have been inappropriate as well because he was not asking a question. Here we see that in order to use this expression correctly he had to have knowledge of the prosodic or suprasegmental features of intonation. He of course would have to make use of other phonological rules as well — in order to correctly produce the segmental sounds of the language. Then, too, if he had said “Ladies *or* gentlemen ...” he would have erred by choosing the wrong lexical item — the exclusive connector *or* rather than the inclusive connector *and*. If he had begun his speech with: “What a great show we have for you today, ladies and gentlemen and children of all ages”, he would have demonstrated an incomplete knowledge of the organizational or discourse rules at the suprasentential level. His line only makes sense if it is the first one in the sequence.

If he had whispered: “Ladies and gentlemen and children of all ages”, he would have been violating paralinguistic appropriateness rules, since one expects a ringmaster to bellow, not whisper.

Finally, if he had said: “Ladies and gentlemen and children of all ages”, while pointing to himself, he would have shown that he did not know the proper nonverbal gesture to accompany this utterance.



Thus, just to avoid violating any of the linguistic rules of the language, he had to have knowledge of and be able to apply morphological, phonological, lexical, syntactic, discourse, paralinguistic, and nonverbal rules. But he needed to know other things as well. He needed to know how to use these linguistic forms appropriately.

He needed to know that the occasion warranted the use of a particular speech act (Searle, 1969) — the function in this case of something we might call an “attention-getter”. Furthermore, he needed to choose from among all the “attention-getters” in his repertoire to determine the right one for the circus setting. He might have used another form like “Quiet everyone!” but he would have violated a politeness constraint and have offended everyone present. He would also have selected the wrong form if he had used instead: “Gals and guys and kids of all ages.” These colloquial terms of address would have been in an inappropriate register or style of formality given the situation.

Of course, he also had to plan the propositional content of his message. He needed to know how to encode meaning. He obviously understood that in order to have his message apply to the entire audience he would have to use terms that included both sexes and all ages. He also deliberately extended the meaning of “children” to invite the adults to be young-at-heart and to enjoy the circus like their offspring. His utterance also revealed that he knew the appropriate content of an attention-getter for this occasion. He didn’t say, “Class, come to order!” an attention-getter for another setting.

This ringmaster was a polished performer. He delivered his lines fluently and perfectly. But suppose on one evening when he began the show he slipped and said: “Ladies and gents ... I mean gentlemen ...” We would say that we had witnessed his “strategic competence” — an ability to use verbal and nonverbal strategies to compensate for breakdowns in his message in order to restore the flow of communication.

Even though, as we have seen, the ringmaster had to attend to many details, his task was a limited one because he had only to concern himself with what he was going to say — he was delivering a monologue. There was no need for him to attend to a partner in a conversation. If some woman in the audience had responded to his attention-getter by yelling out: “It’s sexist to call us ‘ladies’! Please call us ‘women’”, we would have thought her response inappropriate. She had taken a turn to speak when the speech event was not a conversation and she had no right to a turn. On the other hand, if she and an acquaintance were at a restaurant and the

acquaintance had asked her where the ladies' room was, it would have been proper for her to take a turn and make her point about her objection to the use of "ladies" — that is, providing she abided by the paralinguistic rules and didn't yell out her feelings as she did at the ringmaster. In the latter example she would have been taking a turn where the "interactional" rules permitted, indeed demanded, that she speak.

In some ways, perhaps the choice of my example was ill-advised because this utterance is a conventionalized form (Yorio, 1980). As such, the ringmaster had probably memorized his line and did not have to actively apply all the rules we have listed. Yet, every time we create an original sentence in a conversation, we do have to draw upon our knowledge of all the rules we have just identified. In order to fashion our utterance and use it appropriately within a context we must minimally make use of our knowledge of linguistic rules, functions or speech acts, propositional content, interactional patterns, and strategic competence.

## RESEARCH SUMMARY

I would like to turn now to the studies being conducted in these five areas by second language acquisition researchers. The "What" of Second Language Acquisition, the title of this chapter, has traditionally been used to refer to the learner's linguistic product or speech output which researchers study.

Of course, in order to account for *what* the learner is producing in the second language, we need to examine other *whats* as well: *What* is the nature of the input to which the learner is exposed (in our case, the English language)? *What* is the nature of the learner's native language, knowledge of which will influence his or her speech in English? If the learner already is proficient in a second or third language before his or her English acquisition begins, we need to know about these languages as well. Since descriptions of languages have typically embraced only the linguistic aspects of communicative competence, it has become incumbent upon second language researchers to do some basic research—contrastive analyses between English speech acts and speech acts of other languages, for example — before even beginning to consider *what* the learner is producing. I felt it necessary to clarify this because some of the studies I will treat don't attempt to account for the acquisition process at all. They are designed for basic research — to describe the interactional patterns in English or speech acts in Spanish so that researchers will eventually have the essential *baseline* data

with which to explain why the ESL learner is speaking the way he or she is.

It was my original intention to identify and deal with all the studies being done on the three *whats* (the language the learner produces, the learner's native language, and the target language) as reported in the literature on second language acquisition. As I began to compile the studies, however, I realized how lengthy my address would have to be if it were to be comprehensive. I have decided instead, therefore, to report on trends in the research, discussing several studies by way of illustration and citing others when I can. I am not proposing a model of communicative competence in what follows; I offer it instead as a framework that I have found useful in organizing and dealing with the research on acquiring communicative competence in a second language.

## LINGUISTIC ASPECT

I submitted earlier that communicative competence, linguistically speaking, demanded control of rules at all levels from morphological, phonological, lexical, and syntactic rules to discourse rules governing the cohesion (Halliday & Hasan, 1976; Widdowson, 1978) of language at the supra-sentential level. In this category I also included knowledge of appropriate paralinguistic and nonverbal behavior. Of course all along it has been the linguistic domain in which much of the *what* research of second language acquisition has centered. Important research has gone on and is continuing in the areas of syntactic and morphological development.<sup>3</sup> I want, however, to discuss research which is being done from a discourse perspective.

**Morphology.** When Godfrey (1980) conducted an analysis of the errors in English tense morphology produced by ESL learners, he found a large number of errors attributable to the learners' failure to observe discourse constraints—errors resulting from the learners not maintaining tense continuity during a monologue, for example. Godfrey pointed out that these errors would have been overlooked (i.e. would never have been identified as errors) had each sentence produced by the learners been analyzed in isolation. It was only when the learners' speech was viewed from a discourse perspective that the errors were revealed.

**Syntax.** In the area of syntax, Celce-Murcia (1980) and some of her students have been engaged in what they call contextual analysis. They ask: "What is the effect of context on the form of syntactic structures?" And they have designed studies to address questions such as:

- When do native speakers permit the use of uninverted questions in conversational spoken English?
- In what context is the passive voice preferred over the active?

**Phonology.** In the area of phonology, researchers such as Backman (1977; 1979), Gilbert (1980), and Neufeld and Schneiderman (1980) have been investigating the function of prosodic features like intonation. It is a well-established fact that prosodic features play a role in enabling us to differentiate utterance types (questions and statements, for instance) and in emphasizing certain constituents within sentences, but we now recognize the richness of language prosody in connoting other meanings/functions as well. Gasser (1979) includes the following: the identification of the speaker's sex; the division of utterances into information units; the conveying of degrees of certainty; the conveying of the communicative functions of utterances; the marking of the speaker's emotional state; the signaling of humorous, sarcastic, or sexual intent; and the signaling of degrees of formality and the marking of the status relationship existing between the speaker and listener.

A study in the acquisition of *segmental phonology* by Beebe (1980) makes us aware of how narrow our former view of language transfer was. In a study of the pronunciation of American /r/ by Thai learners of English as a second language, Beebe discovered that the learners pronounced the /r/ differently depending upon where it occurred in an English word. This finding may not be surprising in and of itself, but Beebe's explanation of it is. She theorizes that what affected the pronunciation of the /r/ in initial position in a word was the fact that the Thai equivalent for /r/ had social value in the learners' native language in initial position. In other words, the Thai speakers pronounced this phoneme variably in English depending on its sociolinguistic pattern in Thai. Once again we find evidence that a simple contrastive analysis of linguistic features will no longer suffice to explain language transfer from a first language to a second language.

**Discourse.** Reminding us of the inadequacy of simple contrastive analyses, researchers like Schmidt (1980) and Schachter and Rutherford (1979) have discovered that errors sometimes occur in ESL learners' English speech which are due not to interference from the learners' native language at the syntactic level, but rather because the discourse constraints or discourse types of the native language and the target language are at variance. For instance, speakers of Mandarin Chinese, intending to produce an English sentence such as *The 747 is a big plane*, might instead render it as *Airplanes, the 747 is big*. They produce sentences like this because, as

reported by Schachter and Rutherford and based upon the research of Li and Thompson (1976), Mandarin is a topic-prominent language while English is subject-prominent. The subjects make use of the lexical items of English but adopt the strategy of relexification or replacement of the Mandarin words in the discourse pattern with English words.

Since I do not mean to neglect the written modality, I should probably point out that early studies like those conducted by Kaplan (1966/1972) and others on the nonnative rhetorical organization patterns in compositions written by ESL learners would fall into this domain as well. The intent of these researchers is to see if the organizational pattern which ESL learners adhere to in writing English compositions is a product of transfer from their native language. Such studies are an example of research being conducted at the suprasentential or written discourse level.

Another area of investigation which should be conducted on the discourse level, I feel, would include an analysis of the structure of different speech events (Hymes, 1971). What is the difference, for instance, between the discourse structure of a lecture and the structure of the ringmaster's monologue? Could some of the reason for foreign university students' struggles with understanding lectures (even when the students are conversationally competent) be their lack of familiarity with the organizational pattern of an American university lecture?

Falling into this domain is all the research which has been done on the differences between planned and unplanned discourse. Krashen (1977) has observed dissimilarities regarding error types and error frequencies of occurrence between the two. Ochs Keenan (1977) and her students have compared unprepared oral stories with planned, written forms of the same stories to show how monologues are altered.

**Paralinguistic.** In the paralinguistic area (following Wardhaugh, 1972) I include characteristics of the oral modality such as the tempo, the volume, the pitch, the openness, and the degree of clipping of verbal language; I also include nonlanguage vocalizations like laughing, sighing, crying, and yawning.

It takes a long time for children to recognize appropriateness with regard to volume and pitch — a fact I am constantly reminded of when I take my 2½-year-old son to the library — but what about in a second language? Does it take a long time for adults to learn to control the volume/pitch of their voices if the appropriateness levels are not the same in the second language as in their native language? "Agrawal shows that speakers of Indian English use heightened pitch to signal that they want to

take the floor, and [they] are systematically misunderstood by speakers of British English as intending to show anger.” (Tannen, 1981)

Another study in the paralinguistic area was conducted by Palmberg (1979) who examined laughs in second language communication. Palmberg claims to have identified a number of different functions of laughs used by second language learners. They can be used as a joke signal, I-know-this-is-not-correct signal, recognition signal, ignorance/embarrassment signal, pause filler, relief signal, and delight signal. Whether laughs are used for these same purposes in all languages remains to be resolved.

I am also reminded of the recurring problem of one of my colleagues at SIT when she goes to Mexico to supervise our student teachers. Her subdued manner always provokes queries from Mexicans about her health or emotional state. She is neither ill nor melancholy but just quieter than is expected in a Mexican context. Another colleague, raised in an Italian-American family, sometimes finds he has to apologize to people who approach him with trepidation following a spirited meeting because they feel they have angered him, whereas in fact he has simply transferred the paralinguistic features of Italian to English.

**Nonverbal behavior.** Maltby and Richardson (1978:17) observe that “crucial to the concept of communicative competence is the recognition that a speech community shares not only a language but also rules governing nonverbal behavior and that these rules vary significantly from one speech community to another. The members of a speech community are seldom consciously aware of these rules, yet they react strongly when these rules are broken. It is precisely because the rules are not recognized as such on a conscious level that the reaction is so strong”.

Nonverbal action, of course, embraces a whole spectrum of behavior from kinesics (gestures, body movement) — which is usually thought of first — through haptics (touching, physical contact), oculusics (eye movement, eye contact), and proxemics (spacing between interlocutors). Researchers such as Nine-Curt (1975), Taylor (1975), and others (reported in the book by Laver & Hutcheson, 1972) have identified some cross-cultural differences in this area, but much work remains to be done.

## SPEECH ACTS

The second area of awareness that is necessary for successful communication involves the employment of appropriate speech acts. Speech

acts, according to Austin (1962), can be accounted for by a ternary taxonomy: locutionary acts, illocutionary acts, and perlocutionary acts (Fraser, 1978). I will define the second of these three, since most of the research in speech act acquisition in ESL has been directed towards the study of illocutionary acts. "An illocutionary act is an act performed in saying something—acts such as requesting, promising, complaining, ordering, authorizing, and apologizing would be examples." (Fraser & Nolen, 1980) You may have heard this area also referred to by second language acquisition researchers like Fraser, Rintell, and Walters (1980) as the area of communicative competence involving the acquisition of pragmatics.

Schmidt and Richards (1980:138) have noted that "for the purpose of investigating speech acts in the context of second language learning, perhaps the most important question is whether and to what extent the various aspects of speech acts ... are universal". Indeed, of all the research done in this area (and there has been a fair amount) much of it has been directed towards establishing whether or not all English speech acts exist in other languages and if they do, to what extent their forms are comparable. Hatch, Loos, Inoue, Gidden, and Schaefer, for example, are currently engaged in just this sort of endeavor. They are gathering data on the structure of complaints in English, Japanese, and Spanish in order to compare them cross-lingually. They are examining the complaints they collect according to the sociolinguistic variables of the interlocutors' sex, age and status, the situation, and whether the complaints are registered in speech or writing. The next step after their preliminary analysis of the structure of complaints will be to determine whether foreign students recognize the appropriate form for complaints in English.

D'amico-Reisner (1980) has also conducted research to ascertain if expressions of disapproval are culture-specific. She used various situations where one would normally expect an expression of disapproval to elicit data from nonnative speakers of English. One situation she used was the following. She told her subjects: "I am your father. I have come to your house to visit you. I sit on your new couch to read the paper, I lift my legs and stretch them across the couch. You disapprove. Do you say anything? If so, what?" Speakers from Saudi Arabia, Egypt, Kuwait, Vietnam, and Japan chose the no-response option. They would have said nothing to their fathers. Even when the culture did permit an expression of disapproval, it was observed that the form of the expression was determined by the culture of the speaker. The imperative form was used by the English

native-speaker group, but was not even an alternative for nonnative speakers who did respond. They preferred to embed their expression of disapproval in an interrogative or declarative form.

Of much significant work in the speech act area let me at least cite Rintell (1979; 1981) with her work on the different deference levels of requests and suggestion; Borkin and Reinhart (1978) for their work on the difference between “Excuse me” and “I’m sorry”, expressions often confused by ESL students; Walters (1979) for his research on the strategies for requesting in Spanish and English according to the politeness dimension; Fraser (1980), who has observed and reported on the means by which English speakers use nonverbal and verbal insults; Fraser (1981) for his work on apologizing; Fanselow (1977); Politzer etc. (1981); Hamayan and Tucker (1980); Allwright (1980b); and of course Sinclair and Coulthard (1975) for their pioneering efforts at identifying functions in classroom discourse. We should also cite Cohen and Olshtain (1981) and Farhady (1980) for their attempts to create a test of sociolinguistic competence; Manes and Wolfson (1981) for their work on compliments; Wolfson (1979) on pseudo-invitations; Scarcella (1979) on the acquisition of politeness features by second language learners; Schmidt (1979) for his work on the acquisition of English directives by nonnative speakers; Carrell and Konneker’s research (1981) on judgments of politeness made by both native speakers and nonnative speakers when they made requests ranging from the use of a past tense modal embedded in an interrogative: *Could you give me a pack of Marlboros?* to an elliptical imperative: *A pack of Marlboros.*

Although this is quite an impressive list of studies in the area of speech acts, we’ve only just scratched the surface. Austin estimates that there are over 1,000 speech acts similar to those described in this section.

## PROPOSITIONAL CONTENT

The area I have termed “propositional content”<sup>4</sup> has apparently not been thought to have the same fecundity that the speech act area has, for the research potential of this area of communicative competence has been virtually untapped.

As Bycina (1981:28) has argued: “We have to take into account the fact that functional meaning, that is, speech acts ... is not the only kind of meaning that sentences or utterances convey. Most sentences also contain



some kind of proposition which further contributes to the meaning of the sentence. To put it crudely, we do not simply ask a question; we ask a question about something.” One of the challenges to the second language learning researchers is to determine if the quantity and quality of the propositional content of utterances is the same regardless of culture.

Grice (1975), for instance, has asserted that in order for conversations to be cooperative ventures, conversationalists follow the maxim “to be as informative as is required, but no more informative than is necessary”. However, one piece of evidence against the claim that all cultures require the same amount of information comes from Keenan<sup>5</sup>, who discusses how speakers in “Malagasy society regularly provide less information than is required by their conversational partner, even though they have access to the necessary information. For reasons having to do with local customs and beliefs, speakers in that society may avoid identifying people in their utterances. They will obscure the identity of a child in referring to it in conversation, for example, for fear of tempting a malevolent force to intervene.” So merely the amount of information included in a conversation may be culture specific.

As to the question of the quality of propositional content and whether all cultures talk about the same things, it is well documented that the content of some functions at least is culture specific. As Richards (1980:419) observes: “Greetings in some cultures may involve questions about the addressee’s health; in others, questions about how recently you ate your last meal”, and, if I might add, questions about where you are going.

Another whole potentially productive area of research involving the propositional content area might be the study of how people encode and decode the semantics of a message, i.e. speech perception. Among the models of speech perception is the two-stage model of Neisser (brought to our attention by Tarone, 1974). In the first stage an utterance is received by a listener. He or she stores the message temporarily in short-term memory. While it is there, it is subjected to preliminary analysis through the application of perceptual strategies. One such strategy is the noun-verb-noun strategy that a listener might apply to an utterance in English (Bever, 1970). The listener’s strategy is to interpret the noun-verb-noun utterance as corresponding to an actor-action-object schema. While this strategy may not work for every English sentence, it could prove an efficient strategy for deciphering global meaning from many input sentences. Applying Neisser’s model to second language acquisition Tarone (1974:232) notes:

In second language acquisition, if universal perceptual strategies do exist for the decoding of meaning in the second language, it would appear to be very important to study these processes in their own right and discover what they are and how they influence the shape of the learner's (inter) language.

Finally, there should be one other goal of research in the propositional content category — this would involve attempting to better understand the coherence property of language, the property that Widdowson (1978) sees as concerned with tying together the contextual meaning of utterances. We have already talked about the cohesive property of texts, but cohesion in texts is basically accomplished through formal devices. Coherence, on the other hand, refers to what ties together the *meanings* in discourse. For instance, if A says to B (Widdowson, 1978: 29):

A: That's the telephone.

and B responds:

B: I'm in the bath.

and A rejoins:

A: OK.

there is no formal property that ties these three lines together, although the flow of propositional content in context allows us to appreciate the coherence among these three conversational turns and to make sense of the dialogue.

## INTERACTIONAL

Let us now turn to the area of communicative competence having to do with interactional patterns—knowing when it's one's turn to speak. According to Coulthard (1977) the basic structural unit in conversation is the *adjacency pair*. An example of an adjacency pair was given earlier when I suggested that the woman in the conversation at the restaurant would be perfectly proper in replying to her acquaintance's request for information by stating: "You really should say 'women's room'; it's the first door on your left down that hall." In addition to requests for information and replies, other adjacency pairs can take the form of:

Offer-acceptance

Offer-rejection

Complaint-apology

or simply exchanging greetings. Of course, these pairs obscure the fact that most exchanges have a far more complicated pattern than mere alternation.

To give a dramatic example of a complicated interactional pattern, one must only leave the mainstream culture of the United States (where interlocutors usually do take alternative turns in a conversation) and enter a polychronic cultural setting — the norm for many Latin cultures — where it is customary to find many people speaking at one time, while all engaged in the same conversation! (Fantini, personal communication)

To cite another example of different interactional patterns, consider Tannen's report (1980:03) that one group of people she studied favored overlap — that is, they favored one person talking at the same time as another. For this group of people, “the overlap is a way of signaling conversational involvement, even if it temporarily obscures the relay of a fully developed message. ... However ... for (other groups of speakers), overlap is perceived as interruption and is rejected because it obscures the expression of complete thoughts”. So who talks when with whom is a question researchers are just beginning to tackle.

Another aspect in the interactional area might be the consideration of pacing. As Shields (1978) has noted, interactional patterns require the taking into account of the reciprocal behavior of one another. We have all no doubt heard or experienced the fact that Americans are uncomfortable with silence and will jump in and take two turns in a row if the nonnative speaker takes too long (according to American standards) to reply. An interesting question to pursue along these lines would be to measure the tolerance for silence among different cultures. Does your students' silence after you asked them a question indicate a hesitation or simply that they are following the pacing of turn-taking of their culture?

The turn-taking system in conversation is fascinating and very complicated for speakers of all cultures. People are even nominated to take turns or relinquish turns based upon nonverbal behavior. For example, Williams (1979) declares that a person (in our culture) could signal that she or he intends to end a turn — or even a conversation — by eye aversion. This is not true of other cultures, of course, where eye contact is not a component necessary to maintain conversation. Richards (1980) suggests that a turn may be not only nonverbally terminated but also nonverbally initiated. A mere glance at one of the conversational partners may select him or her to be the next speaker. Allwright (1980b) has done an extensive analysis of interaction in a classroom, partly to address the question of how it is that a student is able to procure and relinquish turns. How does a student get an opportunity to speak in an ESL class? According to Allwright, a student in a classroom may procure

a turn by any of the following means. He or she may:

- Accept: Respond to a personal solicit
- Steal: Respond to a solicit made to another
- Take: Respond to a general solicit (e.g. a question addressed to the whole class)
- Take: Take an unsolicited turn when a turn is available — discourse maintenance
- Make: Make an unsolicited turn during the current speaker's turn, without intent to gain the floor (e.g. comments that indicate one is paying attention)
- Make: Start a turn, during that of a current speaker, with intent to gain the floor (i.e. interrupt, make a takeover bid)
- Make: Take a wholly private turn, at any point in the discourse (e.g. a private rehearsal for pronunciation practice of a word spoken by the teacher)
- Miss: Fail to respond to a personal solicit within whatever time is allowed by interlocutor(s)

(Allwright, 1980b: 168–169)

Adopting Allwright's schema would allow us to see how many turns and what type each student in each of our classes obtains.

Others, too, have studied interactional patterns. Early and Salica (1980), for example, have detailed the devices used by ESL students for interrupting in order to gain a turn. And Keller-Cohen (1979) examined the development of turn allocation in children acquiring ESL.

Finally, to return once again to the written form of the language, we should entertain Widdowson's contention (1980:232) that "written discourse operates by means of the same basic interactive procedures as characterize spoken conversation but the absence of reciprocity calls for a different mode of exploitation". In other words, Widdowson believes, as do others, that written discourse is not all that different from spoken with regard to its interactional pattern. The skilled writer has to enact both the reader's and the writer's roles when planning his or her message such that the meaning of the written form is clear without the presence of someone to ask questions when they don't understand. It seems to me that the interactional communicative nature of writing — indeed this entire interactional area of communicative competence — warrants much future attention by researchers.

## STRATEGIC COMPETENCE

Let us conclude our review of the relevant research by considering the fifth area, strategic competence. I have saved it till last because it appears to be qualitatively different from the other competences. Whereas the other

four categories we have looked at appear to be more inventories of items and rules (with the exception perhaps of the encoding and decoding strategies referred to in the propositional content area), strategic competence, as I interpret it, seems to entail a dynamic process. It is a superordinate process responsible for controlling the smooth flow of communication. It enables the participant in discourse to draw upon his or her knowledge in the other four areas and to put this knowledge together in a fluent, creative way — as a listener, speaker, reader, or writer. If there are lapses affecting the fluency, a specific strategy may be called upon to help restore communication. I subscribe to Corder's observation (1977:12) that “all speakers, native or otherwise, adopt communicative strategies”. Recall the ringmaster who was able to interrupt the flow of his message and repair his utterance when he mispoke: “Ladies and gents, I mean gentlemen...” It is in this area of interrupted communication where much of the second language acquisition research has focused. The research has been designed to address the questions of 1) what the learner does to communicate when he or she has not fully acquired communicative competence and 2) what native speakers do to facilitate communication with nonnative speakers. We can organize the research by where the gap in the nonnative speaker's competence occurs. For instance, does communication come to a halt because the learner needs a lexical item that he or she doesn't have, or does the learner not know the polite form of a speech act when he or she realizes it is appropriate for the occasion, or does communication break down because the learner does not realize that it is his or her turn to speak?

By way of example, let us look at some of the communicative strategies that learners exploit when they lack essential vocabulary items. Tarone (1978), building on the work of Varadi (1980), has identified a number of such strategies: The learner who is faced with a communication problem might choose to coin a new word, for instance. Tarone cites the example of an ESL learner trying to identify a balloon in a picture. Not knowing the word *balloon*, the learner instead produces *air ball*. Another strategy that learners utilize is mime — clapping their hands together to mean applause, for example. Message abandonment, a third strategy, is resorted to in extreme cases where the learner begins to talk about a concept but then is unable to continue and just gives up.

In the area of communicative strategies involving speech acts, Kasper (1979) cites the nonnative speaker in his study who has a complaint to make about a certain situation. She realizes that she must soften her

complaint, however, because it is not a very serious one. She does not know how to modulate her complaint with something like "I'm terribly sorry but ..." so she resorts to the strategy of modality reduction and complains much more strongly and directly than she would in her native tongue. Other significant work in the area of communicative strategies has been done by Galvan and Campbell (1978), Fathman (1980), Kellerman (1977), Seliger (1980), Facrch and Kasper (1980), Bialystok and Frohlich (1980), Wong-Fillmore (1976), Blum and Levenston (1978), Krashen and Scarcella (1978), Hamayan and Tucker (1979), Butler-Wall (1980), Dechert (1979), and Glahn (1980). Work by Schwartz (1980) and Gaskill (1980) also falls in this category, although their work is not so much on learner strategies as it is on how the two interlocutors resolve the communication breakdown together. (See Tarone, 1980 for discussion.) Although there seem to be quite a number of researchers probing this area, most of the studies view communicative strategies adopted by learners for dealing with their deficiencies in the linguistic area. I know of no studies, for instance designed to identify strategies learners use to compensate for their inadequate knowledge in the interactional area. One would imagine that speakers don't consciously think about interactional patterns and therefore would simply rely on the interactional patterns of their native culture.

With a different focus, but still in the area of communicative strategies, is the extensive research examining what native speakers do in order to adjust their speech to accommodate nonnative speakers. The simplified speech that natives use when conversing with less proficient nonnatives is termed "foreigner talk" (Ferguson, 1971). In her seminal research on foreigner talk, Hatch (1979) developed a long list of strategies adopted by native speakers: Among other things, native speakers slow down, speak louder, use high frequency vocabulary items, and reduce the complexity of their syntactic constructions. Other research undertaken to identify features of foreigner talk has been done by Henzl (1973), Chaudron (1980), Katz (1977), Hatch, Shapira, and Gough (1975), Arthur et al. (1980), Freed (1978), and Carty (1980). Gaies (1977) and Long (1981) have also examined aspects of the English input received by native speakers. Long, in his recently completed dissertation (1980), has done a thorough analysis of a number of features of the conversational interaction between native and nonnative speakers. Hatch (1979) and Peck (1980) have examined conversation between native and nonnative speakers and have speculated as to what the nonnative speakers might be learning from

such interactions.

Despite the number of studies in this area, many questions have yet to be fully explored. One such issue might be to determine the extent to which strategic competence is language-specific as opposed to how much can be transferred from one language learning situation to another.

This completes the review of the research being conducted in the communicative competence area that I am aware of. Although I anticipate challenges to the organization I have imposed, I have found it to be a useful framework to help me sort out all the issues surrounding the notion of communicative competence and for recognizing the areas of strength in our research as well as the lacunae.

## IMPLICATIONS

Let me now share with you some implications I have drawn from reflecting on all of the preceding. First of all, my intentions will have been misconstrued if you concluded that I am endorsing a “communicative approach”<sup>6</sup> or the wholesale adoption of a notional-functional syllabus. I have made no claims one way or the other about these. I do, however, think there are some general principles which I can derive from the research and work on defining communicative competence that would be helpful in my teaching. There are ten of them (many culled from my experience and discussions with colleagues at SIT).

1. I need to be cognizant of the fact that my students will not be equipped with the full complement of forms for performing a given function in English. I should try to not be offended by my students’ limited ability to use polite forms. Rather, I should treat such occasions as opportunities to teach my students about polite forms in their emerging second language competence (paraphrased from Walters, 1979).
2. I need to distinguish (following Allwright, 1980a) “what is taught” in the classroom from “what is available to be learned”. Much can be learned about interactional patterns, for example, from the interactive nature of classroom events without my necessarily planning a lesson to deal with them. I should also recognize that my learners (even young ones) do have communicative competence in another language and that there may be things about English I don’t have to teach, things which will reveal themselves if I make an attempt to discover what my students do know.
3. I need to entertain the thought that there may be areas among the ones I’ve discussed today which I have never taught before but which would be

worthwhile additions to my syllabus. I am reminded of Gomes de Matos' tactic (1979) of teaching learners useful phrases to employ when they want to learn something specific about the target language. Expressions like: "Can I ask you a question?" "There's something I don't understand.", and so on. I will also reflect upon Palmer and Kimball's suggestion (1977) that sometimes I should give my students communicative tasks that are a little advanced for them — not to frustrate them, but to give them practice with communicative strategies and better prepare them to deal with what they might encounter outside my classroom.

4. I recognize, communicative competence being as demanding as it is, that there is no way my students are going to become fluent communicators if I spend a good deal of my time with them talking about the language rather than letting them use it. As Widdowson (1979:24) eloquently puts it:

Acquisition and use are interdependent; knowledge is acquired through behavior and behavior derived from knowledge in a process of reciprocal facilitation.

I will therefore provide my students with ample opportunity to use the language. Of course, I will bear in mind that communicative fluency requires a combination of both adequate interactive ability and *also* accurate construction (Sinclair, 1980). I will not ignore the latter for the sake of the former.

5. I will not view my classroom as "an artificial language learning context" (Breen & Candlin, 1980:98), but will "seek to exploit the classroom in terms of what it *can* realistically offer as a resource for learning". As Krashen and Seliger (1975) asked six and a half years ago, I will ask myself: What can I provide my students with that they can't easily get outside of my class?
6. When I find my students have committed an error — have not quite said something the way I would — I will think to look beyond the linguistic form and function of the utterance if both of these appear to be correct. I will look to the other areas of communicative competence that I am aware of for the source of the trouble. I will realize that the error was unintentional and appreciate and use the error because it gives me invaluable information about the stage of development of my students' communicative competence. I will try to give my students meaningful feedback based upon my error analysis — feedback that gets at the trouble spots (recognizing they may be nonlinguistic in nature) which are blocking their progress.
7. I will attempt to be sensitive to the fact that not all learners want to be culturally assimilated and recognize that there may be great resistance to what learners have to do to become truly bilingual. I will recognize



that this resistance comes in many forms. As Claire Stanley (personal communication) has observed, sometimes her students will ask her, “Why is it that way?” about some sociolinguistic point in English, when what the student really means is, “Why isn’t it like my language!” In any event, I will try to recognize their concerns and keep my expectations of my students in line with why they are studying English (ESL versus EFL, for example), realizing that I won’t be able to push them beyond where they want and need to go anyway.

8. I believe and will try to keep uppermost in my mind that only the learner can *do* the learning (Allwright, 1980a). I am there to aid in this process. As the fantasy writer George MacDonald (1973:27) has put it: “Best thing you can do for your fellow [man], next to rousing his conscience is ... not to give him things to think about, but to wake things up that are in him; or say to make him think things for himself.” Since it’s impossible for me to teach everything about the language, perhaps the way I can serve my students best is by helping them to learn on their own.
9. I understand that acquiring a second language is not going to happen overnight — that even at the advanced levels there will be a lot to learn — and that I have to try to be patient throughout the process.
10. And finally, I am constantly reminded that language (as I noted at the beginning) is a wonderful tool for individual expression and interpersonal communication. After considering what it takes to be communicatively competent, I come away with a renewed appreciation for the challenge of using language within a context and I am eager to return to the classroom to share my enthusiasm for language with my students.

## CONCLUSION

I admit that this has been a whirlwind tour through research being conducted on communicative competence in the second language field. If I have overwhelmed you with detail, then I have defeated my purpose. Rather than being dismayed by the language teaching task, let us exult in the challenge it provides. Let us strive to make the learning task a meaningful one for learners. Let us appreciate the richness of language. Let us find ways of conveying our enthusiasm for language to our students, all the while maintaining a realistic attitude towards their acquisition endeavor.

To “A Celebration of Language”, the theme of this year’s convention, I bring a dedication to language teaching born out of a renewed appreciation for language itself.

Won’t you all join me in the celebration?

## Notes

1. This chapter was written and revised with the helpful suggestions of K. Bailey, A. Fantini, A. Hawkinson, F. Hinofotis, J. Millett, A. Silverman and C. Stanley.
2. The others include Savignon (1972), Paulston (1974), Wilkins (1976), Widdowson (1978; 1980), Munby (1978), Canale and Swain (1980), Riley (1980), Brumfit and Johnson (1980), Breen and Candlin (1980).
3. I call to your attention, for example, the current undertaking by Stauble and Schumann to study the acquisition of the form and function of English verb phrase morphology by Spanish and Japanese speakers.
4. I believe this area corresponds to Widdowson's conceptual or Halliday's ideational function: "language used for thinking, formulating concepts, fashioning propositions" (Widdowson, 1980: 235).
5. As quoted in Richards (1980).
6. I believe this term to be a misnomer if one adheres to Anthony's ternary classification of approach, method and technique. The main assumptions of the so-called communicative approach have to do with the nature of language — very little is said about the processes of language learning and teaching.

## References

- Allwright, R. L. (1980a). What do we want teaching materials for? Paper presented at the Fourteenth Annual Convention of TESOL, San Francisco.
- Allwright, R. L. (1980b). Turns, topics, and tasks: Patterns of participation in language learning and teaching. In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.11–124). Rowley, Mass: Newbury House.
- Arthur, B., R. Weiner, M. Culver, L. Young & D. Thomas. (1980). The register of impersonal discourse to foreigners: Verbal adjustments to foreign accent. In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.11–124). Rowley, Mass: Newbury House.
- Austin, J. (1962). *How to Do Things with Words*. Oxford: Oxford University Press.
- Backman, N. (1977). Learner intonation — a pilot study. *Proceedings of the Los Angeles Second Language Research Forum*, UCLA.
- Backman, N. (1979). Intonation errors in second-language pronunciation of eight Spanish-speaking adults learning English. *Interlanguage Studies Bulletin*, 4 (2): 239–265.
- Beebe, L. (1980). Sociolinguistic variation and style shifting in second language acquisition. *Language Learning*, 30 (2): 433–448.
- Bever, T. G. (1970). The cognitive basis for linguistic structures. In J. R. Hayes (Ed.), *Cognition and the Development of Language*. New York: Wiley.

- Bialystok, E. & M. Frohlich. (1980). Oral communication strategies for lexical difficulties. *Interlanguage Studies Bulletin*, 5 (1): 3–30.
- Blum, S. & E. Levenston. (1978). Universals of lexical simplification. *Language Learning*, 28 (2): 399–415.
- Borkin, A. & S. Reinhart. (1978). *Excuse me and I'm sorry*. *TESOL Quarterly*, 12 (1): 57–70.
- Breen, M. & C. Candlin. (1980). The essentials of a communicative curriculum in language teaching. *Applied Linguistics*, 1 (2): 89–112.
- Brumfit, C. & K. Johnson. (1980). *The Communicative Approach to Language Teaching*. Oxford: Oxford University Press.
- Butler-Wall, B. (1980). Managing questions: Data from second language learners of Swedish. Paper presented at the Second Language Research Forum, UCLA.
- Bycina, D. (1981). Communicative language teaching. *TESOL Newsletter*, XV (1): 27–28.
- Canale, M. & M. Swain. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics*, 1 (1): 1–47.
- Carrell, P. & B. Konneker. (1981). Politeness: Comparing native and nonnative judgments. *Language Learning*, 31 (1).
- Carty, M. (1980). Strategies used by native speakers in native-nonnative conversations. *Papers in Linguistics 1979–1980*. Chicago, ILL: Northeastern Illinois University.
- Celce-Murcia, M. (1980). Contextual analysis of English: Application to TESL. In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.41–55). Rowley, Mass: Newbury House.
- Chaudron, C. (1980). Foreigner talk in the classroom — an aid to learning? Paper presented at the New England Child Language Association, Cambridge, Mass.
- Cohen, A. & E. Olshtain. (1981). Developing a measure of sociocultural competence: The case of apology. *Language Learning*, 31 (1).
- Corder, S. P. (1977). Language continua and the interlanguage hypothesis. *The Notions of Simplification, Interlanguages and Pidgins and Their Relation to Second Language Pedagogy* (pp.11–17). Neuchatel & Geneva: AIMAV.
- Coulthard, M. (1977). *An Introduction to Discourse Analysis*. London: Longman.
- D'amico-Reisner, L. (1980). Expressions of disapproval: An examination of the speech act in foreign speaker speech. Unpublished term paper for Ed. 676, University of Pennsylvania.
- Dechert, H. (1979). On the evaluation of "avoidance strategies" in second language speech productions — a psycholinguistic approach. Paper presented at the TESOL Summer Meeting, UCLA.
- Early, M. & C. Salica. (1980). The acquisition of interruption. Paper presented at the Second Language Research Forum, UCLA.
- Faerch, C. & G. Kasper. 1980. Process and strategies in foreign language learning and communication. *Interlanguage Studies Bulletin*, 5 (1): 47–118.
- Fanselow, J. (1977). Beyond Rashoman: Conceptualizing and describing the teaching act. *TESOL Quarterly*, 11 (1): 17–40.

- Farhady, H. (1980). Justification, development and validation of functional language testing. Unpublished Ph.D. dissertation, UCLA.
- Fathman, A. (1980). Repetition and correction as an indication of speech planning and execution processes among second language learners. *Towards a cross-linguistic assessment of speech*. In H. W. Dechert & M. Raupach. (Eds.), *Towards a Cross-linguistic Assessment of Speech* (pp.77–85). Frankfurt: Peter Lang.
- Ferguson, C. (1971). Absence of copula and the notion of simplicity: A study of normal speech, baby talk, foreigner talk and pidgins. In D. Hymes (Ed.), *Pidginization and Creolization of Languages*. New York: Cambridge University Press.
- Fraser, B. (1978). Acquiring social competence in a second language. Unpublished manuscript.
- Fraser, B. (1980). Insulating problems in a second language. Unpublished manuscript.
- Fraser, B. (1981). On apologizing. *Conversational Routines*. In F. Coulmas. (Ed.), *Conversational Routines* (pp.259–273). The Hague, The Netherlands: Mouton Publishing.
- Fraser, B., E. Rintell & J. Walters. (1980). An approach to conducting research on the acquisition of pragmatic competence in a second language. In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.75–91). Rowley, Mass: Newbury House.
- Fraser, B. & W. Nolen. (1980). The association of deference with linguistic form. *International Journal of the Sociology of Language*, 27: 93–109.
- Freed, B. (1978). Talking to children, talking to foreigners. Paper presented at the Los Angeles Second Language Research Forum, USC.
- Gaies, S. (1977). The nature of linguistic input in formal second language learning: Linguistic and communicative strategies in ESL teachers' classroom language. In H. D. Brown, C. Yorio & R. Crymes (Eds.), *On TESOL '77*. Washington, DC: TESOL.
- Galvan, J. & R. Campbell. (1978). An examination of the communication strategies of two children in the Culver City Spanish immersion program. Paper presented at the Twelfth Annual TESOL Convention, Mexico City.
- Gaskill, W. (1980). Correction in native speaker—nonnative speaker conversation. In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.125–137). Rowley, Mass: Newbury House.
- Gasser, M. (1979). Suprasegmental meaning in English. Unpublished MA in TESL thesis, UCLA.
- Gilbert, J. (1980). Prosodic development: Some pilot studies. In S. Krashen & R. Scarcella (Eds.), *Research in Second Language Acquisition*. Rowley, MA: Newbury House.
- Glahn, E. (1980). The metalinguistic function in native speaker-learner conversations. Paper presented at Second Language Research Forum, UCLA.
- Godfrey, D. (1980). A discourse analysis of tense in adult ESL monologues. In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.92–110). Rowley, Mass: Newbury House.

- Gomes de Matos, F. (1979). Helping learners capitalize on their English: The use of learning strategies. *Creativity*, 32: 1–4.
- Grice, H. (1975). Logic and conversation. In P. Cole and J. L. Morgan (Eds.), *Syntax and Semantics 3: Speech Acts*. New York: Academic Press.
- Halliday, M. & R. Hasan. (1976). *Cohesion in English*. London: Longman.
- Hamayan, E. & G. R. Tucker. (1979). Strategies of communication used by native and nonnative speakers of French. *Working Papers on Bilingualism*, 17: 83–96. Toronto: Ontario Institute for Studies in Education.
- Hamayan, E. & G. R. Tucker. (1980). Language input in the bilingual classroom and its relationship to second language achievement. *TESOL Quarterly*, 14 (4): 453–468.
- Hatch, E. (1979). Simplified input and second language acquisition. Paper presented at LSA Winter Meeting, Los Angeles.
- Hatch, E. & M. Long. (1980). Discourse analysis, what's that? In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.1–40). Rowley, Mass: Newbury House.
- Hatch, E., R. Shapira & J. Gough. (1975). Foreigner talk discourse. Working papers in English as a second language, UCLA.
- Henzl, V. (1973). Linguistic register of foreign language instruction. *Language Learning*, 23 (1): 207–227.
- Hymes, D. (1971). *On Communicative Competence*. Philadelphia: University of Pennsylvania Press.
- Kaplan, R. (1966/1972). Cultural thought patterns in intercultural education. In H. Allen & R. Campbell (Eds.), *Teaching English as a Second Language*. New York: McGraw-Hill.
- Kasper, G. (1979). Communication strategies: Modality reduction. *Interlanguage Studies Bulletin*, 4 (2): 266–283.
- Katz, J. (1977). Foreigner talk input in child second language acquisition: Its form and function over time. *Proceedings of the Los Angeles Second Language Research Forum*, UCLA.
- Keller-Cohen, D. (1979). Systematicity and variation in the nonnative child's acquisition of conversational skills. *Language Learning*, 29 (1): 27–44.
- Kellerman, E. (1977). Toward a characterization of the strategy of transfer in second language learning. *Interlanguage Studies Bulletin*, 2 (1): 58–145.
- Krashen, S. (1977). Some issues relating to the monitor model. Paper presented at the Eleventh National TESOL Convention, Miami, Florida.
- Krashen, S. & H. Seliger. (1975). The essential contributions of formal instruction in adult second language learning. *TESOL Quarterly*, 9 (2): 173–184.
- Krashen, S. & R. Scarcella. (1978). On routines and patterns in second language acquisition and performance. *Language Learning*, 28 (2): 283–300.
- Larsen-Freeman, D. (Ed.). (1980). *Discourse Analysis in Second Language Research*. Rowley, MA: Newbury House.
- Laver, J. & S. Hutchesson (Eds.). (1972). *Communication in Face-to-Face Interaction*.

- Harmondsworth: Penguin.
- Li, C. & S. Thompson. (1976). Subject and topic: A new typology of language. In C. Li (Ed.), *Subject and Topic*. New York: Academic Press.
- Long, M. (1980). Input, interaction and second language acquisition. Unpublished doctoral dissertation, UCLA.
- Long, M. (1981). Questions in foreigner talk discourse. *Language Learning*, 31 (1): 1–42.
- MacDonald, G. (1973). The fantastic imagination. In G. Sadler (Ed.), *The Gifts of the Christ Child*, Vol. I. Grand Rapids, Mich.: William B. Erdmans Company.
- Maltby, L. & C. Richardson. (1978). Helping students discover verbal and nonverbal behavioral rules. *University of Pennsylvania ESL professional papers*.
- Manes, J. & N. Wolfson. (1981). The compliment formula. In Florian Coulmas (Ed.), *Conversational Routine*. The Hague: Mouton.
- Munby, J. (1978). *Communicative Syllabus Design*. Cambridge: Cambridge University Press.
- Neufeld, G. & E. Schneiderman. (1980). Prosodic and articulatory features in adult language learning. In S. Krashen & R. Scarcella (Eds.), *Research in Second Language Acquisition*. Rowley, MA: Newbury House.
- Nine-Curt, C. (1975). Nonverbal communication in the classroom: A frill or a must? In M. Burt & H. Dulay (Eds.), *On TESOL '75*. Washington, DC: TESOL.
- Ochs Keenan, E. (1977). Why look at unplanned and planned discourse. In E. Keenan & T. Bennett (Eds.), *Occasional Papers in Linguistics*, No. 5. Los Angeles: University of Southern California.
- Palmberg, R. (1979). On the functions of laughs in second language communication. Paper presented at the First Nordic Symposium on Interlanguage, Helsinki.
- Palmer, A. & M. Kimball. (1977). Proper intake: A neglected component of formal instruction. Paper presented at the Eleventh Annual TESOL Convention, Miami, Florida.
- Paulston, C. (1974). Linguistic and communicative competence. *TESOL Quarterly*, 8(4): 347–362.
- Peck, S. (1980). Language play in child second language acquisition. In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.154–164). Rowley, Mass: Newbury House.
- Politzer, R., A. Ramirez & S. Lewis. (1981). Teaching standard English in the third grade: Classroom functions of language. *Language Learning*, 31 (1).
- Richards, J. (1980). Conversation. *TESOL Quarterly*, 14 (4): 413–432.
- Riley, P. (1980). When communication breaks down: Levels of coherence in discourse. *Applied Linguistics*, 1 (3): 201–216.
- Rintell, E. (1979). Getting your speech act together: The pragmatic ability of second language learners. *Working Papers on Bilingualism*, 17: 97–106. Toronto: Ontario Institute for Studies in Education.
- Rintell, E. (1981). Sociolinguistic variation and pragmatic ability: A look at learners.

- International Journal of the Sociology of Language*, 27: 11–34.
- Savignon, S. (1972). *Communicative Competence: An Experiment in Foreign-Language Teaching*. Philadelphia: Center for Curriculum Development.
- Scarcella, R. (1979). On speaking politely in a second language. In C. Yorio, K. Perkins & J. Schachter (Eds.), *On TESOL '79*. Washington, DC: TESOL.
- Schachter, J. & W. Rutherford. (1979). Discourse function and language transfer. *Working Papers on Bilingualism*, 19: 1–12. Toronto: Ontario Institute for Studies in Education.
- Schmidt, M. (1980). Coordinate structures and language universals in interlanguage. *Language Learning*, 30 (2): 397–416.
- Schmidt, R. (1979). Getting what you want in a new language. Paper presented at the Thirteenth Annual TESOL Convention, Boston, Mass.
- Schmidt, R. & J. Richards. (1980). Speech acts and second language learning. *Applied Linguistics*, 1 (2): 129–157.
- Schwartz, J. (1980). The negotiation for meaning: Repair in conversations between second language learners of English. In D. Larsen-Freeman (Ed.), *Discourse Analysis in Second Language Research* (pp.138–153). Rowley, Mass: Newbury House.
- Searle, J. (1969). *Speech Acts*. London: Cambridge University Press.
- Seliger, H. (1980). Data sources and the study of L2 speech performance: Some theoretical issues. *Interlanguage Studies Bulletin*, 5 (1): 31–46.
- Shields, M. (1978). Symposium on discourse analysis systems. A.I.L.A. Fifth Congress at Montreal (as reported by John Regan in *Creativity*, 32: 4–6).
- Sinclair, J. (1980). Some implications of discourse analysis for ESP Methodology. *Applied Linguistics*, 1 (3): 253–261.
- Sinclair, J. & M. Coulthard. (1975). *Towards an Analysis of Discourse*. London: Oxford University Press.
- Tannen, D. (1981). Indirectness in discourse: Ethnicity as conversational style *Discourse Processes*, 4: 221–238.
- Tannen, D. (1980). Oral and literate strategics in discourse. *The Linguistic Reporter*, 22 (9): 1–3.
- Tarone, E. (1974). Speech perception in second language acquisition: A suggested model. *Language Learning*, 24 (2): 223–234.
- Tarone, E. (1978). Conscious communication strategies in interlanguage: A process report. In H. D. Brown, C. Yorio & R. Crymes (Eds.), *On TESOL '77*. Washington, DC: TESOL.
- Tarone, E. (1980). Communication strategies, foreigner talk and repair in interlanguage. *Language Learning*, 30 (2): 417–432.
- Taylor, H. (1975). Beyond words: Nonverbal communication in EFL. In M. Burt & H. Dulay (Eds.), *On TESOL '75*. Washington, DC: TESOL.
- Varadi, T. (1980). Strategies of target language learner communication: Message adjustment. *IRAL*, 18 (1): 59–72.
- Walters, J. (1979). Strategies for requesting in Spanish and English—Structural similarities

- and pragmatic differences. *Language Learning*, 29 (2): 277–294.
- Wardhaugh, R. (1972). *Introduction to Linguistics*. New York: McGraw-Hill.
- Widdowson, H. (1978). *Teaching Language as Communication*. London: Oxford University Press.
- Widdowson, H. (1979). The acquisition and use of language systems. *Studies in Second Language Acquisition*, 2 (1): 15–26.
- Widdowson, H. (1980). Conceptual and communicative functions in written discourse. *Applied Linguistics*, 1 (3): 234–243.
- Wilkins, D. A. (1976). *Notional Syllabuses*. Oxford: Oxford University Press.
- Williams, E. (1979). Elements of communicative competence, *English Language Teaching Journal*, XXXIV (1): 18–21.
- Wolfson, N. (1979). Let's have lunch together sometime: Perceptions of insincerity. Paper presented at the Thirteenth Annual TESOL Convention. Boston, Mass.
- Wong-Fillmore, L. (1976). Cognitive and social strategies in second language acquisition. Unpublished Ph.D. dissertation, Stanford University.
- Yorio, C. (1980). Conventionalized language forms and the development of communicative competence. *TESOL Quarterly*, 14 (2): 433–442.

## Comment after Chapter 3

The previous article promotes the importance of examining the input to language learners. It is, after all, the “raw material” with which learners have to work. Furthermore, it expands the locus of investigation well beyond linguistic form. Presumably, in natural language acquisition, learners do not learn a language as a linguistic system apart from communication.

In the next article, published one year later (1983), I reinforce the role that input plays in the second language acquisition process. However, I do so with a different agenda in mind. I was concerned that learners were being ascribed a passive role — that they were simply to be seen as the recipients of modified, simplified, comprehensible input or that input was solely obtainable through negotiation with native speakers of the language being learned.

I felt that this characterization denied the agency of the learner. It obscured the active role that he or she may play in making sense of the input. While it has been demonstrated in L1 acquisition, for instance, that not much language learning can take place by watching television programs, I had too many of my own students saying that they did



indeed learn a great deal of English from watching soap operas or music videos. I reasoned that with some degree of language proficiency, my students could build upon what they know by making use of their real-world knowledge and the support of the television images and somewhat predictable storylines. Even what is referred to as “canned” language in this article (what is now called prefabricated or formulaic language), such as highly predictable greeting sequences (“Hello.” “How are you?” “I am fine.” “And you?”) or that encountered in regular service encounters (“Can I help you?” “How much does this cost?”) can provide the groundwork for later analysis and acquisition. So, the input might not be linguistically simplified, but it might be contextually so.

My thinking also revolved around the idea that there might be many sources of input in addition to that which is obtained through interaction with native speakers. Books are one example. Even more important than the source of the input, then, is that learners learn how to learn.

In this article that follows, I also make use of the distinction between input and intake — the idea that just because there is ambient language input does not mean that all is attended to or taken in by the learner. Along similar lines, in an IATEFL address that I gave much later (Larsen-Freeman, 2016), I distinguished between two types of affordance. An affordance is what the environment provides in terms of a learning opportunity. What I called a “first order affordance” is what is available in the environment for the learner to make use of. For example, a teacher may decide to afford the learner the opportunity to learn from authentic materials, not pedagogically simplified ones. A second order affordance is what the learner perceives of what is available. In other words, authentic materials can be helpful — but in order for students to learn from them, the materials must be perceived by students as something that they can learn from and that are important to their learning. It is the latter, the emic perception of an affordance, that is so important, I would contend.

## References

- Larsen-Freeman, D. (2016). Shifting metaphors: From computer input to ecological affordances to adaptation. In *Proceedings from the IATEFL 50<sup>th</sup> Anniversary Conference, Birmingham* (pp.10–19). Kent: IATEFL.



## The Importance of Input in Second Language Acquisition

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In 1973 second language acquisition researchers Dulay and Burt reported that they had found an order of acquisition<sup>1</sup> for eight morphemes for Spanish-speaking children learning English as a second language. Their claim that certain morphemes were acquired earlier than others was based on the relative number of times a subject correctly supplied morphemes in obligatory contexts (Brown, 1973).<sup>2</sup>

Following Dulay and Burt's report, further "morpheme studies" were undertaken. The results of these studies showed that the morpheme order originally reported for children was also characteristic of adult ESL learners (Bailey, Madden & Krashen, 1974; Larsen-Freeman, 1975). Furthermore, although learners from different native language backgrounds did exhibit slightly different acquisition orders, there was still a strikingly similar pattern in the morpheme acquisition order for all learners when elicited by means of an oral production task (Dulay & Burt, 1973; Larsen-Freeman, 1975). Thus, although the order is not invariant (individual factors and native language background exert some influence), researchers can predict with some confidence which morphemes ESL learners will supply in obligatory contexts the most often, the next most often, and so on.

In pursuit of an explanation for why such a common order occurs, the data from the morpheme studies were examined in light of conceivable determinants (Larsen-Freeman, 1976a). Factors considered to account for the order were basically of four types:

1. The nature of the morphemes themselves (their syntactic, semantic, and phonological complexity).
2. Characteristics of the learners involved in the morpheme studies (their cognitive development, their previous training, the affective factors

influencing their acquisition).

3. Acquisition heuristics (Slobin's Operating Principles, the sequence of morphemes in the textbooks and syllabi the learners were using).
4. The characteristics of the input the subjects were exposed to (the frequency of occurrence of the morphemes in adult native-speaker speech, the perceptual saliency of the morphemes).

Of all the preceding factors, only the frequency of occurrence of these morphemes in adult native-speaker speech was determined to be significantly correlated with the acquisition order adhered to by ESL learners. This native-speaker morpheme frequency order was derived from two sources: a count of the morphemes in a series of transcripts of the speech of parents conversing with their children (from Brown, 1973) and a count of the morphemes in a series of transcripts of the speech of two ESL teachers talking to their ESL classes (Larsen-Freeman, 1976b). Both of these frequency counts correlated significantly with each other and with the morpheme acquisition order of the ESL learners.

While high positive correlations do not imply causality, the conclusion that second language acquisition researchers must consider the characteristics of the input to the learner in explaining the output certainly seems warranted. Although such a notion may seem self-evident, researchers all too often have confined the scope of their studies to examining the learner's linguistic product, thus overlooking an important source of information which could prove elucidating in achieving a better understanding of the acquisition process.

From this perspective I welcome Evelyn Hatch's paper, "Simplified Input and Second Language Acquisition", because Hatch also recognizes the necessity of subjecting the input the learner receives to the same careful scrutiny previously afforded only the learner's linguistic output. The stated purpose of Hatch's paper is to "show that foreigner talk (the reputed 'simplification' or adjustment of speech a native speaker makes when talking with a nonnative speaker) does assist the learner in promoting communication and in making the learning process easier".

I am convinced of the validity of the first part of Hatch's proposal. There is ample evidence in the work of Hatch and others that foreigner talk (FT) is used by native speakers to facilitate communication. Although all the aspects of input in Hatch's Table 1 do not necessarily result in linguistic simplification, they no doubt are adopted to facilitate comprehension and allow communication to take place.

I am less certain of Hatch's second point — that FT makes learning easier. It has not yet been demonstrated that learning is facilitated by the application of these strategies by native speakers. While native-speaker adjustments may encourage communication at the moment, is the language nonnative speakers encounter through FT useful in aiding their acquisition? Nonetheless, this is an empirical question and I applaud Hatch's call for intermediate-level research, which I presume would be designed to show the connection between simplified input from FT and the learner's acquired system.

There is a point of contention between Hatch's paper and my perspective, however. The disagreement is over what should be considered sources of simplified input to the L2 learner. Hatch, it appears, implies that input becomes intake only when negotiation takes place:

For me, all input is intake if the learner does respond in some way to it. When the language is *not* addressed to the learner, when there is a vast mismatch of language used by the native speaker, when no negotiation is possible (for example, in classroom lectures given to native speakers and foreign students) almost all of it is likely to be noise for the beginning language learner. There is no meat for learners to latch on to since the language has not been simplified via negotiation, and they simply tune out the language. (Hatch, 1983: 81)

I would contend, in contrast, that there are at least three areas where simplification can be observed vis-à-vis second language acquisition:

1. The learner can receive simplified input through negotiated interaction.<sup>3</sup>
2. The learner can impose simplification on unnegotiated (and negotiated) native-speaker input by selectively attending to it.
3. The learner produces so-called "simplified" forms of the target language utterances (simplified from the native speaker's vantage point but commensurate with the nonnative speaker's interlanguage stage).

The first two of these I would maintain constitute sources of simplified input. To view the first as the only legitimate source of simplified input will result, I fear, in our getting a distorted view of the language acquisition process. Accommodation (FT) on the part of the native speaker is one way of gaining access to simplified input. It is a good way because successful negotiation, as Hatch observes, brings about accompanying positive affective feelings on the part of the learner — but it is by no means the only way.

It may well be that the L1 equivalent of FT, "caretaker speech" or

“motherese”, is important for L1 acquisition to take place. L1 learners have to work on both form and meaning simultaneously. L2 learners, on the other hand, know about the world and know what it is that languages enable them to say about it. There might be some linguistic differences reflecting cultural differences among learners from different L1 backgrounds, but basically L2 learners bring with them tremendous tools to the second language learning task: knowledge of another language and the experience of having already gone through the process of acquiring a language. And L2 learners can and do use what they already know to simplify the input to which they are exposed.

I think of my student from the 1979 TESOL Institute who claimed he had learned German from listening to the radio. Such a source of native-speaker speech obviously did not allow for any negotiation or adjustment on the part of the native speaker. But unlike an L1 learner who could bring very little except maybe an innate grammar to the learning task, my student was a native speaker of Dutch. He had already coped with the task of language learning and he had mastered a language that was enormously helpful in his acquisition of this second language. His knowledge of his L1 helped facilitate comprehension of the broadcast just as FT helps facilitate comprehension during conversations. He was able to listen selectively to the radio broadcast and, because certain aspects of the program were no doubt highly predictable, the input became “simplified” — not linguistically but contextually.

By understanding that learners bring with them previous knowledge of the world, obtained through their experience in it, we can explain the success of some of the learners Hatch calls “outliers” — people who *do* learn in unfavorable learning settings. One such group of outliers is what Seliger (1977) calls the high-input generators. Such learners, Hatch notes, sometimes generate the input by talking to bus drivers, waiters, etc. Hatch asks: “Is that input likely to be of the FT variety or even negotiated interaction?” She answers her own question: “Talking with waiters is unlikely to be truly negotiated. More likely the learner gets a ‘chunk dialogue’ — a number of set exchanges which he can successfully practice each day with growing success.” If negotiation does not occur, what is there about the use of what Hatch calls “canned speech” that fosters acquisition for those who use it? The use of “canned speech” allows the low-risk-taker to engage a native speaker in a dialogue in which the learner has a great deal of control. The situation, based on the prior experience of the learner, is one in which

the topic and language used are very predictable. Again, linguistic forms may not be simplified, but the learner knows what to expect from the situation, and this allows him certain control over the discourse.

Then, too, I take note of Stauble's finding (1977) that one of her subjects, Paz, who had the highest ESL proficiency of the three subjects Stauble studied (she was at the upper mesolang stage), also exhibited the highest social distance. Paz claimed to have had very limited contact with native speakers of English, speaking Spanish at work, at home, and with most social contacts, but Paz, by her own report, valued education highly and was thus motivated to learn. She spent a great deal of time reading English books and watching English television programs.

Deriving input from books again enables the learner to be selective. An added benefit of deriving input from books is the fact that one can reread when miscomprehension occurs just as a native speaker employing FT will rerun an utterance a nonnative speaker has not comprehended. Television programs, like radio broadcasts, provide contextually simplified input due, among other things, to the redundancy of themes and, in the case of television, the accompanying nonverbal actions.

My interpretation of simplified input helps me understand why a language teaching method like the Silent Way, which allows for such parsimonious input from the teacher, works. The input is minimal, but the situation the teacher has created is so focused that meaning is very clear. There is no need for great repetition and negotiation when the input is of such quality. Upon considering another "innovative" teaching method, Counseling-Learning/Community Language Learning (CLL), my view of input helps me understand why learning can take place despite the barrage of uncontrolled language unleashed in the CLL classroom. It is because, with the introduction of any new linguistic form, the learner receives an immediate translation. Translation, of course, is another way the L2 learner can benefit from "simplified" input without negotiation.

Thus, I can explain another of Hatch's outliers — the person who learns a language in the classroom — by saying that his or her success is due to the fact that he or she received good, simplified input there. Having said all this, I am perfectly willing to acknowledge that it may be unnecessary to have access to "simplified" input to make advances in the acquisition of L2 phonology.

One of my students at the School for International Training enrolled in a beginning Spanish class this past fall. He discovered much to his amazement that he was able to emulate the teacher's pronunciation very

well. He was surprised by this because in previous L2 learning situations he had always had trouble pronouncing the new sounds of the L2. He attributed his success in pronouncing Spanish to the fact that he lived in a Spanish-speaking neighborhood in eastern Massachusetts the year before. He claims he understood nothing of the language spoken around him but feels he developed a sense of Spanish phonology. If my student is correct in his attribution, on the phonological level, at least (and I would, of course, claim on other levels as well), interaction is unnecessary for selective input to be transformed into intake.

All of this is not to say that we should discount the value of informal native speaker interaction. Even my student who claimed he learned German by listening to the radio would no doubt have a lot to learn merely in terms of register differences which operate in the L2. Then, again, for child L2 learners, informal interaction with nonnative speakers may be the best option they have for obtaining simplified input. However, I am arguing that the accommodation aspect of native speaker input may not be necessary for acquisition to proceed. Indeed, overaccommodation, such as that of Hatch's subject "G", whose FT included syntax and morphology that was less grammatical than that of his students, may even inhibit acquisition.

In short, I am making a plea to include all sources of input to the learner in our examination of the L2 acquisition process, not simply that which is elicited through FT. Although we may not be able to look at all the input as easily as we can tape and analyze conversations of the FT variety, other sources of input deserve our attention as well. I believe acquisition/depidginization can proceed regardless of whether there is accommodation on the part of native speakers as long as simplified input is obtainable.

The reader must decide whether or not what I am calling a point of contention between Hatch and me really reflects a difference of opinion. After all, Hatch does acknowledge that people can learn languages in classrooms and from "canned speech", so perhaps our positions are not all that distant. I do think, however, to call people who learn languages without the benefit of FT "outliers" is misleading. Because they have developed an *awareness* of how they learn, they have been able to obtain simplified input by selectively attending to the language to which they are exposed and maybe by even eliciting the input necessary to promote their learning.<sup>4</sup> They are only outliers in what they had to do to obtain simplified input. Presumably their acquisition from that point on takes place in the same fashion as those learners who have received FT input,



and in any comprehensive theory of second language acquisition, we must account for their learning as well.

## Notes

1. Since this is the term used in the literature, I have adopted it here. I believe “accuracy order” to be a more suitable label, however, for what we are comparing is the relative percentage of occasions when subjects accurately supply morphemes in obligatory contexts.
2. It is generally recognized these days that researchers must account for the way the L2 learner handles the function of any given morpheme and not simply attest to his or her acquisition of a morpheme because he or she supplies the form of the morpheme in obligatory contexts (Wagner-Gough, 1975; Andersen, 1977; Heubner, 1979; Bickerton, 1981). The research reported on here was conducted within the prevailing methodology of the day, before this recognition. Nevertheless, I believe this research still affords us some interesting insights into the L2 acquisition process.
3. Through FT with native speakers (or proficient nonnative speakers), through teacher talk in a classroom setting and through peer talk with fellow nonnative speakers.
4. All other things being equal, why is it reportedly true that third and fourth languages are easier to learn than second? I would contend that, if it is true, it is true because the learners have learned how to learn. They have been able to develop a repertoire of acquisition heuristics to access the cognitive potential they possess.

## References

- Andersen, R. (1977). The impoverished state of cross-sectional morpheme acquisition/accuracy methodology (or: The leftovers are more nourishing than the main course). In C. Henning (Ed.), *Proceedings of the Los Angeles Second Language Research Forum*. Los Angeles: UCLA.
- Bailey, N., C. Madden & S. Krashen. (1974). Is there a “natural sequence” in adult second language learning? *Language Learning*, 24: 235–243.
- Bickerton, D. (1981). Discussion of “Two perspectives on pidginization as second-language acquisition”. In R. Andersen (Ed.), *New Dimensions in Second Language Acquisition Research* (pp.202–206). Rowley, MA: Newbury House.
- Brown, R. (1973). *A First Language: The Early Stages*. Cambridge, MA: Harvard University Press.

- Dulay, H. & M. Burt. (1973). Should we teach children syntax? *Language Learning*, 24: 37–53.
- Hatch, E. (1983). Simplified input and second language acquisition. In R. Andersen (Ed.), *Pidginization and Creolization as Language Acquisition*. Rowley, MA: Newbury House.
- Heubner, T. (1979). Order-of-acquisition vs. dynamic paradigm: A comparison of method ininterlanguage research. *TESOL Quarterly*, 13: 21–28.
- Larsen-Freeman, D. (1975). The acquisition of grammatical morphemes by adult ESL students. *TESOL Quarterly*, 9: 409–419.
- Larsen-Freeman, D. (1976a). An explanation for the morpheme acquisition order of second language learners. *Language Learning*, 26: 125–134.
- Larsen-Freeman, D. (1976b). ESL teacher speech as input to the ESL learner. *Workpapers in TESL*, Vol. X, UCLA.
- Larsen-Freeman, D. (1980). Second language acquisition: Getting the whole picture. Plenary address delivered at the Los Angeles Second Language Research Forum, UCLA.
- Seliger, H. (1977). Does practice make perfect? A study of interaction patterns and second language competence. *Language Learning*, 27: 263–278.
- Stauble, A. (1977). An exploratory analogy between decreolization and second language learning: Negation. Unpublished MA in TESL Thesis, UCLA.
- Wagner-Gough, J. (1975). Comparative studies in second language learning. CAL-ERIC CLL Series on Languages and Linguistics, No. 26. Center for Applied Linguistics.

## Comment after Chapter 4

The point of the previous article is that input is important, no matter its source. Furthermore, I believe that learners have a role in selecting from the input, or even creating their own intake. Nevertheless, I do feel the need to mention at this point that I no longer use the term “input” in my writing. The term comes from a computer metaphor, and I feel that using it undermines not only a learner’s agency, but also belittles a learner’s humanity.

The next chapter was written in a response to an invitation to commemorate the 25<sup>th</sup> anniversary of the inaugural publication of the journal *TESOL Quarterly*. In my article, I laid out what I considered to be the ever-expanding scope of SLA. I drew on my recent experience in writing a book, summarizing SLA research, with Mike Long (1991), who had been my SLA student at UCLA.

In the next chapter, I outlined the stages in the broadening of the field,

beginning with the evolution of research methods: from contrastive analysis to error analysis to performance analysis to discourse analysis. Each method did not supplant the previous type of analysis, but rather incorporated it. I also pointed out that while the early days of SLA research were dedicated to describing what learners do, by the mid-1980s, calls were being made for moving beyond description to explanation and theory construction.

The article goes on to discuss prominent theories of language learning and then turns to a description of learner factors and models that make such factors central. It also reiterates my earlier claim (1985) that I foresaw a time when questions concerning the learning process and those concerning language learners would no longer occupy different research agendas as they had since the earliest days of SLA research. Instead, I maintained that questions about learning and learners should not be researched independently. I didn't think that we would be able to understand the process apart from those engaged in it.

I have not been accurate in my forecast, as studies on learning and on learners still are pursued separately as far as I can tell. However, I see in the next article seeds of my interest in a more holistic theory, which makes an attempt to understand learners and learning in tandem. In this book, I will soon discuss a theory that does this. In the meantime, I conclude that given the complexity of language, we should not expect explanation of its acquisition to be simple.

## References

- Larsen-Freeman, D. (1985). State of the art on input in second language acquisition. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition* (pp.433-444). Rowley, MA: Newbury House.
- Larsen-Freeman, D. & M. H. Long. (1991). *An Introduction to Second Language Acquisition Research*. London & New York: Longman.



## Second Language Acquisition Research: Staking out the Territory

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One could argue that the launching of the *TESOL Quarterly* 25 years ago predated the emergence of second language acquisition (SLA) research as an identifiable field. Accordingly, my task should have been easier than that of my colleagues writing for these commemorative issues of the *Quarterly*. This was small comfort, however, when faced with the daunting challenge of doing justice to all that has transpired since the early 1970s.<sup>1</sup> What has occurred since then, of course, is a veritable explosion of research focusing first upon the acquisition/learning process and second upon the language learner.<sup>2</sup> This review will be organized around these two foci and around two subthemes: the alternate broadening and narrowing of perspective on the focus of inquiry and the movement from description (or what learners do) to explanation (or how they learn to do it).

### THE LEARNING PROCESS: DESCRIPTION

#### A Broadening of Perspective<sup>3</sup>

Before the emergence of SLA as a field, researchers conducted contrastive analyses between the learners' L1 and L2 in order to anticipate areas of divergence which were likely to cause the learners difficulty and those of convergence where one could expect positive transfer. This practice was consistent with the then prevailing behaviorist view of language acquisition: learning by conditioning. It was thought that if materials could be prepared which would help learners overcome the conditioned habits of their L1 while they were imitating the new patterns of the L2, language acquisition would be facilitated. Errors that might result from interference from the L1 were to be prevented or at least held to a minimum.

Ironically, it was learners' errors, so threatening to behaviorists, which were to lead to the shift in awareness that spawned the SLA field. Overgeneralization errors (*\*I eated it*) typical of first language acquirers were discovered in the oral production of L2 learners. Since such errors could not have resulted from imitation of target language (TL) speech, the errors were taken as support for Chomsky's proposal that the acquisition process was essentially one of rule formation, not habit formation. Learners were seen to play an active role in forming and testing hypotheses in an effort to induce the TL rules from the TL speech to which they were exposed. With the ascribing of an active role to the language learner, the SLA field was born. (See, for example, Oller & Richards, 1973; Schumann & Stenson, 1974.)

Learner errors became a major focus of study. Certainly interference errors were detected, but so were errors resulting from overgeneralization, redundancy reduction, and communicative strategies. Errors were also analyzed to see if they reflected the underlying system that Corder (1967) claimed learners used. Error analyses determined this indeed to be the case, and Selinker's (1972) term *interlanguage* (IL) was embraced to signify that learners' approximations of the TL were separate linguistic systems in their own right, not governed by the same rules as either the learners' L1 or L2 (Adjemian, 1976).

While the study of learner errors continued to be illuminating, error analysis alone was deemed an incomplete perspective for a number of reasons (Schachter & Celce-Murcia, 1977). Chief among these was that a focus on errors neglected learners' actual successes. In addition, since learners could sometimes avoid making errors in the L2 by not attempting to produce difficult structures, error analyses did not even account for all sources of learner difficulty (Schachter, 1974). These limitations of error analysis were remedied in a type of analysis which took the learner's performance (errors and well-formed utterances) as the focus of inquiry.

Among the earliest performance analyses were the morpheme studies. In 1974, Dulay and Burt claimed that they had found evidence of an English morpheme order of acquisition based upon ESL learners' relative use of eleven morphemes in obligatory contexts. Furthermore, they asserted, the acquisition order held for both Chinese and Spanish-speaking children, and was therefore thought to be impervious to L1 influence. Dulay, Burt, and Krashen (1982) thus referred to the SLA process as "creative construction: the subconscious process by which language learners gradually organize the language they hear, according to

the rules they construct to understand and generate sentences” (p.276). This and other early morpheme studies excited researchers who welcomed the new view of language acquisition and the empirical support of an innate learner-generated or built-in syllabus (Corder, 1967). These studies also, however, came under attack, mostly for their methodology and claims of minimal L1 interference.

Another type of performance analysis was also being conducted at the time, namely the analysis of the speech data of learners collected at regular intervals for a period of at least several months. Data collected longitudinally enabled researchers to see that learners of all types passed through common developmental stages in their acquisition of certain structures. Developmental sequences were identified for English interrogatives (Cazden, Cancino, Rosansky, & Schumann, 1975; Wode, 1978), negation (Schumann, 1979), German word order (Meisel, Clahsen, & Pienemann, 1981), Swedish relative clauses (Hyltenstam, 1984), English relative clauses (Pavesi, 1986), and a variety of other English structures (Johnston, 1985). Since the intermediate stages in the developmental sequences looked like neither the L1 nor L2, they reinforced the observation that learners were not merely reshaping their L1s to conform to the L2s, but rather that learners were creatively constructing the L2 through a process of gradual complexification. These findings also underscored the need for researchers to examine the learners' IL in its own right in order to understand the acquisition process rather than seeing the IL as an incomplete version of the TL (Bley-Vroman, 1983). This observed acquisition process was not a linear one; often there was backsliding or forgetting when new forms were introduced, resulting in a learning curve that was more U-shaped than smoothly ascending (Kellerman, 1985). Sometimes, too, not all stages in a sequence were traversed, leading to arrested development or fossilized forms. Moreover, learners were freely making use not only of rule-governed utterances, but also of rote-learned formulaic utterances, both routines and patterns (Hakuta, 1976), leading some investigators to suggest that rule-governed language developed from formulaic speech, which was later analyzed by the learner (Wong Fillmore, 1976).

Notwithstanding the insights yielded, a focus on learner performance, as with the error analyses that preceded it, was found to be too narrow. Time and research were required to discover what in hindsight seems obvious: Performance analysis alone could not account for the whole picture. ESL learner Homer's (Wagner-Gough, 1975) utterances such as *\*what is this is*

*truck* could only be understood by expanding the focus of investigation to include what was being said to Homer prior to his response.

Recognition of the need to examine not only the learner's performance but also the input to the learner, introduced a whole new area of inquiry, namely discourse analysis (Larsen-Freeman, 1980). Hatch has been the SLA researcher who has most promoted the value of examining what learners could be learning when engaged in collaborative discourse. For Hatch, a significant vehicle for acquisition is interaction with other speakers. Rather than the usual view that learners build up to conversational competence after gaining gradual control of lexical items and syntactic structures, Hatch (1978) writes: "One learns how to interact verbally, and out of this interaction, syntactic structures are developed." (p.409) Since Hatch's observation, much research has been conducted under the rubric of discourse analysis: the study of the acquisition of speech acts (Blum-Kulka & Olshtain, 1984), communicative strategies (Faerch & Kasper, 1983) and classroom discourse analysis (Allwright, 1988; Chaudron, 1988; van Lier, 1988), to name a few.

This brief historical review of the SLA field demonstrates a progressive broadening of perspective. Each type of analysis subsumed without replacing its predecessor. Indeed, each type of analysis continues to be conducted, but with greater awareness of a necessary breadth of inquiry. After the decade of broadening perspective, there came also a recognition of the need for a deeper examination of specific issues raised during the 1970s, specifically: L1 transfer, input to learners, and IL variation.<sup>4</sup> Thus, the 1980s saw a narrowing of focus so that each of these could be explored more fully. The following is a summary of what was learned.

### **Narrowing the Perfective: Language Transfer**

We have already seen that all errors could no longer be traced to L1 interference. Indeed, the contrastive analysis hypothesis, which stated that those areas of the TL which were most dissimilar to the learners' L1 would cause the most difficulty, was refuted by research that indicated that it was often the similarities between the two languages which caused confusion. In fact, Wode (1978) framed this observation as a principle: "Only if L1 and L2 have structures meeting a crucial similarity measure will there be interference, i.e. reliance on prior L1 knowledge" (p.116). This principle is significant in two respects. First, it reflects the growing view that transfer could be seen as a cognitive strategy: Learners rely on what they know (Taylor, 1975). Second, it foreshadowed what was to occupy researchers



throughout the next decade: specifying precisely when transfer would occur. The fact that four books were published during the 1980s on the theme of transfer in SLA is testament to the vitality of this line of research (Dechert & Raupach, 1989; Gass & Selinker, 1983; Kellerman & Sharwood Smith, 1986; Odlin, 1989).

In addition to Wode's claim that there had to be a "crucial similarity", work by Eckman and by Kellerman contributed to our understanding of when transfer occurs. Eckman (1985) suggested that the markedness difference between the L1 and L2 would play a role. Where the L2 was more marked than the L1, learners would experience more difficulty; furthermore, the relative degree of difficulty would correspond to the relative degree of markedness. Where the two languages were different, but the L2 was not more marked than the L1, difficulty would not arise. Kellerman (1984) noticed that learners' perceptions of the distance between the L1 and L2 would affect the degree to which learners would transfer forms. What was noteworthy here was the extent to which the idea of transfer as a deliberate cognitive strategy had taken hold.

A second question concerning transfer, which stimulated much research during the decade, was precisely what effect transfer had on learners' ILs. We have already seen how it was responsible for errors as well as positive transfer and underproduction or avoidance of certain structures. Other research demonstrated that transfer manifested itself in the following ways:

1. Overproduction of a particular TL form (Schachter & Rutherford, 1979)
2. Inhibiting or accelerating passage through a developmental sequence (Zobl, 1982)
3. Constraining the nature of hypotheses that language learners make (Schachter, 1983)
4. Prolonging the use of a developmental form when it is similar to an L1 structure (potentially resulting in fossilization) (Zobl, 1983)
5. Substitution (use of L1 form in the L2) (Odlin, 1989)
6. Hypercorrection (overreaction to a particular influence from the L1) (Odlin, 1989)

Clearly, transfer is a much more pervasive phenomenon in SLA than was once thought.

### **Narrowing the Perspective: Input**

Recall that by the end of the 1970s researchers had become aware of the need to examine the raw material or input with which the learners had

to work, recognizing, of course, that not all input would become intake (Corder, 1967). Many studies investigated the link between input and output (Gass & Madden, 1985). (I have drawn from Larsen-Freeman, 1985, for a synopsis of these studies.) With regard to the quantity of the input, many, but not all, researchers adduced evidence in support of the hypothesis that learners who have the opportunity to use the L2 regularly or to receive the most input will exhibit the greatest proficiency. Research in the area of input quality searched for a link between certain characteristics of the input (perceptual saliency, frequency of occurrence, syntactic complexity, semantic complexity, instructional sequence) and some aspect of the learners' output. Again, although not without challenge, a recurring finding was the correlation between the frequency of certain forms in the input and their appearance in learners' ILs.

Studies of input also focused on conversations between native speakers (NSs) and normative speakers (NNSs) and those between NNSs, comparing both to a baseline of NS-NS interactions (see Day, 1986). Some of the modifications (termed *foreigner talk* [FT]) which NSs make to accommodate NNSs' level of comprehension are slower rate of speech, louder volume (!), fewer false starts, longer pauses, more restricted vocabulary, more concrete lexicon, greater use of gestures, repetition, shorter length, more deliberate enunciation, and simpler syntax (Hatch, 1983). These modifications are not made by all native speakers, nor are they static. The degree of modification of "teacher talk", for example, varies according to the proficiency of the students (Gaies, 1977). Similarly, NSs are continuously readjusting their speech based on their ongoing assessment of their NNS interlocutors' comprehension (Gass & Varonis, 1985).

Long (1980) made an important distinction between the linguistic modifications of FT and those made to the interactional structure of conversations between NSs and NNSs. The latter include such phenomena as comprehension checks, confirmation checks, expansions, requests for clarification, self-repetition, etc., which are the result of the negotiation of meaning between the learners and their conversational partners. It was shown that these interactional or elaborative modifications may enhance NNSs' comprehension even more than linguistic alterations.

Strong proposals have been put forth about the role of input in SLA. For instance, Krashen (1982) called comprehensible input in the presence of a low affective filter the only causal variable in SLA. While most researchers accept the need for learners to comprehend the input

(in order for it to become intake and not just noise), few would agree that comprehensible input alone is sufficient. Swain (1985), for example, considered the case of the students in the Canadian French Immersion Program. These students received abundant comprehensible input but had not yet fully acquired grammatical competence in French. Since the learners could understand the input without fully analyzing its syntactic structure, Swain suggested that the learners also needed practice producing comprehensible output. Doing so may force learners to move from semantic to syntactic processing.

### **Narrowing the Perfective: Variation**

As are all natural languages, ILs are variable. It is not surprising, however, that this variability was overlooked in the early days of research given that most attention was focused on the systematicity of IL. Synchronic variability was too obvious to be ignored for long, however. As teachers can readily attest, it is not uncommon for students who appear to have mastered a particular item, to revert to an erroneous form when a new challenge presents itself.

In recent years, the number of books devoted to variation demonstrates the significance of this topic in SLA circles (Adamson, 1988; Burmeister & Rounds, 1990; Eisenstein, 1989; Ellis, 1987; Gass, Madden, Preston, & Selinker, 1989a, 1989b; Preston, 1989; Tarone, 1988). Most of the research has attempted to explain variability, while preserving the notion of an IL system (Huebner, 1985). This has been accomplished by maintaining that variability itself is systematic, i.e. explicable with appeal to certain linguistic and contextual factors, leaving only a portion as nonsystematic free variation. One explanation proffered for the synchronic variability found in learners' performance on tasks has been the sociolinguistic construct of speech style. Tarone (1979) hypothesized that at any point in time a learner's IL is really a continuum of speech styles, where *style* is defined in terms of the amount of attention given to form in the language. With the least attention being given to form, learners rely on a vernacular speech style, a style which shows the greatest systematicity (Labov, 1969). When learners are carefully attending to form, the style they exhibit is at the other end of the continuum. This style is more permeable, i.e. more open to influence from other languages, and is therefore the most variable, or least systematic. (But see Sato, 1985.)

In addition to attention to form as a reason for variable performance, other explanations have been:

1. Learners' monitoring their performance (Krashen, 1977)
2. Sociolinguistic factors (Beebe, 1980)
3. Adjustment of one's speech towards one's interlocutor (convergence) or away from one's interlocutor (divergence) (Beebe & Zuengler, 1983)
4. Linguistic or situational context of use (Ellis, 1985)
5. Discourse domains (Selinker & Douglas, 1985)
6. The amount of planning time learners have (Crookes, 1989)
7. A combination of factors: stage of acquisition, linguistic environment, communicative redundancy (Young, 1988)
8. Learners' use of other-regulated or self-regulated speech (Lantolf & Ahmed, 1989)

What seems to be accepted at the moment is that what appears at first to be random variation can often be accounted for with variable (or probabilistic) rules. The notion of systematicity in IL, therefore, remains intact. What is not clear, however, is just what kind of system it is. What is certain is that being systematic does not mean simply governed by categorical rules.

I shall return to the theme of variation below; before doing so, it should be remembered that a subtheme of this article is the shift from description to explanation. While the early days of SLA research were appropriately consumed by descriptions of what learners do (and still much more is needed at *all* levels of language), by the mid-1980s calls were being made for theory construction and explanations of the acquisition process (see, for example, Long, 1985). (Of course, it should be acknowledged that the questions posed and data collected in describing anything has "the beginning of an explanation embedded in it" (Long, 1990b) and that explanation is a complementary extension of description.)

## THE LEARNING PROCESS: EXPLANATION

We have already seen with regard to description how the SLA field has moved from a narrow focus on error analysis to a broader one on discourse analysis and back to a narrow focus on the areas of transfer, input, and variation. Since the latter half of the 1980s, we find a more or less narrow approach being taken with theory construction as well. Following Ellis (1985) and Larsen-Freeman and Long (1991), I will adopt a threefold classification schema for theoretical perspectives in the SLA field: nativist (learning depends upon a significant, specialized innate capacity

for language acquisition), behaviorist/environmentalist (the learner's experience is more important than innate capacity), and interactionist (both internal and external processes are responsible). I will illustrate each category with one theoretical perspective in SLA research, recognizing that through my selectivity I will have unavoidably slighted many others.<sup>5</sup>

### **Nativist: Universal Grammar (UG)**

For many years, linguists operating within the tradition of generative grammar have taken as their primary objective a description of the knowledge or competence of the ideal speaker-listener of the language. With the advent of Chomsky's government-binding theory, more attention has been concentrated on the question of how the competence of the native speaker is attained. A major assumption Chomsky makes is that the linguistic input to children acquiring their first language underdetermines or is insufficient to account for language acquisition. Moreover, children do not receive negative evidence (they are not told that a given utterance is ungrammatical) and thus must learn from the positive evidence instantiated in the input alone. Since the input is supposedly inadequate, it is assumed that the children possess an innate UG which constrains their grammatical development. The UG consists of a number of fixed abstract principles which predispose children to organize the language they hear in certain ways (White, 1990). The principles, in turn, have parameters associated with them which differ from language to language. One example which has often been cited as a principle in UG is the subjacency principle, which limits movement of constituents within sentences so that, at most, one boundary can be crossed at a time. This principle is held to apply to all languages. What counts as a bounding node, however, is determined by a parametric setting triggered by exposure to a given language. Thus, in English the bounding nodes are S and NP, whereas in Italian and French NP and S' are bounding nodes, but not S (White, 1990).

The impact of Chomsky's theory on SLA can be measured by the number of books that have been published of late dealing with the application of UG to SLA (Flynn, 1987; Flynn & O'Neil, 1988; Gass & Schachter, 1989; Pankhurst, Sharwood Smith, & van Buren, 1988; White, 1988). Some researchers maintain (Felix, 1985; Flynn, 1983; Hilles, 1986; Mazurkewich, 1985; Tomaselli & Schwartz, 1990; White, 1988; Zobl, 1990) that UG is in fact still available to second language learners such that their resulting grammar is shaped by its principles. White points out

that the adult second language learner is faced with the same challenge as is a child first language learner: trying to learn a language from degenerate and limited input. (Although just how degenerate the data are is a matter of some debate [cf. Larsen-Freeman & Long, 1991].) Felix adds that sequences of development and paucity of input data suggest that there is good reason to expect that UG may continue to operate even after puberty.

As Schachter (1990) reports, Bley-Vroman (1989), Clahsen and Muysken (1986), and Schachter (1988) (see also Jordens, 1988) have arrived at somewhat different conclusions. These researchers have argued that the results of the SLA process differ so dramatically from first language acquisition (where native speaker competence is always achieved, there are no transfer effects or fossilization, etc.) that it is not likely that UG is present in its entirety in postpubescent learners. It is possible, however, that if language learners do not have direct access to UG, they do through their knowledge of their L1 (Clahsen & Muysken, 1989). Another possibility is that L2 learners initially adopt L1 parameter settings but, if necessary, at certain points in their development, reset the parameters to the values inherent in the L2 (Hulk, 1991).

For now, the question of UG accessibility in SLA is still unresolved. There is evidence that there is at least some accessibility through the learners' L1, although the access may be only partial (Felix & Weigl, 1991).

### **Environmentalism: Connectionism/Parallel Distributed Processing (PDP)**

Although PDP/connectionist models are fairly new to the field, I have chosen to discuss them because of their striking contrast to the UG approach, and because some researchers, at least, believe that they have much to offer the SLA field (Gasser, 1990; Sokolik, 1990; Spolsky, 1988). Sokolik points out that connectionist principles are by no means new; what is new is the attempt to build connectionist models to test their explanatory power in a number of different fields. PDP theorists (Rumelhart, McClelland, & the PDP Research Group, 1986a, 1986b) have built computer models of human cognition based on what is known about the structure of the human brain. PDP theorists assume no innate endowment (although, as Gasser points out, these researchers are increasingly concerned with the initial state of the networks they have constructed). Learning is held to consist of the strengthening of connections in complex neural networks. The strength of their connections or their weight is

determined by the frequency of patterns in the input.

As the input is encoded, the computer reorganizes itself to reflect the new statistical relationships present in the input. After being presented with a number of correctly matched input and output patterns, the computer is presented with a novel set of items to see how it generalizes beyond what it has received as input (Sokolik, 1989). Interestingly, what results is performance that looks like rule-governed behavior (some forms are produced correctly, some are incorrect due to overgeneralizations), but which is simply a reflection of the connections formed on the basis of the relative frequency of patterns in the input. It has also been pointed out, however, that some of the computer output is not consonant with the performance of child L1 learners (i.e. some of the errors are not plausible from a human standpoint [Pinker & Prince, 1988]). “One possibility is that L2 learning may be associative in the connectionist sense, whereas L1 acquisition may be more rule-driven in the generative sense.” (Sokolik, 1989: 358) In any event, a model that learns without rules and which will account for at least “some performance without postulating competence” (Spolsky, 1989: 227) clearly has the potential to force us to rethink earlier assumptions.

### **Interactionist: Variable Competence Model**

Another theoretical perspective which would require a reexamination of the performance/competence distinction is a model which attempts to account for the external and internal processes responsible for SLA (Ellis, 1985). Recall that Tarone (1979) hypothesized that learners control a continuum of styles ranging from a superordinate style produced when the speaker pays the most attention to form, to a vernacular style produced when the least attention to form is given. Interlanguage data, Tarone (1983) argued, contradict what is called the “homogeneous competence” model of Chomsky, which assumes that there is a homogeneous competence of an ideal speaker-learner available for inspection through intuitional data. Instead, Tarone interprets the IL data to suggest that learners develop heterogeneous capability, which is systematic and which is composed of a range of styles, and Tarone maintains that the proper data for the study of this capability is natural speech.

Ellis (1985) is in substantial agreement with this position. Rather than viewing variability in the data at best as an inconvenience, Ellis places variability at the heart of his model. In the variable competence model, Ellis hypothesizes that free variation is crucial because it serves as the

impetus for development. (But see Preston, 1989.) New forms, he believes, first enter the learner's IL in the careful style of speech when learners are attending to form. Tarone (1990) suggests that they may enter the learner's IL due to conversational interactions with native speakers or possibly due to social convergence or Slobin's (1973) operating principles. Once the learner starts using them, the new forms are in free variation with existing forms, the new and the old coexisting without definably separate functions. Because this state is in violation of the efficiency principle (Ellis, 1990b) or Andersen's (1984) one-to-one principle, a second phase follows. During this replacement phase, learners seek to make maximum communicative use of the L2 resources they have by mapping one form onto one function. Therefore, each form in a pair is gradually restricted in use, i.e. takes on a particular range of target- and non-target-like forms. In Ellis' model, free variability is the force driving development; systematic variability then comes into play, determining what subsequently happens to newly acquired items.

### **A Broader View?**

The variable competence model rejects the customary distinction between competence and performance that is held to be axiomatic by UG researchers. It is this rejection that has led Gregg (1990) to assert that "variation ... is not the duty of an acquisition theorist to explain" (p.379). Gregg insists that a theory of acquisition should explain the acquisition of a speaker's knowledge, not merely describe the speaker's output.

Tarone (1990) rebuts Gregg's criticism, arguing that research on the acquisition of competence has not been particularly elucidating as so much of what is acquired is attributed to an innate capacity. Further, acquisition research from the two perspectives has different objectives, Tarone contends. The variationists seek to explain how knowledge gets realized as use, whereas those who prefer a UG approach take as their objective an explanation of competence or grammatical knowledge, "not the ability to do anything" (Widdowson, 1989: 129).

Theoretical perspectives, therefore, need to be assessed in terms of their purpose (Ellis, 1990b). Clearly, at the current, still early stage in SLA research, both perspectives (and others) are welcome.

The argument as to what kind of explanation, mentalist or functional, best fits the facts is an old one. Doubtlessly, it will continue in the years to come. It is an argument about what needs to be explained and what facts need



explaining. Any explanation that ignores what language is primarily for — communication — is incomplete and, therefore, unsatisfactory. But this does not mean that there are no aspects of language that are purely formal. Some undoubtedly are and will need to be explained in terms of abstract linguistic principles. Do we really need to engage in arguments about the relative merits of formal and functional explanations of language? Can we not accept that both are needed? (Ellis, 1990b: 390)

Certainly I would concur that multiple perspectives on acquisition are useful, especially since not all theories can be expected to do everything (Bialystok, 1990; Long, 1990b). However, there is reason to be circumspect in this regard: Despite the value of multiple perspectives (see, for example, Beebe, 1988), when we borrow perspective from other fields, we inherit their problems as well. (For example, UG principles keep changing, and within linguistics the theoretical status of variable rules is under debate.) Moreover, extant theories are not always complementary, and we have not yet agreed upon criteria by which to evaluate them (Beretta, 1991; Schumann, 1983). I would also, therefore, agree with Gass (1989), who notes that it is important for the vitality of the field that we establish some common ground regarding the intellectual basis and goals of the field. Although we have yet to achieve complete consensus on these, it seems to me that definitional issues are what these past two decades of research have been about: staking out the territory.

Some have suggested we need a general theory to encompass a wider area than our theories to date (Spolsky, 1989). Others have suggested that we may have to accept that a theory of SLA will be modular, each module explaining different domains of language (Lightbown & White, 1987). Hatch, Shirai, and Fantuzzi (1990) have called for an integrated theory of acquisition. While researchers must of necessity restrict the scope of their investigation and usually do so to one domain (most often it has been morphosyntax, less commonly, phonology; see Ioup & Weinberger, 1987), the dilemma is that everyone recognizes that the domains are interrelated (Eisenstein, Bailey, & Madden, 1982; Nunan, 1987; Pennington, 1990; Sato, 1988). To cite just one example of the problem, Odlin (1989) observes that transfer in one subsystem of language (lexis, syntax, morphology, etc.) will sometimes condition its occurrence in other subsystems. Thus, according to Hatch et al. (1990), a theory must include a much broader scope of research than that centered on two modules — syntax and phonology. It must also include semantics, conversational structure, event scripts and rhetorical

organization, but it must do so in a way that integrates the modules on the one hand and also allows them to be viewed separately. It follows, then, “that an attempt to explain acquisition by recourse to a single factor (for example motivation, comprehensible input, or the workings of an innate LAD [language acquisition device]) ... lacks face validity” (Long, 1990b: 661). Indeed, given the complexity of language, why should we expect an explanation of its acquisition to be simple (Larsen-Freeman, 1991)?

We will return to this theme later, but for now we should consider the other major focus in SLA research to date: the focus on the learner.

## THE LEARNER: DESCRIPTION

The question of differential success is one of the major conundrums of SLA: Why is it that all individuals with normal faculties successfully acquire their first language but meet with different degrees of success when they attempt to master an L2? A related issue is indeed whether complete success in acquiring an L2 is even possible when study is begun beyond a so-called critical age. In this section I will deal with the matter of age first, followed by a brief look at the other major factors which have been hypothesized to explain the facts of differential success: aptitude, social-psychological variables, personality, cognitive style and learning strategies.

### Age

As with so much in the fledgling SLA field, the issue of age-related effects in SLA is a contested one — in fact, even their very existence is controversial. (My sources for this section are primarily Long, 1990a, and Larsen-Freeman & Long, 1991, chapter 6.) The three books published in the late 1980s which explore the link between age and SLA will serve to illustrate the controversy. The first position is that only children, not adults, can attain native-like pronunciation in the L2 (Scovel, 1988a); the second finds that the data are ambiguous or mixed (Singleton, 1989). The third position holds that older learners enjoy an advantage over younger learners (Harley, 1986, reports evidence showing older learners are faster than younger ones). Opinion also varies about the scope of the alleged effects (only accent or other domains as well?) and the causes of such effects (affective factors, identity, cognitive maturation, input differences, neurological causes?).

Early on, Krashen, Long, and Scarcella (1979) (see also Krashen, Scarcella, & Long, 1982) reviewed the literature on age differences in second language acquisition and came to the conclusion that older learners are initially faster than younger learners when it comes to the acquisition of morphosyntax; however, younger learners outperform older learners in the long run. According to Long (1990a), despite the fact that numerous studies have been conducted since this early conclusion, the generalization seems to hold, “with the exception of some fuzziness in the area of phonology” (p.260).

### **Aptitude**

Obvious to the casual observer is the fact that individuals learn at different rates. Not so obvious to even the careful observer, however, is whether or not there is a special language learning aptitude which is the source of the difference. Certainly it has long been presumed that there is such a thing as language aptitude, and in fact there are several major tests which are commonly employed to measure it (Carroll, 1981). Some researchers, however, have questioned the existence of an *innate* linguistic aptitude (Neufeld, 1979). A solution to the dispute may lie in the distinction Cummins (1980) makes between cognitive/academic language proficiency (CALP) and basic interpersonal communication skills (BICS). It may be that aptitude tests are a good measure of CALP, or an individual’s ability to deal with decontextualized language (Skehan, 1982), which is a learned ability, but not a particularly good measure of BICS, an innate capacity. The fact that so much schoolwork involves CALP could explain the predictive power of aptitude tests on foreign language achievement. This is essentially Krashen’s (1981) position when he proposes that aptitude relates only to learning, not to acquisition. In a more recent account of aptitude, however, Skehan (1989) argues that aptitude plays a role in both informal and formal acquisition environments. He also proposes that there are different profiles of language aptitude; some learners possess an analytic aptitude, others are more memory-oriented. Wesche (1981) has shown how matching learners’ aptitude with methodology can lead to success, while mismatching can have deleterious effects.

### **Social-psychological Factors: Attitude and Motivation**

Along with aptitude, the social-psychological factors of attitude and motivation have long been thought to have an important bearing on

language learning success. In 1959 Gardner and Lambert were able to identify two factors which were responsible for the French proficiency of Anglophone students of French in Montreal: aptitude and a constellation of attitudes towards French Canadians including motivational intensity and integrative motivation. For Gardner and Lambert (cf. Gardner, 1979), there is actually an indirect relationship between attitude and successful SLA. Attitudes affect motivation, which in turn affects SLA.

Since Gardner and Lambert's pioneering research, much work has been done on refining the relationship among the constructs. Just in the area of attitudes alone, for example, learners' parents' attitudes towards speakers of the TL, attitudes of peers, learners' attitudes toward their learning situation, teachers' attitudes towards their students, and one's attitudes towards one's ethnicity were all studied for their influence on SLA.

In the area of motivation, the strength of learners' instrumental (a utilitarian motive for learning an L2) versus integrative (identification with L2 group) motivation has been measured to test predictions of their differential effect on L2 learning outcomes. Different researchers have reached different conclusions about hypothesized correlations depending upon the learner context; perhaps the only reliable finding is that the intensity of the motivation is more important than the type. Clearly more research is needed on the different influences on motivation. For example, in a study conducted by Strong (1984) on the acquisition of English by Spanish-speaking children living in the United States, it was concluded that motivation does not necessarily promote acquisition, but rather stems from it. The children in his study who met with success became more motivated to continue their study than those who were less successful.

### **Personality**

Various personality traits have been thought to facilitate or inhibit SLA: self-esteem (Heyde, 1979), extroversion (Busch, 1982), reaction to anxiety (Bailey, 1983; MacIntyre & Gardner, 1989), risk taking (Ely, 1986), sensitivity to rejection (Naiman, Fröhlich, Stern, & Todesco, 1978), empathy (Guiora, Brannon, & Dull, 1972), inhibition (Guiora et al., 1972), and tolerance of ambiguity (Chapelle & Roberts, 1986). Some of these traits have correlated positively with success in SLA; other findings have been inconclusive.

Two generalizations can be drawn from a review of the literature. First, often it appears that the optimal personality "setting" is a point midway between the two extremes, i.e. moderate anxiety can be facilitating

(Scovel, 1978); moderate risk taking is linked with achievement (Beebe, 1983). Second, it is difficult to predict an individual's behavior in a particular situation based on a global trait measurement. Although there no doubt exist some fairly consistent personality traits, more attention must be given to the relation between states and traits.

### **Cognitive Style**

Closely aligned with personality attributes is work on cognitive styles. A cognitive style is the preferred way in which individuals process information or approach a task (Willing, 1988). A few cognitive styles have been investigated for their SLA implications: field independence/dependence, category width, reflectivity/impulsivity, aural/visual, and analytic/gestalt. Cognitive styles are often presented in this fashion — as polarities. In actual fact, humans more commonly exhibit a tendency toward one pole or the other.

Of the cognitive styles which have been studied, field independence has most consistently shown a significant positive correlation with language learning achievement (Chapelle & Roberts, 1986; Hansen & Stansfield, 1981; Tucker, Hamayan, & Genesee, 1976). One puzzling consequence of this finding is that field dependence is often linked with empathy, and empathy has also been found to be correlated with language learning success. H. D. Brown (1977) offers a solution: He observes field independence may be more important to classroom learning, whereas field dependence and empathy may be more beneficial in an untutored language learning situation.

### **Learning Strategies**

The last learner factor to be discussed is one which has stimulated much interest recently. Again, we can look to the number of books that have been published as one sign of the vitality of this area (H. D. Brown, 1991; Cohen, 1990; O'Malley & Chamot, 1990; Oxford, 1990; Stevick, 1989; Wenden & Rubin, 1987).

Rubin (1975) used the term *learning strategies* to refer to “the techniques or devices which a learner may use to acquire knowledge” (p.43). Rubin compiled a list of strategies employed by good language learners. For example, good language learners are willing to guess when they aren't sure, attend to both form and meaning, and monitor their own and others' speech. Following Rubin's initiative, much of the research has focused upon identifying and classifying learning strategies. A second focus of the research

has been on determining the effect of strategy training. As we have seen in other areas, the results are not straightforward. It seems that the performance of students tutored in strategies is superior to the performance of students with no such training; however, the degree to which the training has been effective depends on the task, task difficulty, and the level of support for strategy transfer.

### **A Broadening of Perspective: Learner Factors**

Most of the research just reviewed involves simple correlations between a single individual variable and learner proficiency. This is problematic for the same reason that studying one subsystem of language cannot fully illuminate interrelated acquisition processes. As d'Anglejan and Renaud (1985) point out, learner variables inevitably overlap and interact. Thus, we are likely getting a distorted picture if we study one factor in isolation from others. More powerful multivariate analyses exist and should be employed to examine the relationship among learner factors. (See, for example, Gradman & Hanania, 1991.) Exacerbating the problem is our awareness that some of these variables may affect language proficiency only indirectly as has been postulated by Gardner with respect to attitudes and L2 learning.

As Seliger (1984) contends, “while many characteristics have been related correlationally to language achievement, we have no mechanism for deciding which of the phenomena described or reported to be carried out by the learner are in fact those that lead to language acquisition” (p.37). Perhaps if our sights were set higher — aspiring to explain how learner factors play a causal role in the acquisition process — we would be able to identify the truly important factors. This is precisely what some theorists like Schumann and Gardner have attempted to do.

## **LEARNER FACTORS: EXPLANATION**

### **The Acculturation/Pidginization Model**

Perhaps the earliest model to award centrality to learner factors was Schumann's acculturation/pidginization model (1978a, 1978b). The model developed from Schumann's observation of the untutored acquisition of English by Alberto, a 33-year-old, working-class Costa Rican living in the Boston area. Alberto lived in a Portuguese-speaking neighborhood and worked in a factory staffed by NNSs of English. Due to his limited

contact with English speakers, it is not surprising that Alberto was not a very successful language learner. Schumann explained Alberto's limited acquisition of English by pointing to Alberto's social and psychological distance from speakers of the TL. Social distance comprises eight group-level phenomena: social dominance, integration patterns, enclosure, cohesiveness, size, cultural congruence, attitudes, and intended length of residence. Psychological distance is a construct involving four factors operating at the level of the individual: language shock, culture shock, motivation, and ego permeability.

Noting the similarities which existed between the social and psychological dimensions of Alberto's learning context and the conditions associated with pidginization, Schumann claimed that the processes underlying pidginization and the early stages of naturalistic SLA were analogous. With acculturation (social and psychological proximity), the IL elaborates and develops much as in creolization. Schumann summarized his position by suggesting that SLA is one aspect of acculturation and thus the degree to which the learner acculturates to the TL group will control the degree to which the learner acquires the L2.

### **The Socioeducational Model**

What Schumann labels acculturation is similar in many ways to Gardner's notion of integrativeness, a central feature of Gardner's (1985) socioeducational model. Gardner's model also confers a high status on learner factors — attitudes and motivation, in particular. Also, like Schumann, Gardner emphasizes the social dimension of language acquisition: "The acquisition of a language involves social adjustment... Languages are acquired in order to facilitate communication, either active or passive, with some cultural community... Emotional adjustments are involved and these are socially based." (p.125)

Like the other models examined here, the socioeducational model was not intended to explain all of second language learning. It purports to account for a significant and meaningful proportion of the variance in second language achievement. If it withstands the test of time, it will certainly help to broaden our perspective on learner factors.

## **BROADENING STILL**

Despite the broadening in perspective that has occurred within our two foci, further expansion is desirable — and we are beginning to see

signs of it in the SLA field. At the Xth University of Michigan Conference on Applied Linguistics in 1983, I said:

I believe that [questions about learning and the learner] should not be addressed independently as they have been. I think it will not be the case that we will come to some understanding of the SLA process and then introduce learner variables and calculate their effect on the process. Likewise, I think we cannot fully understand what influences the learner apart from his or her engagement in the process of learning. (1985, p.434)

To cite one example in support of my observation on the interdependence of variables, Scarcella's (1990) review of Young's (1988) work highlights their independence: As L2 proficiency increased, social variables (learner) replaced linguistic ones (learning) as the more powerful influences on variation. The use of plural markers by low-proficiency learners was influenced by the markers' phonological environments. The performance of high-proficiency learners was more likely to be affected by the learners' degree of convergence (adjustment of speech toward) and identification with their interlocutor. We can see how intertwined are social and linguistic factors! (Even UG researchers, who choose to deal with linguistic factors only, will have to account for individual differences in some way. Language acquisition is not only a linguistic phenomenon.) Also implicit in this finding is the dynamic quality of the influential factors; they do not apply continuously, but rather affect learners at different points in their development.

Krashen, in his monitor model, recognized the need to take both learning (the acquisition/learning distinction) and learner (the affective filter) factors into account. More recent evidence of this trend is Schumann's (1990) attempt to introduce a cognitive dimension to his acculturation model and Sokolik's (1990) appeal to PDP models to explain learner differences due to age. I predict that increasing numbers of researchers will accept the challenge of integrating these two foci: learning and the learner.

Broadening our perspective to include tutored acquisition would also be desirable. Most of the research to date has dealt with natural or untutored acquisition, as researchers have operated under the tacit assumption that instruction was a variable (see, for example, Schumann, 1978c) which could be factored in after we arrived at some understanding of the natural process. While it is common practice when faced with complex systems to deal with one definable part at a time (Spolsky, 1988), I do not think that instruction



can be factored in later, any more than learner factors can be included after we have deciphered the learning process. Thus, researchers should not limit their goals to specifying what is minimally necessary for untutored SLA to occur, but rather, work with teachers in a collaborative manner to help define what is maximally effective in tutored acquisition. Besides, we have reason now to believe that tutored and untutored acquisition are more similar than different, at least in terms of exhibiting common developmental sequences (Ellis, 1989; Pienemann, 1984; Wode, 1981) and some, by no means all, common error types (Felix & Simmet, 1981; Lightbown, 1983; Pica, 1985).

SLA research has not directly answered questions about teaching, which is why a research agenda is needed for pedagogical concerns (Larsen-Freeman, 1990; Lightbown, 1985). Nevertheless, it has, and should, continue to offer enhanced understanding of the learning process and learners (Cohen, Larsen-Freeman, & Tarone, 1991; Cook, 1986; Ellis, 1990a; Hatch, Shirai, & Fantuzzi, 1990) and provide explanatory support for accepted teaching practices (Lightbown, 1985). The next section will distill from the research to date observations which should be relevant to teachers, although I realize that the “relevance resides in the individual” (G. Brown, 1990: 156).

## ISSUES OF RELEVANCE TO TEACHERS

There are general characteristics of the learning process and of language learners that teachers should be aware of. I list ten here and suggest some pedagogical implications for each.

1. *The learning/acquisition process is complex.* As has been evident throughout this review, simple solutions have evaded researchers for more than 20 years; I would not expect them in the future. There are many complex elements in the SLA puzzle. It is probable that acquisition/learning is not monolithic and that there are multiple subprocesses, multiple routes, and multiple causes. Teachers, therefore, cannot seek simplistic solutions. As Spolsky (1988) has written: “Any intelligent and disinterested observer knows that there are many ways to learn languages and many ways to teach them, and that some ways work with some students in some circumstances and fail with others. (This is why good language teachers are and always have been eclectic ...)” (p.383)
2. *The process is gradual.* Learners do not master forms with their first encounter. Even if they start using the form soon thereafter, the function for which they use it might not coincide with its TL use. Acquisition is a

gradual process involving the mapping of form, meaning, and use. Form/functional correspondences do not simply appear in the IL fully formed and error-free. In a pedagogical situation, it makes sense to recycle the presentations of forms (e.g. grammar structures) so that learners will have ample opportunity to work out form-function correspondences. A corollary to this is the acknowledgement that language learning takes time. A conservative estimate of the number of hours young first language learners spend “acquiring” their first language is 12,000–15,000 (Lightbown, 1985); our expectations of second language learning should be realistic.

3. *The process is nonlinear.* Learners do not tackle structures one at a time, first mastering one and then turning to another. Even when learners appear to have mastered a particular form, it is not uncommon to find backsliding occurring when new forms are introduced, presumably due to an underlying restructuring (McLaughlin, 1990) which is taking place. Teachers should not despair when such behavior is exhibited by their students, but should rather expect well-formedness to be restored eventually.
4. *The process is dynamic.* The factors that influence the learner and the cognitive strategies the learner adopts change over time. As Gleick (1987) put it: “The act of playing the game has a way of changing the rules.” (Quoted in Diller, 1990: 238) Teachers should know that what works for learners at one level of proficiency may not do so when learners are at a later stage of proficiency.
5. *Learners learn when they are ready to do so.* What evidence exists suggests that learners will only acquire that for which they are prepared. One empirically supported explanation was offered by Pienemann (1985), who demonstrated that developmental sequences arise from speech processing constraints. The sequences themselves do not appear to be alterable through instruction, so it may not be realistic for teachers to expect students to master aspects of the language which are too far beyond their current stage of development (Brindley, 1987).
6. *Learners rely on the knowledge and experience they have.* Second language learners are active participants in the learning process. They rely on what they know (their L1 or other languages they have mastered, or what they know of the TL) to formulate hypotheses. They then test these against the input to which they are exposed, or at least that part of it that they notice (Schmidt, 1990).
7. *It is not clear from research findings what the role of negative evidence is in helping learners to reject erroneous hypotheses they are currently entertaining* (Carroll & Swain, 1991). It is intuitively appealing, at any rate, to believe that learners can make use of such feedback when it is judicious and they are ready and have time to digest it (Birdsong, 1989; Schachter, 1991).

Another tentative conclusion which can be drawn is that a deliberate focus on the formal properties of language or “consciousness raising” (Rutherford & Sharwood Smith, 1988: 3) does seem to promote accuracy, at least (Lightbown & Spada, 1990).

8. *For most adult learners, complete mastery of the L2 may be impossible.* Learners can get very good, of course, and a few may even be indistinguishable from native speakers in their command of the L2; however, for most, some aspects of their IL will likely fossilize before acquisition is complete, and for all (nearly all?), there appears to be a physiologically determined critical period for pronunciation. Teachers obviously should encourage learners to go as far as they are capable of going in the L2, but teachers should also be realistic in their expectations.
9. *There is tremendous individual variation among language learners.* Teachers need to take into account these differences and learn to work with them in the classroom — herein lies the interpretive artistry of teaching.
10. *Learning a language is a social phenomenon.* Most (although by no means all) learners seek to acquire a second language in order to communicate with members of the TL group or to participate in their institutions. Much of what happens in the classroom, too, is attributable to the social needs of the participants, both students and teachers (Breen, 1985; Prahbu, 1991).

As I have indicated above, none of these generalizations should be startling to teachers, nor are they precise enough to be prescriptive. They might fit more into the category of expanding awareness or affirming customary practice. What is important is that teachers integrate these and any other generalizations distilled from research into their own experiential framework in guiding their decisions as teachers (Scovel, 1988b).

## A FINAL REMARK

In an editorial I wrote for *Language Learning* in 1980, I described the field of SLA in transition from infancy to adolescence. In 1985 I wrote in the same journal that SLA had arrived at older adolescence — surer of itself as a separate discipline while still enjoying the vigor of youth. If I may be permitted to extend the analogy once again, I would have to say that developmentally SLA has entered young adulthood. Matters of identity should no longer be of central concern. As the field enjoys the privileges of adulthood, however, we must also remember the responsibility which accompanies privilege. Forced to adopt a narrow perspective in our research due to practical constraints, we need to acknowledge the

limitations of our points of view. What I hope researchers will be able to achieve is what teachers must also accomplish: preserving a detailed focus on the particular or individual, while simultaneously holding the whole.

## Notes

1. Certainly some important studies of language learning were conducted prior to this (see, for example, some of the early studies compiled in Hatch, 1978), but these did not constitute a field of investigation as was to emerge in the 1970s.
2. It is beyond the scope of this article to treat either of these comprehensively. Interested readers may wish to consult overviews by Ellis (1985), and Larsen-Freeman and Long (1991) for more detail. I have especially drawn upon the latter in writing this review. I will also be unable to deal with matters concerning research methodology in this article. Interested readers should see J. D. Brown (1988), Hatch and Lazaraton (1991), Kasper and Grotjahn (1991), and Seliger and Shohamy (1989).
3. The sequence described in this section follows from Hakuta and Cancino (1977), and van Els, Bongaerts, Extra, van Os, and Janssen-van Dielen (1984).
4. In fact, each of these areas was the theme of at least one conference. The series of three applied linguistics conferences at the University of Michigan during the decade, for example, addressed language transfer (1982), input (1983), and variation (1987).
5. Some of the more prominent among these being Krashen's monitor model (1985), Hatch and Hawkins' experiential approach (1985); Bialystok and Ryan's knowledge and control dimensions (1985); McLaughlin's cognitive theory (1987); the multidimensional model (Pienemann & Johnston, 1987; Clahsen, 1987); Andersen's cognitive interactionist model (1988), and the functionalist perspective (Tomlin, 1990).

## References

- Adamson, H. D. (1988). *Variation Theory and Second Language Acquisition*. Washington, DC: Georgetown University Press.
- Adjemian, C. (1976). On the nature of interlanguage systems. *Language Learning*, 26(2): 297-320.
- Allwright, R. (1988). *Observation in the Language Classroom*. London: Longman.
- Andersen, R. (1984). The one to one principle of interlanguage construction. *Language Learning*, 34(4): 77-95.
- Andersen, R. (1988). Models, processes, principles, and strategies: Second language

- acquisition in and out of the classroom. *IDEAL*, 3: 111–138.
- Bailey, K. M. (1983). Competitiveness and anxiety in adult second language learning: Looking at and through the diary studies. In H. Seliger & M. Long (Eds.), *Classroom Oriented Research in Second Language Acquisition* (pp.67–103). Rowley, MA: Newbury House.
- Beebe, L. (1980). Sociolinguistic variation and style shifting in second language acquisition. *Language Learning*, 30(2): 433–447.
- Beebe, L. (1983). Risk-taking and the language learner. In H. Seliger & M. Long (Eds.), *Classroom Oriented Research in Second Language Acquisition* (pp.39–66). Rowley, MA: Newbury House.
- Beebe, L. (Ed.). (1988). *Issues in Second Language Acquisition: Multiple Perspectives*. New York: Newbury House/Harper & Row.
- Beebe, L. & J. Zuengler. (1983). Accommodation theory: An explanation for style shifting in second language dialects. In N. Wolfson & E. Judd (Eds.), *Sociolinguistics and Second Language Acquisition* (pp.195–213). Rowley, MA: Newbury House.
- Beretta, A. (1991). Theory construction in SLA: Complementarity and opposition? *Studies in Second Language Acquisition*, 13(3): 451–512.
- Bialystok, E. (1990). The competence of processing: Classifying theories of second language acquisition. *TESOL Quarterly*, 24(4): 635–648.
- Bialystok, E. & E. Ryan. (1985). A metacognitive framework for the development of first and second language skills. In D. L. Forrest-Pressley, G. E. MacKinnon & T. G. Waller (Eds.), *Metacognition, Cognition, and Human Performance* (pp.207–249). Orlando, FL: Academic Press.
- Birdsong, D. (1989). *Metalinguistic Performance and Interlinguistic Competence*. Berlin: Springer-Verlag.
- Bley-Vroman, R. (1983). The comparative fallacy in interlanguage studies: The case of systematicity. *Language Learning*, 33(1): 1–17.
- Bley-Vroman, R. (1989). The logical problem of foreign language acquisition. In S. Gass & J. Schachter (Eds.), *Linguistic Perspectives on Second Language Acquisition* (pp.41–68). Cambridge: Cambridge University Press.
- Blum-Kulka, S. & E. Olshtain. (Eds.). (1984). Pragmatics and second language learning (Special issue). *Applied Linguistics*, 5(3).
- Breen, M. (1985). The social context for language learning — A neglected situation? *Studies in Second Language Acquisition*, 7(2): 135–158.
- Brindley, G. (1987). Verb tenses and TESOL. In D. Nunan (Ed.), *Applying Second Language Acquisition Research* (pp.173–204). Adelaide, Australia: National Curriculum Resource Center.
- Brown, G. (1990). Pit Corder: A personal memory. *Second Language Research*, 6(2): 155–158.
- Brown, H. D. (1977). Cognitive and affective characteristics of good language learners. In C. Henning (Ed.), *Proceedings of the Los Angeles Second Language Research Forum*

- (pp.349–354). Los Angeles: University of California, Department of English.
- Brown, H. D. (1991). *Breaking the Language Barrier: Finding Your Path to Success*. Yarmouth, ME: Intercultural Press.
- Brown, J. D. (1988). *Understanding Research in Second Language Learning*. Cambridge: Cambridge University Press.
- Burmeister, H. & P. Rounds. (Eds.). (1990). *Variability in Second Language Acquisition* (Vols. 1–2). Eugene: University of Oregon, Department of Linguistics.
- Busch, D. (1982). Introversion-extroversion and the EFL proficiency of Japanese students. *Language Learning*, 32(1): 109–132.
- Carroll, J. (1981). Twenty-five years of research on foreign language aptitude. In K. Diller (Ed.), *Individual Differences and Universals in Language Learning Aptitude* (pp.83–118). Rowley, MA: Newbury House.
- Carroll, S. & M. Swain. (1991, February-March). Negative evidence in second language learning. Paper presented at the Eleventh Annual Second Language Research Forum, University of Southern California.
- Cazden, C., H. Cancino, E. Rosansky & J. Schumann. (1975). *Second Language Acquisition Sequences in Children, Adolescents and Adults*. Washington, DC: National Institute of Education.
- Chapelle, C. & C. Roberts. (1986). Ambiguity tolerance and field independence as predictors of proficiency in English as a second language. *Language Learning*, 36(1): 27–45.
- Chaudron, C. (1988). *Second Language Classrooms: Research on Teaching and Learning*. Cambridge: Cambridge University Press.
- Clahsen, H. (1981). *Spracherwerb in der Kindheit*. Tübingen, Germany: Gunter Narr.
- Clahsen, H. (1987). Connecting theory of language processing and (second) language acquisition. In C. Pfaff (Ed.), *First and Second Language Acquisition Processes* (pp.103–116). New York: Newbury House/Harper & Row.
- Clahsen, H. & P. Muysken. (1986). The accessibility of universal grammar to adult and child learners: A study of the acquisition of German word order. *Second Language Research*, 2: 93–119.
- Clahsen, H. & P. Muysken. (1989). The UG paradox in L2 acquisition. *Second Language Research*, 5(1): 1–29.
- Cohen, A. (1990). *Language Learning: Insights for Learners, Teachers and Researchers*. New York: Newbury House/HarperCollins.
- Cohen, A., D. Larsen-Freeman & E. Tarone. (1991, April). The contribution of SLA theories and research to teaching language. Paper presented at the RELC Regional Seminar.
- Cook, V. (Ed.). (1986). *Experimental Approaches to Second Language Learning*. Oxford: Pergamon Press.
- Corder, S. P. (1967). The significance of learners' errors. *International Review of Applied Linguistics*, 5(4): 161–170.
- Crookes, G. (1989). Planning and interlanguage variation. *Studies in Second Language*

- Acquisition*, 11(4): 367–383.
- Cummins, J. (1980). The cross-lingual dimensions of language proficiency: Implications for bilingual education and the optimal age issue. *TESOL Quarterly*, 14(2): 175–188.
- d'Anglejan, A. & C. Renaud. (1985). Learner characteristics and second language acquisition: A multivariate study of adult immigrants and some thoughts on methodology. *Language Learning*, 35(1): 1–19.
- Day, D. (Ed.). (1986). *Talking to Learn: Conversations in Second Language Acquisition*. Rowley, MA: Newbury House.
- Dechert, H. & M. Raupach. (Eds.). (1989). *Transfer in Language Production*. Norwood, NJ: Ablex.
- Diller, K. (1990). The non-linearity of language-learning and “post-modern” language teaching methods. In H. Burmeister & P. Rounds (Eds.), *Variability in Second Language Acquisition* (pp.333–343). Eugene: University of Oregon, Department of Linguistics.
- Dulay, H. & M. Burt. (1974). Natural sequences in child second language acquisition. *Language Learning*, 24(1): 37–53.
- Dulay, H., M. Burt & S. Krashen. (1982). *Language Two*. New York: Oxford University Press.
- Eckman, F. (1985). The markedness differential hypothesis: Theory and applications. In B. Wheatley, A. Hastings, F. Eckman, L. Bell, G. Krukar & R. Rutkowski (Eds.), *Current Approaches to Second Language Acquisition: Proceedings of the 1984 University of Wisconsin-Milwaukee Linguistics Symposium* (pp.3–21). Bloomington: Indiana University Linguistics Club.
- Eisenstein, M. (Ed.). (1989). *The Dynamic Interlanguage: Empirical Studies in Second Language Variation*. New York: Plenum.
- Eisenstein, M., N. Bailey & C. Madden. (1982). It takes two: Contrasting tasks and contrasting structures. *TESOL Quarterly*, 16(3): 381–393.
- Ellis, R. (1985). *Understanding Second Language Acquisition*. Oxford: Oxford University Press.
- Ellis, R. (1989). Are classroom and naturalistic acquisition the same? A study of the classroom acquisition of German word order rules. *Studies in Second Language Acquisition*, 11(3): 305–328.
- Ellis, R. (1990a). *Instructed Second Language Acquisition*. Oxford: Basil Blackwell.
- Ellis, R. (1990b). A response to Gregg. *Applied Linguistics*, 11(4): 384–391.
- Ellis, R. (Ed.). (1987). *Second Language Acquisition in Context*. Englewood Cliffs, NJ: Prentice-Hall.
- Ely, C. (1986). An analysis of discomfort, risktaking, sociability, and motivation in the L2 classroom. *Language Learning*, 36(1): 1–25.
- Faerch, C. & G. Kasper. (Eds.). (1983). *Strategies in Interlanguage Communication*. London: Longman.
- Felix, S. (1985). More evidence on competing cognitive systems. *Second Language Research*, 1: 47–72.
- Felix, S. (1988). UG-generated knowledge in adult second language acquisition. In S.

- Flynn & W. O'Neil (Eds.), *Linguistic Theory in Second Language Acquisition* (pp.277–294). Dordrecht, Netherlands: Kluwer Academic.
- Felix, S. & A. Simmet. (1981, May). Natural processes in classroom learning. Revised version of a paper presented at the III<sup>me</sup> Colloque Group de Recherche sur l'Acquisition des Langues, Paris.
- Felix, S. & W. Weigl. (1991). Universal grammar in the classroom: Effects of formal instruction on second language acquisition. *Second Language Research*, 7(2): 162–181.
- Flynn, S. (1983). A study of the effects of principal branching direction second language acquisition: The generalization of a parameter universal grammar from first to second language acquisition. Unpublished doctoral dissertation. Cornell University, Ithaca, NY.
- Flynn, S. (1987). *A Parameter-setting Model of L2 Acquisition*. Dordrecht, Netherlands: Reidel.
- Flynn, S. & W. O'Neil. (Eds.). (1988). *Linguistic Theory and Second Language Acquisition*. Dordrecht, Netherlands: Kluwer Academic.
- Gaies, S. (1977). The nature of linguistic input in formal second language learning. In H. Brown, C. Yorio & R. Crymes (Eds.), *On TESOL '77* (pp.204–212). Washington, DC: TESOL.
- Gardner, R. (1979). Social psychological aspects of second language acquisition. In H. Giles & R. St. Clair (Eds.), *Language and Social Psychology*. Oxford: Basic Blackwell.
- Gardner, R. (1985). *Social Psychology and Second Language Learning: The Role of Attitudes and Motivation*. London: Edward Arnold.
- Gardner, R. & W. Lambert. (1959). Motivational variables in second language acquisition. *Canadian Journal of Psychology*, 13: 266–272.
- Gass, S. (1989). Language universals and second-language acquisition. *Language Learning*, 39(4): 497–534.
- Gass, S. & C. Madden. (Eds.). (1985). *Input in Second Language Acquisition*. Rowley, MA: Newbury House.
- Gass, S., C. Madden, D. Preston & L. Selinker. (Eds.). (1989a). *Variation in Second Language Acquisition: Vol. 1. Discourse and Pragmatics*. Clevedon, Avon, England: Multilingual Matters.
- Gass, S., C. Madden, D. Preston & L. Selinker. (Eds.). (1989b). *Variation in Second Language Acquisition: Vol. 2. Psycholinguistic Issues*. Clevedon, Avon, England: Multilingual Matters.
- Gass, S. & E. Varonis. (1985). Task variation and nonnative/nonnative negotiation of meaning. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition* (pp.149–161). Rowley, MA: Newbury House.
- Gass, S. & J. Schachter. (Eds.). (1989). *Linguistic Perspectives on Second Language Acquisition*. Cambridge: Cambridge University Press.
- Gass, S. & L. Selinker. (Eds.). (1983). *Language Transfer in Language Learning*. Rowley, MA: Newbury House.



- Gasser, M. (1990). Connectionism and universals of second language acquisition. *Studies in Second Language Acquisition*, 12(2): 179–199.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Viking.
- Gradman, H. & E. Hanania. (1991). Language learning background factors and ESL proficiency. *Modern Language Journal*, 75(1): 39–51.
- Gregg, K. (1990). The variable competence model of second language acquisition and why it isn't. *Applied Linguistics*, 11(4): 364–383.
- Guiora, A., R. Brannon & C. Dull. (1972). Empathy and second language learning. *Language Learning*, 22(1): 111–130.
- Hakuta, K. (1976). A case study of a Japanese child learning English as a second language. *Language Learning*, 26(2): 321–351.
- Hakuta, K. & H. Cancino. (1977). Trends in second language acquisition. *Harvard Educational Review*, 47: 294–316.
- Hansen, J. & C. Stansfield. (1981). The relationship of field dependent-independent cognitive styles to foreign language achievement. *Language Learning*, 31(2): 349–367.
- Harley, B. (1986). *Age in Second Language Acquisition*. Clevedon, Avon, England: Multilingual Matters.
- Hatch, E. (1978). Discourse analysis and second language acquisition. In E. Hatch (Ed.), *Second Language Acquisition: A Book of Readings* (pp.402–435). Rowley, MA: Newbury House.
- Hatch, E. (1983). *Psycholinguistics: A Second Language Perspective*. Rowley, MA: Newbury House.
- Hatch, E. & A. Lazaraton. (1991). *The Research Manual*. New York: Newbury House/HarperCollins.
- Hatch, E. & B. Hawkins. (1985). Second-language acquisition: An experiential approach. In S. Rosenberg (Ed.), *Advances in Applied Psycholinguistics* (Vol. 2, pp.241–283). New York: Cambridge University Press.
- Hatch, E., Y. Shirai & C. Fantuzzi. (1990). The need for an integrated theory: Connecting modules. *TESOL Quarterly*, 24(4): 697–716.
- Heyde, A. (1979). The relationship between self-esteem and the oral production of a second language. Unpublished doctoral dissertation. University of Michigan, Ann Arbor.
- Hilles, S. (1986). Interlanguage and the pn-drop parameter. *Second Language Research*, 2(1): 33–52.
- Huebner, T. (1985). System and variability in interlanguage syntax. *Language Learning*, 35(2): 141–163.
- Hulk, A. (1991). Parameter setting and the acquisition of word order in L2 French. *Second Language Research*, 7(1): 1–34.
- Hyltenstam, K. (1984). The use of typological markedness conditions as predictors in second language acquisition: The case of pronominal copies in relative clauses. In R. Andersen (Ed.), *Second Language: A Crosslinguistic Perspective* (pp.39–58). Rowley,

MA: Newbury House.

- Johnston, M. (1985). Syntactic and morphological progressions in learner English [Research report]. Department of Immigration and Ethnic Affairs, Australia.
- Jordens, P. (1988). The acquisition of word order in Dutch and German L1 and L2. *Second Language Research*, 4(1): 41–65.
- Kasper, G. & R. Grotjahn. (Eds.). (1991). Methods in second language research. *Studies in Second Language Research*, 13(2).
- Kellerman, E. (1984). The empirical evidence for the influence of the interlanguage. In A. Davies, C. Cramer & A. Howatt (Eds.), *Interlanguage* (pp.98–122). Edinburgh: Edinburgh University Press.
- Kellerman, E. (1985). If at first you do succeed. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition* (pp.345–353). Rowley, MA: Newbury House.
- Kellerman, E. & M. Sharwood Smith. (Eds.). (1986). *Cross-linguistic Influence in Second Language Acquisition*. Oxford: Pergamon Press.
- Krashen, S. (1977). Some issues relating to the monitor model. In H. Brown, C. Yorio & R. Crymes (Eds.), *On TESOL '77* (pp.144–158). Washington, DC: TESOL.
- Krashen, S. (1981). *Second Language Acquisition and Second Language Learning*. Oxford: Pergamon Press.
- Krashen, S. (1982). *Principles and Practice in Second Language Acquisition*. Oxford: Pergamon Press.
- Krashen, S. (1985). *The Input Hypothesis: Issues and Implications*. New York: Longman.
- Krashen, S., M. Long & R. Scarcella. (1979). Age, rate, and eventual attainment in second language acquisition. *TESOL Quarterly*, 13(4): 573–582.
- Krashen, S., R. Scarcella & M. Long. (Eds.). (1982). *Child-adult Differences in Second Language Acquisition*. Rowley, MA: Newbury House.
- Labov, W. (1969). Contraction, deletion and inherent variability of the English copula. *Language*, 45(4): 715–762.
- Lantolf, J. & M. Ahmed. (1989). Psycholinguistic perspectives on interlanguage variation: A Vygotskian analysis. In S. Gass, C. Madden, D. Preston & L. Selinker (Eds.), *Variation in Second Language Acquisition: Psycholinguistic Issues*. Clevedon, Avon, England: Multilingual Matters.
- Larsen-Freeman, D. (1985). State of the art on input in second language acquisition. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition* (pp.433–444). Rowley, MA: Newbury House.
- Larsen-Freeman, D. (1990). On the need for a theory of language teaching. In J. Alatis (Ed.), *Georgetown University Round Table on Languages and Linguistics 1990* (pp.261–270). Washington, DC: Georgetown University Press.
- Larsen-Freeman, D. (1991). Teaching grammar. In M. Celce-Murcia (Ed.), *Teaching English as a Second or Foreign Language* (2<sup>nd</sup> edn., pp.279–296). New York: Newbury House/HarperCollins.
- Larsen-Freeman, D. & M. Long. (1991). *An Introduction to Second Language Acquisition*

- Research. London: Longman.
- Larsen-Freeman, D. (Ed.). (1980). *Discourse Analysis in Second Language Research*. Rowley, MA: Newbury House.
- Lightbown, P. (1983). Exploring relationships between developmental and instructional sequences in L2 acquisition. In H. Seliger & M. Long (Eds.), *Classroom Oriented Research in Second Language Acquisition* (pp.217–243). Rowley, MA: Newbury House.
- Lightbown, P. (1985). Great expectations: Second language acquisition research and classroom teaching. *Applied Linguistics*, 6(2): 173–189.
- Lightbown, P. & L. White. (1987). The influence of linguistic theories on language acquisition research. *Language Learning*, 37(4): 483–510.
- Lightbown, P. & N. Spada. (1990). Focus-on-form and corrective feedback in communicative language teaching: Effects on second language learning. *Studies in Second Language Acquisition*, 12(4): 429– 448.
- Long, M. (1980). Input, interaction and second language acquisition. Unpublished doctoral dissertation. University of California, Los Angeles.
- Long, M. (1985). Input and second language acquisition theory. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition* (pp.377–393). Rowley, MA: Newbury House.
- Long, M. (1990a). Maturation constraints on language development. *Studies in Second Language Acquisition*, 12(3): 251–285.
- Long, M. (1990b). The least a second language acquisition theory needs to explain. *TESOL Quarterly*, 24(4): 649–666.
- Loup, G. & S. Weinberger. (Eds.). (1987). *Interlanguage Phonology: The Acquisition of a Second Language Sound System*. New York: Newbury House.
- MacIntyre, P. & R. Gardner. (1989). Anxiety and second-language learning: Toward a theoretical clarification. *Language Learning*, 39(2): 251–275.
- Mazurkewich, I. (1985). Syntactic markedness and language acquisition. *Studies in Second Language Acquisition*, 7(1): 15–35.
- McLaughlin, B. (1987). *Theories of Second-language Learning*. London: Edward Arnold.
- McLaughlin, B. (1990). Restructuring. *Applied Linguistics*, 11(2): 113–128.
- Meisel, J., H. Clahsen & M. Pienemann. (1981). On determining developmental stages in natural second language acquisition. *Studies in Second Language Acquisition*, 3(1): 109–135.
- Naiman, N., M. Fröhlich, H. Stern & A. Todesco. (1978). *The Good Language Learner* (Research in Education Series No. 7). Toronto: The Ontario Institute for Studies in Education.
- Neufeld, G. (1979). Towards a theory of language learning ability. *Language Learning*, 29(2): 227–241.
- Nunan, D. (1987). Methodological issues in research. In D. Nunan (Ed.), *Applying Second Language Acquisition Research* (pp.143–171). Adelaide, Australia: National Curriculum Resource Center.

- Odlin, T. (1989). *Language Transfer: Cross-linguistic Influence in Language Learning*. Cambridge: Cambridge University Press.
- Oller, J. W. & J. C. Richards. (Eds.). (1973). *Focus on the Learner: Pragmatic Perspectives for the Language Teacher*. Rowley, MA: Newbury House.
- O'Malley, J. & A. Chamot. (1990). *Learning Strategies in Second Language Acquisition*. Cambridge: Cambridge University Press.
- Oxford, R. (1990). *Language Learning Strategies: What Every Teacher Should Know*. New York: Newbury House/HarperCollins.
- Pankhurst, J., M. Sharwood Smith & P. van Buren. (Eds.). (1988). *Learnability and Second Languages: A Book of Readings*. Dordrecht, Netherlands: Foris.
- Pavesi, M. (1986). Markedness, discursial modes, and relative clause formation in a formal and an informal context. *Studies in Second Language Acquisition*, 8(1): 38–55.
- Pennington, M. (1990). The context of L2 phonology. In H. Burmeister & P. Rounds (Eds.), *Variability in Second Language Acquisition* (pp.541–564). Eugene: University of Oregon, Department of Linguistics.
- Pica, T. (1985). The selective impact of classroom instruction on second language acquisition. *Applied Linguistics*, 6(3): 214–222.
- Pienemann, M. (1984). Psychological constraints on the teachability languages. *Studies in Second Language Acquisition*, 6(2): 186–214.
- Pienemann, M. (1985). Learnability and syllabus construction. In K. Hyltenstam & M. Pienemann (Eds.), *Modelling and Assessing Second Language Development*. Clevedon, Avon, England: Multilingual Matters.
- Pienemann, M. & M. Johnston. (1987). Factors influencing the development of language proficiency. In D. Nunan (Ed.), *Applying Second Language Acquisition Research* (pp.45–141). Adelaide, Australia: National Curriculum Resource Center.
- Pinker, S. & A. Prince. (1988). On language and connectionism: Analysis of a parallel distributed processing model of language acquisition. *Cognition*, 28(1–2): 73–193.
- Prahu, N. S. (1991, March). The dynamics of the language lesson. Paper presented at the 25th Annual TESOL Convention, New York City.
- Preston, D. (1989). *Sociolinguistics and Second Language Acquisition*. Oxford: Basil Blackwell.
- Rubin, J. (1975). What the “good language learner” can teach us. *TESOL Quarterly*, 9(1): 41–51.
- Rumelhart, D., J. McClelland & the PDP Research Group. (1986a). *Parallel Distributed Processing: Explorations in the Microstructures Cognition: Vol. I. Foundations*. Cambridge, MA: MIT Press.
- Rumelhart, D., J. McClelland & the PDP Research Group. (1986b). *Parallel Distributed Processing: Explorations in the Microstructures Cognition: Vol. II. Psychological and Biological Models*. Cambridge, MA: MIT Press.
- Rutherford, W. & M. Sharwood Smith. (Eds.). (1988). *Grammar and Second Language Teaching*. New York: Newbury House/Harper & Row.

- Sato, C. (1985). Task variation in interlanguage phonology. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition* (pp.181–196). Rowley, MA: Newbury House.
- Sato, C. (1988). Origins of complex syntax in interlanguage development. *Studies in Second Language Acquisition*, 10(3): 371–395.
- Scarcella, R. (1990). Review of Variation in second language acquisition (Vols. 1 & 2). *Studies in Second Language Acquisition*, 12(4): 458–460.
- Schachter, J. (1974). An error in error analysis. *Language Learning*, 24: 205–214.
- Schachter, J. (1983). A new account of language transfer. In S. Gass & L. Selinker (Eds.), *Language Transfer in Language Learning* (pp.98–111). Rowley, MA: Newbury House.
- Schachter, J. (1988). Second language acquisition and its relationship to universal grammar. *Applied Linguistics*, 9(3): 219–235.
- Schachter, J. (1990). On the issue of completeness in second language acquisition. *Second Language Research*, 6(2): 93–124.
- Schachter, J. (1991). Corrective feedback in historical perspective. *Second Language Research*, 7(2): 89–102.
- Schachter, J. & M. Celce-Murcia, M. (1977). Some reservations concerning error analysis. *TESOL Quarterly*, 11(4): 441–451.
- Schachter, J. & W. Rutherford. (1979). Discourse function and language transfer. *Working Papers on Bilingualism*, 19: 3–12.
- Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics*, 11(2): 129–158.
- Schumann, J. (1978a). *The Pidginization Process: A Model for Second Language Acquisition*. Rowley, MA: Newbury House.
- Schumann, J. (1978b). The acculturation model for second language acquisition. In R. Gingras (Ed.), *Second Language Acquisition and Foreign Language Teaching* (pp.27–50). Washington, DC: Center for Applied Linguistics.
- Schumann, J. (1978c). Social and psychological factors in second language acquisition. In J. C. Richards (Ed.), *Understanding Second & Foreign Language Learning* (pp.163–178). Rowley, MA: Newbury House.
- Schumann, J. (1979). The acquisition of English negation by speakers of Spanish: A review of the literature. In R. Andersen (Ed.), *The Acquisition and Use of Spanish and English as First and Second Languages* (pp.3–32). Washington, DC: TESOL.
- Schumann, J. (1983). Art and science in second language acquisition research. In M. Clark & J. Handscombe (Eds.), *On TESOL '82: Pacific Perspectives on Language Learning and Teaching* (pp.107–124). Washington, DC: TESOL.
- Schumann, J. (1990). Extending the scope of the acculturation/pidginization model to include cognition. *TESOL Quarterly*, 24(4): 667–684.
- Schumann, J. & N. Stenson. (Eds.). (1974). *New Frontiers in Second Language Learning*. Rowley, MA: Newbury House.
- Scovel, T. (1978). The effect of affect on foreign language learning: A review of the anxiety research. *Language Learning*, 28(1): 129–142.

- Scovel, T. (1988a). *A Time to Speak: A Psycholinguistic Inquiry into the Critical Period for Human Speech*. New York: Newbury House/Harper & Row.
- Scovel, T. (1988b). Multiple perspectives make singular teaching. In L. Beebe (Ed.), *Issues in Second Language Acquisition* (pp.167–190). New York: Newbury House/Harper & Row.
- Seliger, H. (1984). Processing universals in second language acquisition. In F. Eckman, L. Bell & D. Nelson (Eds.), *Universals of Second Language Acquisition* (pp.36–47). Rowley, MA: Newbury House.
- Seliger, H. & E. Shohamy. (1989). *Second Language Research Methods*. Oxford: Oxford University Press.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10(3): 209–231.
- Selinker, L. & D. Douglas. (1985). Wrestling with “context” in interlanguage theory. *Applied Linguistics*, 6(2): 190–204.
- Singleton, D. (1989). *Language Acquisition: The Age Factor*. Clevedon, Avon, England: Multilingual Matters.
- Skehan, P. (1982). Memory and motivation in language aptitude testing. Unpublished doctoral dissertation, University of London.
- Skehan, P. (1989). *Individual Differences in Second-language Learning*. London: Edward Arnold.
- Slobin, D. (1973). Cognitive prerequisites for the development of grammar. In C. Ferguson & D. Slobin (Eds.), *Studies of Child Language Development* (pp.175–208). New York: Appleton-Century-Crofts.
- Sokolik, M. (1989). Comments on Bernard Spolsky’s “Bridging the gap: A general theory of second language learning”. *TESOL Quarterly*, 23(2): 359.
- Sokolik, M. (1990). Learning without rules: PDP and a resolution of the adult language learning paradox. *TESOL Quarterly*, 24(4): 685–696.
- Spolsky, B. (1988). Bridging the gap: A general theory of second language learning. *TESOL Quarterly*, 22(3): 377–396.
- Spolsky, B. (1989). *Conditions for Second Language Learning*. Oxford: Oxford University Press.
- Stevick, E. (1989). *Success with Foreign Languages: Seven Who Found It and What Worked for Them*. Hemel Hempstead, England: Prentice Hall.
- Strong, M. (1984). Integrative motivation: Cause or result of successful second language acquisition? *Language Learning*, 34(3): 1–14.
- Swain, M. (1985). Communicative competence: Some roles of comprehensible input and comprehensible output in its development. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition* (pp.235–253). Rowley, MA: Newbury House.
- Tarone, E. (1979). Interlanguage as chameleon. *Language Learning*, 29(1): 181–191.
- Tarone, E. (1983). On the variability of interlanguage systems. *Applied Linguistics*, 4(2): 142–163.

- Tarone, E. (1988). *Variation in Interlanguage*. London: Edward Arnold.
- Tarone, E. (1990). On variation in interlanguage: A response to Gregg. *Applied Linguistics*, 11(4): 392–400.
- Taylor, B. (1975). The use of overgeneralization and transfer learning strategies by elementary and intermediate students in ESL. *Language Learning*, 25(1): 73–107.
- Tomaselli, A. & B. Schwartz. (1990). Analyzing the acquisition stages of negation in L2 German: Support for UG in adult SLA. *Second Language Research*, 6(1): 1–38.
- Tomlin, R. (1990). Functionalism in second language acquisition. *Studies in Second Language Acquisition*, 12(2): 155–178.
- Tucker, G., E. Hamayan & F. Genesee. (1976). Affective, cognitive and social factors in second language acquisition. *Canadian Modern Language Review*, 32: 214–226.
- van Els, T., T. Bongaerts, G. Extra, C. van Os & A. Janssen-van Dielen. (1984). *Applied Linguistics and the Learning and Teaching of Foreign Languages*. London: Edward Arnold.
- van Lier, L. (1988). *The Classroom and the Language Learner*. London: Longman.
- Wagner-Gough, J. (1975). *Comparative Studies in Second Language Learning* (CAL-ERIC/CLL Series on Languages and Linguistics No. 26). Washington, DC: Center for Applied Linguistics.
- Wenden, A. & J. Rubin. (Eds.). (1987). *Learning Strategies in Language Learning*. Englewood Cliffs, NJ: Prentice Hall.
- Wesche, M. (1981). Language aptitude measures in streaming, matching students with methods, and diagnosis of learning problems. In K. Diller (Ed.), *Individual Differences and Universals in Language Learning Aptitude* (pp.119–139). Rowley, MA: Newbury House.
- White, L. (1988). Island effects in second language acquisition. In S. Flynn & W. O'Neil (Eds.), *Linguistic Theory in Second Language Acquisition* (pp.144–172). Dordrecht, Netherlands: Kluwer Academic.
- White, L. (1989). *Universal Grammar and L2 Acquisition*. Amsterdam: John Benjamins.
- White, L. (1990). Second language acquisition and universal grammar. *Studies in Second Language Acquisition*, 12(2): 121–133.
- Widdowson, H. (1989). Knowledge of language and ability for use. *Applied Linguistics*, 10(2): 128–137.
- Willing, K. (1988). *Learning Styles in Adult Migrant Education*. Adelaide, Australia: National Curriculum Resource Center.
- Wode, H. (1978). Developmental sequences in naturalistic L2 acquisition. In E. Hatch (Ed.), *Second Language Acquisition: A Book of Readings* (pp.101–117). Rowley, MA: Newbury House.
- Wode, H. (1981). Language-acquisitional universals: A unified view language acquisition. In H. Winitz (Ed.), *Native Language and Foreign Language Acquisition* (Annals of the New York Academy of Sciences, No. 379, pp.218–234). New York: New York Academy of Sciences.

- Wong Fillmore, L. (1976). The second time around: Cognitive and social strategies in second language acquisition. Unpublished doctoral dissertation, Stanford University, Palo Alto, CA.
- Young, R. (1988). Variation and the interlanguage hypothesis. *Studies in Second Language Acquisition*, 10(3): 281–302.
- Zobl, H. (1982). A direction for contrastive analysis: The comparative study of developmental sequences. *TESOL Quarterly*, 16(2): 169–183.
- Zobl, H. (1983). Markedness and the projection problem. *Language Learning*, 33(3): 293–313.
- Zobl, H. (1990). Evidence for parameter-sensitive acquisition: A contribution to the domain-specific versus central processes debate. *Second Language Research*, 6(1): 39–59.

## Comment after Chapter 5

In the article that you have just read, I did indeed stake out a large territory. What needed description and explanation of the SLA “territory” had clearly expanded. In concluding the article, I described the learning process as complex, nonlinear, and dynamic, among other characteristics. These early observations were the harbinger of my new interest in complex dynamic systems. The seeds took time to germinate, and I will return to them in the article after the one that follows this commentary.

In the meantime, I wanted to tackle a number of what I called “myths” that I had found troubling concerning a more specific topic: the learning (and teaching) of grammar. These entailed definitions of what grammar is. For instance, I do not think that it is simply about linguistic form. Grammar is a resource for making meaning in a contextually-appropriate way. It is also a myth to think about grammar structures’ being acquired one by one like beads on a string or that all three dimensions of grammar structures (i.e. their form, meaning, and use) are learned in the same way. However, the one myth that I thought was most deserving of challenge was the claim that grammar could be learned naturally, without being taught. It is undeniable that language can be learned without instruction. Millions of immigrants learn another language without tutoring. However, not all learners are successful in this endeavor and not all learn to the same extent or to the level that they wish to achieve. Therefore, I felt compelled to point out what good instruction could offer.



A variant on this myth is what I termed “the reflex fallacy”, the false belief that the natural process of language acquisition outside the classroom should be imitated in it. It seems to me that this is false because instruction facilitates and accelerates the learning of a language. It should not emulate what happens in the environment; it should build on natural learning processes. To this end, here (and elsewhere), I have recommended teaching “grammaring”, i.e. teaching grammar as a skill, which allows students to be able to use grammar structures (not just know about them) for their own purposes (Larsen-Freeman, 2003, 2007).

While discussing the teaching and learning of grammar might seem to be a departure from the central focus of this book on SLA, I think it is actually quite consistent. First of all, much SLA research has addressed the acquisition of morphosyntax. Second, I have learned a great deal from studying the acquisition of grammar, particularly, the need to understand and to teach grammar more as process than a product, a theme you will see present in the following article. Finally, in my collaboration at UCLA (University of California, Los Angeles) with Marianne Celce-Murcia, I have learned how to appreciate the interconnections between grammar and the other resources humans have for making meaning and how grammar operates at many levels of language, including discourse (Larsen-Freeman & Celce-Murcia, 2015). This richer view of grammar invites an expanded view of its learning.

## **References**

- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Grammaring*. Boston: Heinle/Cengage.
- Larsen-Freeman, D. (Series Director). (2007). *Grammar Dimensions: Form, Meaning, and Use* (4<sup>th</sup> edn.). Boston: Heinle/Cengage.
- Larsen-Freeman, D. & M. Celce-Murcia. (2015). *The Grammar Book: Form, Meaning and Use for English Language Teachers* (3<sup>rd</sup> edn.). Boston, MA: Cengage/National Geographic Learning.



# Chapter 6

## On the Teaching and Learning of Grammar: Challenging the Myths

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### INTRODUCTION

There are a number of myths in circulation today about the teaching and learning of grammar. The following are but ten of them:

1. Grammar structures are meaningless forms. They are the skeleton, the bones of the language.
2. Grammar consists of arbitrary rules; the acquisition of the rules is also a somewhat arbitrary process.
3. Grammar structures are learned one at a time.
4. Grammar structures operate at the sentence and subsentence levels only.
5. Grammars are complete inventories; they explain all the structures in a language.
6. Grammar is an area of knowledge like vocabulary (as opposed to a skill like reading, writing, speaking, or listening).
7. Grammar is acquired naturally; it doesn't have to be taught.
8. Learners will eventually bring their performance into conformity with the target language; error correction is unnecessary.
9. All aspects of grammatical structures are learned in the same way.
10. Grammar teaching and learning are boring.

I will mercifully stop at ten; there are others, and I am sure readers will have their own lists as well. It is no doubt also true that some would not agree with my assessment of these as myths. Bearing in mind the theme of this book, *Second Language Acquisition: Theory and Pedagogy*, I will use second language acquisition (SLA) research and theory to demonstrate that certain of these are indeed myths. SLA theory will be invoked to refute numbers 1–3. SLA theory has also, in my opinion, contributed several items to the list.

I will discuss these as well (Nos. 7–9). Then, in the spirit of reciprocity, I will consider what SL pedagogy can contribute to SLA theory. Next, I will point to some areas where I believe a collaborative effort between theorists and pedagogues would be welcome. Finally, I will conclude with an important caveat concerning the application of SLA theory. To begin with, then, how has SLA theory helped to counter some of these myths?

## COUNTERING MYTHS 1–3

### **Myth 1: Grammar Structures Are Meaningless Forms**

Perhaps this myth is a holdover from transformational grammar, in which forms in a language were described without appeal to meaning. As forms, grammatical structures were characterized by their morphology and syntax alone. Judging from a survey of pedagogical materials, I think it is clear that this assumption persists today. Textbooks introduce learners to grammatical structures by delineating their formal properties. It is not uncommon today, for example, to find materials introducing ESL/EFL students to the passive voice in English by demonstrating how a passive sentence is derived from its active counterpart. The transformationalists' regard for the autonomy of syntax is manifest in this purely form-based description. Similarly, the follow-up to such an introduction is often a series of exercises in which students are instructed to transform active sentences into passive ones. To my mind, such an introduction to the passive voice is very misleading. Passive and active sentences sometimes have different meanings and always serve very different purposes. Moreover, the long-term challenge in acquiring the passive voice in English is not learning how to form it, but rather learning when to use it, that is, learning which discourse contexts favor the passive voice and which do not.

The reason I say that SLA research can refute Myth 1 is that quite early on in the evolution of the SLA field it was pointed out that the acquisition of the form of a grammatical structure was incomplete without the concomitant acquisition of its function. Wagner-Gough (1975) was the first, I believe, to make this point in print. Her subject, Homer, a five-year-old Farsi speaker, used the *-ing* morpheme very early in his acquisition of English, as did the other subjects being reported on in the morpheme acquisition studies at the time. What Wagner-Gough noticed in Homer's performance, however, was that he used *-ing* not only for its target function but also to signal an imperative function. Other researchers that expanded on this theme were Andersen (1977), who demonstrated the folly of talking about the acquisition

of the English article as though it were one structure, thus obscuring its many semantic uses; Bahns and Wode (1980), whose German-speaking subject used *didn't* for some time as a past-tense marker before he used it as a negator; and Huebner (1980), whose Hmong-speaking adult subject used a general Wh-question marker (*waduyu*) for all Wh-question words (e.g. *Waduyu kam from?* for *Where are you from?* and *Waduyu kam?* for *Why did you come?*). It is obvious, then, that one cannot talk about the acquisition of a form unless its function is also considered. Indeed, it is often said these days that the language acquisition process is all about learning to map form on function or form and meaning.

I think it is worth pointing out that when we elect to use two terms in tandem as a shorthand — form and function, or form and meaning — we should never lose sight of the fact that there are really three dimensions with which we need to be concerned: form, meaning, and function (use) (Larsen-Freeman, 1991). To return to the passive for our example, we can clearly see that there are three dimensions that must be mastered before any learner can be said to have acquired it. Its form requires a “be” verb (the final auxiliary verb), a past participle, a transitive main verb, and when present, the “by” preposition before the agent. We also should acknowledge its meaning as conferring focus on the theme or receiver of the action, rather than the agent, as happens in canonical word order, and the fact that passive sentences may convey a meaning different from that of the active voice with the same agent and theme. Finally its use: When or why is it used instead of the active voice? The answers are numerous: when the theme is the topic, when the agent is unknown or redundant or when one wishes to conceal it, etc.

Thus, with some impetus from SLA research and a little reflection, we have come to realize that grammatical structures are more than forms; therefore, their acquisition must entail more than learning how to form the structures. It must also include learning what they mean and when and why to use them as well. This awareness is extremely important from a pedagogical standpoint, of course, because as language teachers will attest, the learning challenge for students is not accuracy alone but meaningful and appropriate use as well. As such, grammar teaching does not mean merely teaching forms, and it is certainly not limited to teaching explicit form-based rules.

### **Myth 2: Grammar Consists of Arbitrary Rules; Their Acquisition Is Also a Somewhat Arbitrary Process**

I am afraid arguing against the first half of this myth will take me

too far from my foregrounded objectives in this chapter, i.e. discussing the process of teaching and learning grammar. Suffice it to say that much of the apparent arbitrariness of grammar rules is dispelled when we look at language from a discourse perspective; that is, viewing language from this perspective helps us to see why the rules are the way they are. For the second half of this myth, I summarize what the SLA theory of interlanguage (Selinker, 1972) — which has been so fundamental to our understanding of the language acquisition process for the past two decades or so — has to say about the arbitrariness of the process.

Far from being arbitrary, learner interlanguages are thought to exhibit a fair degree of systematicity and order. Systematicity does not mean that learners use structures in a targetlike manner from their first exposure. What it does mean is that like natural languages, interlanguages (ILs) appear to be rule-governed. There is variability in learner performance, to be sure, but it is typically systematic, that is, learners use certain forms erroneously by target-speaker standards but consistently as a response to certain extralinguistic factors such as task demands (Hulstijn & Hulstijn, 1984; Larsen-Freeman, 1975); topic, setting, and interlocutors (Bell, 1984), attention to form (Tarone, 1988), and planning time available (Crookes, 1989). There does seem to be some random or free variation, such as when a learner produces *no go* and *don't go* within moments of each other under seemingly identical conditions (Ellis, 1985). In fact, there is a fair degree of synchronic variability. Structures do co-occur with temporally and developmentally earlier constructions, and yet change over time follows established paths.

Many explanations for these developmental paths have been put forth, running the gamut from psychological explanations such as the shedding of speech-processing strategy constraints (Clahsen, 1987; Pienemann, 1985), and the invoking of Slobin-like operating principles (Andersen, 1988), to environmental ones having to do with factors in the input such as frequency of occurrence, perceptual saliency, or factors arising out of interaction with speakers of the target language (Larsen-Freeman, 1975; Lightbown, 1983; Long, 1980), and to linguistic ones having to do with markedness directionality (Eckman, 1981) and Universal Grammar (UG) principles and parameter resetting (e.g. Bley-Vroman, 1986; Flynn, 1987; Schachter, 1988; White, 1985). Continuing with our story of interlanguage I will address Myth 3.

**Myth 3: Grammar Structures Are Learned One at a Time**  
IL theory posits that progress is not linear. Language acquisition is

not a matter of steadily accumulating structural entities (Rutherford, 1987: 4). Backsliding is common, giving rise to so-called U-shaped behavior (Kellerman, 1985). Development is gradual, but occasionally there is a fundamental overhaul or restructuring of the underlying grammar (McLaughlin, 1990). A good example of this type of restructuring is reported in the work of Meisel, Clahsen, and Pienemann (1981). They reported that learners of German in their study would sometimes omit items that the learners had previously appeared to master. The omissions involved certain forms over which learners had to move other forms. McLaughlin (1990) speculated that this apparent backsliding resulted from a temporary restructuring of the system that involved an omission of certain elements to allow for the development of other elements. Thus, the acquisition of structures is interdependent and not a matter of simple aggregation.

## **SLA THEORY: HELPING US TO UNDERSTAND GRAMMAR LEARNING AND TRANSFORM TEACHING**

As was just seen, SLA theory has been helpful in challenging the first three myths about the learning of grammar. Before moving on, I would like to underscore the significance of the contribution of SLA theory to the understanding of the learning of grammar. Although the description of SLA that I have just given may seem commonplace by now, remember that in the historical context in which it arose, SLA was a radical departure. Before SLA researchers began looking at learning and the learner in the early 1970s, both had been virtually ignored, at least in modern times. So even if this description of the SLA process does not withstand the test of time, SLA theory has already performed a great service for second language pedagogy by helping us to see learners as rightful partners in any pedagogical enterprise.

This view of language acquisition has influenced language pedagogy in encouraging learner-centered teaching. Learner centeredness, combined with the shift to a focus on communicative competence, has helped to transform the language teaching field dramatically in the past twenty years. Instead of an explicit focus on language itself, there has been an emphasis on learners' expressing their own meanings through language. This in turn has led to a greater tolerance for errors in learners' performance and the creation of opportunities for learners to use the language in more authentic and spontaneous ways (Lightbown & Spada, 1990: 430).

## A MEGAMYTH AND THE REFLEX FALLACY

Another application of an SLA theory to pedagogy has been the claim that learners can develop greater communicative abilities through instruction that more closely resembles the characteristics of a “natural”, that is, untutored, environment. It has been argued by Krashen (1982, 1985) and others that given suitable exposure to the target language, SLA can proceed in much the same manner as child language acquisition, where a learner’s performance gradually approximates and then matches the environmental input. This is a radical reconceptualizing of second language pedagogy, to be sure. But although we appreciate that SLA theory forces us to reexamine long-standing assumptions about second language pedagogy, it would be prudent to interject a note of caution. It seems to me that the biggest myth of all, a megamyth if you will, is the assumption that what works in natural language acquisition should automatically become the pedagogy of the classroom. It may turn out to be effective, but this should not be assumed a priori.

Whether or not there are fundamental differences between tutored and untutored acquisition processes (currently a contentious issue), why should it be assumed that features of natural acquisition are superior to those that occur in instructional settings? In a recent study, for example, Buczowska and Weist (1991: 548), whose subjects were Polish adults learning English in Poland, reported that “in the domain of temporal location, tutored L2 learners do not follow the course of acquisition that is prototypical for L1 learners or untutored L2 learners, and deviations from the untutored L2 pattern [in L2 teaching] can facilitate rather than impede the acquisition process”.

Indeed, I would strenuously object to the assumption that because certain conditions exist in naturalistic acquisition, our objective as teachers should be to emulate them to the best of our abilities. I have called this “the reflex fallacy”. “The fallacy lies in the assumption that teaching is an involuntary reflex of natural acquisition such that what is present and natural in untutored acquisition should be present in abundance in classroom instruction, and what is absent in natural acquisition should be prohibited in the classroom” (Larsen-Freeman, 1990: 262). The goal of SLA theory is to identify what is minimally necessary for SLA to occur. What is minimally necessary for SLA to take place outside the classroom does not automatically constitute the most effective means of learning in the classroom (Cohen, Larsen-Freeman, & Tarone, 1991). One would hope that effective teaching would accelerate the natural process. “The basis of schooling is the assumption that nature can be improved



on by artifice” (Widdowson, 1992). Yet sometimes SLA researchers have taken the unwarranted step of proscribing or prescribing pedagogical practices on the basis of their findings from untutored acquisition (Larsen-Freeman, 1990). As a teacher, I do not ask myself what is minimally necessary for my students to learn but rather what I can give my students that will maximize their learning. It is important that SL teachers know about SLA theory so they can complement natural processes, but their job is to stimulate learning rather than to emulate acquisition.

I believe that there are a few myths that have arisen from the reflex fallacy. It is to these that I will turn next.

## CONTRIBUTING TO THE MYTHS

### **Myth 7: Grammar Is Acquired Naturally; It Doesn't Have to Be Taught**

Taken at face value, the first half of Myth 7 is demonstrably true. Some untutored L2 learners are successful acquirers of second language grammars, and SLA theory does need to account for their success.<sup>1</sup> Nevertheless, this item deserves the myth designation because not all untutored learners successfully acquire L2 grammars. Moreover, even if all learners were successful in acquiring L2 grammars without grammar instruction, the second half of Myth 7 is not an inevitable consequence. It does not necessarily follow that grammar should not be taught. As I have argued previously, pedagogy cannot be wholly informed by reductionist explanations of natural acquisition. In light of the discussion just completed, a better question would be, what value is there, if any, in teaching grammar or of focusing on form, as it has come to be called?<sup>2</sup> Are learners who receive grammar instruction better off than those whose attention is not drawn in any way to the formal features of the code? My interpretation of the research conducted so far yields an affirmative answer to this question.

Research providing evidence that meaning-focused instruction alone does not necessarily lead to grammatical accuracy comes from the much-studied Canadian French immersion programs. “These programs are referred to by Krashen (1984) as ‘communicative programs par excellence’ since the focus is almost exclusively on meaning through subject-matter instruction rather than on the form of the language itself.” (Lightbown & Spada, 1990: 431) Much good has come from these programs. Young classroom learners who receive this content-based instruction develop

productive repertoires in French. It has been demonstrated, however, that although children learn to speak French fluently, their accuracy in French syntax and morphology is still far below what one might expect of learners who have spent several years immersed in the second language (Harley & Swain, 1984). "Less salient morphosyntactic features of the target system, incongruent with the L1 and/or not crucial for comprehension or for getting meaning across may fail to become intake" (Harley, 1993b: 11), possibly because of the self-reinforcing nature of peer interlanguage, "Indeed, some observers have concluded that French immersion is the best demonstration of the inadequacy of CLT" (Hammerly, 1987; see also Lightbown & Spada, 1990: 431), since students become "dysfunctional bilinguals who can convey messages but do so very ungrammatically" (Hammerly, 1992: 215). In fact, it is considered enough of a problem in Canada that "the improvement of immersion children's oral and written grammar has been identified as a major priority by immersion educators . . ." (Day & Shapson, 1991: 26–27).

It is not my intent to detract from the success of immersion education. Indeed I have already asserted that much good has been achieved through it. It seems reasonable, however, to seek ways to address its inadequacy while preserving the good that has come from it.<sup>3</sup> My position is that the acknowledged weakness of immersion education can be overcome by selective form-focused instruction. Research has already been initiated by Harley (1989), Day and Shapson (1991) and Lyster (1993) in French immersion programs which shows that form-focused instruction makes a positive impact on the IL development of students who have had several years of communicative language use. In the Day and Shapson study, for example, the experimental group of Grade 7 early French immersion students performed significantly higher on accuracy in the use of conditionals than a control group who had played no linguistic games with conditionals and had not received any metalinguistic instruction, as had the experimental group. Other studies that have corroborated the value of form-focused instruction, or "input enhancement" activities, to use Sharwood Smith's (1991) term, are Gass (1982), Pienemann (1984), Zobl (1985), Eckman, Bell, and Nelson (1988), Tomasello and Herron (1988, 1989) (but cf. Doughty, 1991; Ellis, 1989; Lightbown, 1991; Spada & Lightbown, 1993; Valdman, 1993; White, 1991; White, Spada, Lightbown, & Ranta, 1991; Zhou, 1992). Although admittedly some of these endorsements are weakened because they could not demonstrate a longterm effect for

instruction (e.g. Harley, 1989; White, 1991), it does not necessarily follow that focus on form does not affect the learners' internalized language systems, as Schwartz and Gubala-Ryzak (1992) concluded. As Harley (1993b) observed, alternative interpretations of the forgetting are possible.<sup>4</sup>

Moreover, Krashen (1991) did accept the Lightbown and Spada (1990) study as demonstrating an effect for form-focused instruction. In a post hoc description of some specific classroom events and outcomes, Lightbown and Spada used a modified version of the COLT (Communicative Orientation to Language Teaching) instrument to collect observational data on four classes of French-speaking students. The macrolevel analyses indicated that all four classes were primarily communicative in their approach and that classroom interaction focused on meaning most of the time. However, the four teachers differed from each other in terms of the total amount of time they gave to form-focused activities.

In class 1, where the most form-focused instruction was provided, the learners were most accurate in their use of the progressive *-ing*, were more likely to use the presentational forms preferred by native speakers (*there is* rather than *you have*), and were at a more advanced stage with their use of possessive determiners. Students in class 4 had the lowest accuracy on all the features examined in the analysis of spontaneous language samples. The teacher in this class was the only one who virtually never focused — however briefly — on grammar. (Lightbown & Spada, 1990: 443)

It should be noted, however, that students in class 4 showed no disadvantage in their overall performance.

Why is form-focused instruction effective in dealing with morphosyntax? Perhaps it is because focusing student attention facilitates intake. Certainly this is what Schmidt (1990) reported for his own acquisition of Portuguese in Brazil. Schmidt was convinced that he usually noticed forms in the out-of-class input only after they were taught — and only then did he begin to acquire them. According to Schmidt, "Noticing is the necessary and sufficient condition for converting input to intake" (1990: 129). Indeed in terms of information-processing theory, it is necessary for learners to attend to the forms they are learning. So giving increased salience to forms, especially perceptually nonsalient forms, is one possible explanation for form-focused instruction being helpful. Other reasons might be that with form focus, learning transfer from marked to unmarked forms is facilitated (more on this later), and provision of negative evidence might help to destabilize an incorrect rule (Long & Crookes, 1992).

With respect to negative evidence, I turn to the next myth.

### **Myth 8: Learners Will Eventually Bring Their Performance into Conformity with the Target Language; Error Correction Is Unnecessary**

There is currently a debate in the field over whether negative evidence (e.g. a teacher's correction of a learner's utterance) is needed. Krashen (1981 and elsewhere) has argued that the only data necessary for acquisition are the actually occurring linguistic forms provided by native speakers in communicative situations. The universal grammar (UG) model for SLA adopts this same theoretical premise. Learners are thought to be equipped with a set of principles that constrain their hypotheses such that the only data necessary for acquisition are actually occurring linguistic forms. Mere exposure to these "positive" data are thought to trigger the appropriate setting of a parameter in the case of L1, or to reset the L1 parameter in the case of L2 (Schachter, 1986: 221). This position has arisen out of the need for UG theorists to explain "how it is that learners can avoid being trapped in an overgeneralization from which escape without provision of disconfirming evidence would theoretically not be possible" (Rutherford, 1993: 4), part of the so-called logical problem.

However, some UG theorists have come to believe that negative evidence may play a more significant role in L2 acquisition than was first hypothesized. White (1987), in her discussion of Krashen's input hypothesis, argued that comprehensible input in and of itself does not eliminate overgeneralizations. A native speaker of French who treats English like French will produce utterances such as those in (1) if the speaker relies on positive evidence alone:

- (1) a. John drank his coffee slowly.  
 b. Slowly, John drank his coffee.  
 c. John slowly drank his coffee.  
 d. \*John drank slowly his coffee.

There is nothing in positive evidence from English to inform the learner that the last example is ungrammatical. Hence, White asks, how can learners learn of the nonoccurrence of a particular possibility if they have no access to negative evidence? It is worth noting that White believes that UG is in operation but that negative evidence may be a requisite in L2 acquisition although it is not in L1. Others have interpreted the need for negative

evidence as a sign that L2 learning is fundamentally different from L1 acquisition and have concluded that second language learners do not rely on UG (because learners no longer have access to it) at all (Bley-Vroman, 1990). Still others do not accept the need for negative evidence in SLA (Schwartz & Gubala-Ryzak, 1992; Schwartz, 1993), holding firmly to the notion that L1 and L2 acquisition processes are the same and can be explained through the theory of UG, which requires positive evidence alone.

So certainly there is a controversy. It might be helpful to recall, however, that SLA theorists are concerned with specifying what is minimally necessary for acquisition to proceed. Second language educators are concerned with maximizing effectiveness. For this reason alone, second language pedagogy should derive comfort from the studies of Tomasello and Herron (1988, 1989), Trahey and White (1993), and most recently, Carroll and Swain (1993), which offer support for the value of negative evidence or feedback in SLA. The Carroll and Swain study is worth summarizing, because their study included several different types of feedback mechanisms. Subjects were divided into five groups according to which type of feedback they received when they made an error in dative alternation in English. Group A subjects were given metalinguistic information when they made an error; Group B subjects were simply told that their response was wrong; Group C subjects were corrected when they erred and were given a model of the desired response; Group D subjects, when they made an error, were asked if they were sure about their response. The fifth group was the control group, which received no feedback at all. What the researchers found was that all four of their experimental groups, which received some sort of feedback when they erred, outperformed the control group, which received only positive evidence of acceptable dative alternation syntax. The authors tentatively concluded that their study "lends empirical support to Schachter's claim that indirect as well as direct forms of feedback can help adult second language learners learn abstract linguistic generalizations" (Carroll & Swain, 1993: 373).

Before becoming too complacent about this issue, however, we should note two often-cited observations in SLA: the first has to do with the fact that learners do not receive adequate feedback because only a small percentage of their errors are corrected, and even these are not always dealt with consistently (e.g. Allwright, 1975). The second concerns the question of why learners' errors often seem resistant to revision even in the presence of correction (Cohen & Robbins, 1976). Is it the case, as

Schwartz (1993) suggests, that even when negative data are abundant, learners do not necessarily incorporate them into their IL system in order to make changes? Certainly this is counterintuitive and would call into question traditional pedagogical practice. Nevertheless, whether negative data can initiate change in a learner's underlying grammar is an important question and one likely to motivate much future research.<sup>5</sup> The last myth I will discuss in this section of this chapter is Myth 9.

### **Myth 9: All Aspects of Grammatical Structures Are Learned in the Same Way**

I am aware of no SLA theory that claims explicitly that there is a single mechanism that accounts for the acquisition of all aspects of grammatical structures; however, some models, such as UG theory, seem to imply that this is the case. Calling Number 9 a myth is my way of warning second language educators to avoid presuming that there is a simple solution to an issue as complex as the nature of the grammar acquisition process. Any claim to the effect that all acquisition is the product of habit formation or of rule formation, or today, of setting/resetting parameters or the strengthening of connections in complex neural networks, is an obvious oversimplification of a complex process. The problem is not that our view of acquisition changes or differs. My concern is with the expectation that all of SLA will be explicable by a single process. With language as complicated as it is, why should we expect that a single process will account for all of it (Larsen-Freeman & Long, 1991)?

Some researchers are more circumspect. They acknowledge the complexity by pointing to a modular view of language and warn that we should refrain from generalizing across modules (Sharwood Smith, 1993). Schwartz (1993: 159) stated: "The lexicon is learned in a distinct manner from syntax. Indeed, lexical items must be learned. Aspects of syntax are not learned in this sense; they grow." Whether one agrees with this characterization of syntax and lexicon acquisition or not, certainly the underlying assumption of disparate learning processes is sensible. In fact, I have carried this line of reasoning further (Larsen-Freeman, 1991) by arguing that even within a module (here syntax), different aspects are learned through different means. I cannot go into this claim, in any detail here, but consider the analysis of the passive voice. I submit that learning how to form the passive voice is different from learning what it means and when and why to use it. As such, I have suggested that we need to

teach diverse aspects of grammar structures differently. Meaningful drills contribute to syntactic fluency; they are unlikely to enhance learners' understanding of the semantics or pragmatics governing the choice of particular structures.

## SL PEDAGOGY'S CONTRIBUTION TO SLA THEORY

We now come to reciprocity. I think SL teachers can contribute to SLA theory by constantly reminding theorists of the need to broaden their perspectives. Although it is perfectly acceptable for a theorist to concentrate on one aspect of a problem at a time, a comprehensive theory of second language acquisition must account for a number of phenomena with which language teachers have been acquainted for some time but which current theories have ignored. Teachers are known to draw on a number of theories to create a blend in practice. I do not believe that their eclecticism stems from capriciousness. I think it can be attributed to the fact that teachers confront the complexity of language, learning, and language learners every day of their working lives. This experience reinforces in teachers the conviction that no unitary view of the three will account for what teachers must grapple with on a daily basis.

There are a number of things that teachers know that no current theory of SLA explains.

1. A theory should provide an account of learner differences, including differences in rate of acquisition and ultimate attainment. Although the literature is vast now and grows bigger every day, not much has been noted about success or failure with regard to particular language modules, save for the age differences cited for phonology. But all teachers know that every learner with whom they work is unique. For this reason, as Tomlin (1990) suggested, SLA is a problem of individuals. "A proper account of SLA must be an account of how individuals learn second languages. . . . Thus, statements of the knowledge represented in an IL grammar, of the cognitive processes activated during second language learning, or of the social contexts favoring or inhibiting SLA must be statements that hold true for individuals." (p.157)
2. The theory should account for the fact that successful learning takes place for some learners regardless of the method employed (Stevick's riddle). As much as we are reluctant to admit it, it is not true that the grammar-translation method or ALM failed to produce communicatively competent individuals. Certainly some students were successful. Why they succeeded

- when they did needs to be explained in any comprehensive theory of SLA.
3. The theory should account for learning of grammar that does not manifest itself in performance. Every teacher knows that learning is taking place even when it is not visible. But SLA research has traditionally relied on rather arbitrary thresholds in performance data (including grammaticality judgments) for evidence of learning.<sup>6</sup> This is a limitation that must be overcome.
  4. The theory must account for the fact that SLA is not merely a linguistic problem. Although it is true that researchers have been exploring learnability constraints, it is not enough to investigate the relationship between knowledge representations for language and their role in constraining acquisition. One must also identify and describe the cognitive mechanisms that account for changes of state in the individual's interlanguage grammar (Long, 1990). By the same token, it must be acknowledged that cognitive psychological descriptions of second language learning also provide only a partial account of SLA and need to be linked with linguistic theories in order to explain such linguistic phenomena as markedness and linguistic universals (McLaughlin, 1990: 126). Furthermore, Wolfe Quintero (1992: 42) noted that UG theory must also account for how *learners acquire morphological and lexical features of the target language* that are language specific and are not instantiations of principles of UG. Currently, morphological and lexical exceptions are considered part of a marked, peripheral grammar, the learning of which is left unexplained within UG theory.

Pointing out that theorists have been selective in their foci is not a criticism, provided that claims that emanate from partial theories are duly modest. Lest we grow too satisfied with our theories, language teachers will be happy to remind us that SLA is a multidimensional phenomenon; by doing so, they will keep us humble. I now turn to the collaborative nature of theory and practice.

## THE COLLABORATIVE NATURE OF THEORY AND PRACTICE

It is not my intention to call for teachers and researchers to collaborate on research projects because this has already been advocated by others. Instead I propose to treat questions of concern to teachers as items for SLA research agendas. Theorists might have more impact on practice if they dealt with issues that teachers wrestle with all the time. To a certain extent they already do, but more such research is needed. Let me nominate five issues:



**1. Learner Readiness.** Teachers do not need SLA researchers to tell them that learners only learn when they are ready. What teacher has not had the experience of teaching some aspect of grammar on Friday, feeling reasonably satisfied that the students learned it, and then finding out on Monday that all of the effort was in vain? More important, is there a way to detect when learners are ready to learn? Pienemann's (1984) experiment, in which he showed that Italian schoolchildren made progress in learning subject-verb inversion in German only when they were at the stage to benefit from the instruction they were offered is tantalizing to language teachers searching for the most efficient way to use their limited time with their students. Will Pienemann's "teachability hypothesis" hold up under further scrutiny if it is tested against more subjects than the few in his first two studies (1984, 1986)? And if so, will it help teachers to determine when to provide focused instruction to coincide with the learner's next stage along a developmental continuum? This would truly be a contribution.

**2. Focus Selectivity.** Teachers know they cannot teach it all. There is too little time for one thing. Are there aspects of structures that if focused upon would yield greater learning efficiency than others? Gass' (1982) experiment teaching relative clause formation is pertinent here. Gass demonstrated that if learners are taught to relativize marked structures (in her case to relativize objects of the preposition in English), they will not only learn to do this but will generalize their learning to being able to relativize unmarked structures as well. Replicating and extending the Gass experiment, Eckman, Bell, and Nelson (1988) showed that generalization of learning is indeed possible from structures that are typologically more marked to those structures that are typologically less marked. The exciting implication of this for L2 pedagogy is, of course, that a strategy of IL intervention could be formulated in which it would not be necessary to teach all structures.

Attractive for the same reason is the idea of clustering in UG. It is predicted by the theory that if the input contains evidence of one aspect of a cluster of properties associated with some parameter, that evidence should be sufficient to trigger all other aspects of the parameter (White, 1992). "Not only is there no one-to-one correspondence between input and acquisition of a construction, but, once the value is set, the acquirer ends up with knowledge that indicates that certain other strings in the language are either possible or impossible as well." (Schwartz, 1993: 154) In other words, learners will learn more than they are taught. Wouldn't this be a welcome development in L2 pedagogy if corroborated? Another attractive prediction

is that instruction is not necessary if L1 and L2 parameters coincide, or where they differ, if the data needed to reset them are available to learners in the input. Thus, only “where L1 and L2 parameter settings differ and the necessary data to trigger resetting are not present, consciousness raising or instruction would be necessary” (Simblist, 1992: 232). If such predictions are borne out, SLA theory might eventually help teachers to focus student attention selectively and thus become more efficient with the time they have.

**3. Defossilizing Errors.** Of course, it is an empirical question in SLA theory whether a case can be made for errors fossilizing, let alone defossilizing. But certainly teachers can vouch for the fact that some errors in learners’ production persist well beyond what one would expect, in spite of the attention the errors receive. What causes these errors to endure? There have been a number of suggestions involving the convergence of L1 differences and L2 inherent complexity, markedness, and so forth. White (1989) suggested that the failure of the Subset Principle, which forces learners to entertain the most conservative hypothesis, contributes to the fossilization that characterizes L2 acquisition. This suggestion is based upon the observation that learners’ interlanguage performances are replete with overgeneralizations and ungrammaticality; like the others, however, White’s claim has not been universally endorsed (see, e.g. MacLaughlin, 1991).

Harley (1993a) proposed that teacher-guided crosslingual comparisons could help defossilize some L2 errors for immersion students, especially where partial similarities have encouraged an assumption of complete identity between L1 and L2 items. She cited Lyster’s (1993) classroom experiment designed to teach the notion of social register in French to Grade 8 immersion students. According to Harley (1993a), “This study provides evidence that [with] analytic [form-focused] teaching that includes a crosslingual element, it is possible to undo fossilized errors — in this case the typical use of *tu* in all second person contexts by early immersion students, which Swain and Lapkin (1989) found still persisting at the high school level” (p.250). Although form-focused instruction at a point of interlingual contrast is not exactly a revolutionary pedagogical practice, it would be worthwhile to look further at fossilized errors and see what can be done about them.

**4. Role of Practice.** This may be a curious addition to my list. After all, practicing grammar forms is a very well established pedagogical procedure. I myself have recently coined the term *grammaring*, asserting that grammar should be seen as a skill like reading and writing rather than an area of knowledge (Larsen-Freeman, 1993). Moreover, for cognitive psychologists

such as McLaughlin (1990), practice plays a vital role in SLA. According to McLaughlin, “a complex cognitive skill, such as acquiring a second language, involves a process whereby controlled, attention-demanding operations become automatic through practice” (p.125). More recently, however, the role of practice has been brought into question. Ellis (1993a) presented arguments in support of a comprehension-based approach to grammar teaching. Pointing to the learnability problem (here that the acquisition of specific grammatical features is constrained developmentally), Ellis (1993b) postulated that structural syllabi serve better to facilitate intake than to teach learners to produce grammatical items correctly. He stated explicitly that “the new rationale for [a structural syllabus] rests on the claim that grammar teaching should be directed at consciousness-raising rather than practice” (1993b: 108).

Ellis' preference for consciousness-raising over practice drew support from a study by VanPatten and Cadierno (1993). They reasoned: “Given the rather important role that comprehensible input plays in SLA, the value of grammar instruction as output practice is questionable, if the intent of the instruction is to alter the nature of the developing system ... It would seem reasonable to suggest that rather than manipulate learner output to effect change in the developing system, instruction might seek to change the way that input is perceived and processed by the learner” (p.227). In their study, VanPatten and Cadierno compared an experimental group that received an explanation of a grammar point and had experience processing input data with a control group that received the explanation followed by output practice. Pretest/posttest measures revealed significant gains in both comprehension and production of sentences for the experimental group; for those that received traditional instruction, significant gains were made in production only. VanPatten and Sanz (1995) corroborated the findings of VanPatten and Cadierno by demonstrating that the positive effects for processing input versus no instruction hold for sentence-level tasks. In addition, they report a significant positive effect for input processing as compared with no instruction on a discourse-level task in the written mode, but not in the oral mode.

**5. Use of Metalanguage.** Teachers often ask if metalanguage is helpful to students and, if so, to what degree it should be used. As Sharwood Smith (1993) noted, “It is still an open question as to how much conscious awareness of the formal properties of language, and hence instruction based on inducing this awareness, actually helps the development of spontaneous

language use” (p.172). It is interesting that in the Carroll and Swain (1993) study cited earlier, Group A, the group receiving explicit metalinguistic feedback, outperformed the other groups. Simply telling subjects that they were wrong, providing indirect feedback, and even providing the right forms did not help as much as the explicit metalinguistic information (p. 372). Such a finding, if it is replicated and if it holds for long-term retention, is clearly important to second language pedagogy. This leads me to my conclusion and final caveat.

## A FINAL CAVEAT

SLA theory has contributed much to our understanding of the learning/acquisition process. As I pointed out earlier, learners and learning were not receiving much attention when SLA was launched. Second language pedagogy has been well served by second language acquisition theory for this reason alone. And yet, although our understanding of the learning process has been enhanced, it does not necessarily follow that the products of theory are prescriptions and proscriptions for classroom practice. One reason is the reflex fallacy; another is that just as there is more to learning than meets the eye (or ear), there is more to teaching as well.

Teachers are not mere conveyor belts delivering to their students’ practices/behaviors implied by SLA theory — and teaching is not simply the exercise of classroom activity. The nature of classroom interaction is complex and contingent. Teachers have good reason to say “it depends” when asked whether they would consider adopting a particular practice. Similarly, there are likely to be very few categorical answers forthcoming from SLA research. However, these will not be the measure of the contribution of SLA theory to pedagogy anyway.

I have already suggested a way that pedagogy can benefit theory. Theory can benefit pedagogy in two ways: First, teachers with enhanced understanding of SLA can become more efficient and effective in the classroom by making moment-to-moment decisions that are in harmony with the students’ learning. If SLA theory can help expand teachers’ awareness of learning beyond the teacher’s own experience, can comfort teachers whose students’ experience backsliding or are not ready to learn, can help teachers to cultivate a positive attitude toward students’ errors but can encourage them not to give up on fossilized errors, then it will do a great deal. Teaching does not cause learning, but those who have expanded

awareness of it and fascination with it are likely to be better managers of it.

Second, SLA theory will be invaluable if it can help a teacher's sense of plausibility (Prabhu, 1990) to stay alive. If a teacher does not have an active intellectual engagement with teaching and learning, teaching becomes more and more routine and stale. Having one's sense of plausibility challenged by research findings and theoretical hypotheses (even the ones I have called myths here) is one way of keeping it vital. Rather than having a circumscribed role, expanding awareness, enhancing attitudes, and challenging teachers' senses of plausibility are major contributions of SLA theory to pedagogy.

## Notes

1. The same could be said, of course, for the successful acquisition of second language grammar by tutored language learners. Some succeed, but by no means all.
2. An unfortunate appellation, in my opinion, given that the acquisition of grammar involves more than the acquisition of form.
3. At the Symposium, Krashen commented that what's wrong with immersion can be corrected by giving students more of the same, i.e. more comprehensible input, not by resorting to form-focused instruction. It is ironic that Krashen advocates doing more of the same when he has previously faulted others for giving the same advice: "Some researchers have simply assumed the effectiveness of error correction. When correction fails, they simply call for more, or more consistent correction. Language acquisition simply does not work that way." (Krashen, 1991: 417)
4. Among the explanations Harley (1993b) offered are that the instruction may have been lacking in some way because it was not oriented toward the students' communicative needs and because the target of instruction may have been too infrequent in subsequent class use to reinforce what learning had taken place. Harley (1993a) offered some guidance for a kind of form-focused instruction that may prove helpful. In any event, I would concur with Harley that in the future research methodology must include an assessment of long-term retention.
5. Of course, as SLA is a complex process, it is unlikely that we will arrive at a categorical answer to this question. It is more likely that we will find that negative evidence is helpful for certain learners, for certain structures (Zhou, 1992), at certain times (Jordens, 1993).
6. I am thinking here, of course, of measures involving some percentage of compliance in obligatory contexts for a certain period of time.

## References

- Allwright, R. (1975). Problems in the study of the language teacher's treatment of learner error. In M. Burt & H. Dulay (Ed.), *On TESOL '75* (pp.96–109). Washington, DC: TESOL.
- Andersen, R. (1977). The impoverished state of cross-sectional morphology acquisition. *Accuracy Methodology Working Papers on Bilingualism*, 14: 49–82.
- Anderson, R. (1988). Models, processes, principles, and strategies: Second language acquisition in and out of the classroom. *IDEAL*, 3: 111–138.
- Bahns, J. & H. Wode. (1980). Form and function in L2 acquisition: The case of do-support in negation. In S. Felix (Ed.), *Second Language Development*. Tübingen: Gunter Narr.
- Bell, A. (1984). Language style as audience design. *Language in Society*, 13: 145–204.
- Bley-Vroman, R. (1986). Hypothesis testing in second language acquisition. *Language Learning*, 36: 353–376.
- Bley-Vroman, R. (1990). The logical problem of foreign language learning. *Linguistic Analysis*, 20: 3–49.
- Buczowska, E. & R. Weist. (1991). The effects of formal instruction on the second language acquisition of temporal location. *Language Learning*, 41: 535–554.
- Carroll, S. & M. Swain. (1993). Explicit and implicit negative feedback: An empirical study of the learning of linguistic generalizations. *Studies in Second Language Acquisition*, 15: 357–386.
- Clahsen, H. (1987). Connecting theories of language processing and (second) language acquisition. In C. Pfaff (Ed.), *First and Second Language Acquisition Processes*. Cambridge, MA: Newbury House.
- Cohen, A., D. Larsen-Freeman & E. Tarone. (1991). The contribution of SLA theories and research to teaching languages. In E. Sadtono (Ed.), *Language Acquisition and the Second/Foreign Language Classroom*. Singapore: Regional English Language Center.
- Cohen, A., D. Larsen-Freeman, E. Tarone & M. Robbins. (1976). Toward assessing interlanguage performance: The relationship between selected errors, learners' characteristics, and learners' expectations. *Language Learning*, 26: 45–66.
- Crookes, G. (1989). Planning and interlanguage variation. *Studies in Second Language Acquisition*, 11: 367–383.
- Day, E. & S. Shapson. (1991). Integrating formal and functional approaches in language teaching in French immersion: An experimental study. *Language Learning*, 41: 25–58.
- Doughty, C. (1991). Instruction does make a difference: Evidence from an empirical study of SL relativization. *Studies in Second Language Acquisition*, 13: 431–469.
- Eckman, F. (1981). On the naturalness of interlanguage phonological rules. *Language Learning*, 31: 195–216.
- Eckman, F., L. Bell & D. Nelson. (1988). On the generalization of relative clause instruction in the acquisition of English as a second language. *Applied Linguistics*, 9: 1–20.

- Ellis, R. (1985). A variable competence model of second language acquisition. *International Review of Applied Linguistics*, 23: 47–59.
- Ellis, R. (1989). Are classroom and naturalistic acquisition the same? A study of the classroom acquisition of German word order rules. *Studies in Second Language Acquisition*, 11: 305–328.
- Ellis, R. (1993a). Interpretation-based grammar teaching. *System*, 21: 69–78.
- Ellis, R. (1993b). The structural syllabus and second language acquisition. *TESOL Quarterly*, 27: 91–113.
- Flynn, S. (1987). *A Parameter-setting model of L2 acquisition*. Dordrecht: Reidel.
- Gass, S. (1982). From theory to practice. In M. Hines & W. Rutherford (Eds.), *On TESOL '81*. Washington, DC: TESOL.
- Hammerly, H. (1987). The immersion approach: Litmus test of second-language acquisition through classroom communication. *Modern Language Journal*, 71: 395–401.
- Hammerly, H. (1992). The need for directed learning in the FL classroom: A response to Collier. *Studies in Second Language Acquisition*, 14: 215–217.
- Harley, B. (1989). Functional grammar in French immersion: A classroom experiment. *Applied Linguistics*, 10: 331–359.
- Harley, B. (1993a). Instructional strategies and SLA in early French immersion. *Studies in Second Language Acquisition*, 15: 245–259.
- Harley, B. (1993b). Appealing to consciousness in the L2 classroom. Paper presented at the Symposium on the Role of Consciousness in Second Language Learning, Association Internationale de Linguistique Appliquée Congress (AILA), Amsterdam.
- Harley, B. & M. Swain. (1984). The interlanguage of immersion students and its implications for second language teaching. In A. Davies, C. Criper & A. P. R. Howatt (Eds.), *Interlanguage*. Edinburgh: Edinburgh University Press.
- Huebner, T. (1980). Creative construction and the case of the misguided pattern. In J. Fisher, M. Clarke & J. Schachter (Eds.), *On TESOL '80*. Washington, DC: TESOL.
- Hulstijn, J. & W. Hulstijn. (1984). Grammatical errors as a function of processing constraints and explicit knowledge. *Language Learning*, 34: 23–43.
- Jordens, P. (1993). Input and instruction in second language acquisition. Paper presented at the Association Internationale de Linguistique Appliquée Congress (AILA), Amsterdam.
- Kellerman, E. (1985). If at first you do succeed ... In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition*. Rowley, MA: Newbury House.
- Krashen, S. (1981). *Second Language Acquisition and Second Language Learning*. Oxford: Pergamon.
- Krashen, S. (1982). *Principles and Practices in Second Language Acquisition*. New York: Pergamon.
- Krashen, S. (1984). Immersion; Why it works and what it has taught us. *Language and Society*, 12: 61–64.

- Krashen, S. (1985). *The Input Hypothesis: Issues and Implications*. New York: Longman.
- Krashen, S. (1991). The input hypothesis: An update. In J. E. Alatis (Ed.), *Georgetown University Round Table on Languages and Linguistics*. Washington, DC: Georgetown University Press.
- Larsen-Freeman, D. (1975). The acquisition of grammatical morphemes by adult learners of English as a second language. Doctoral dissertation, University of Michigan, Ann Arbor.
- Larsen-Freeman, D. (1990). On the need for a theory of language teaching. In J. E. Alatis (Ed.), *Georgetown University Round Table on Languages and Linguistics*. Washington, DC: Georgetown University Press.
- Larsen-Freeman, D. (1991). Teaching grammar. In M. Celce-Murcia (Ed.), *Teaching English as a Second or Foreign Language* (2<sup>nd</sup> edn.). New York: Newbury House/Harper Collins.
- Larsen-Freeman, D. (1993). Introduction to teacher's manual. *Grammar Dimensions: Form, Meaning, Use*. Boston: Heinle and Heinle.
- Larsen-Freeman, D. & M. Long. (1991). *An Introduction to Second Language Acquisition Research*. London: Longman.
- Lightbown, P. (1983). Exploring relationships between developmental and instructional sequences in L2 acquisition. In H. Seliger & M. Long (Eds.), *Classroom-oriented Research in Second Language Acquisition*. Rowley, MA: Newbury House.
- Lightbown, P. (1991). What have we here? Some observations on the influence of instruction on L2 learning. In R. Phillipson, E. Kellerman, L. Selinker, M. Sharwood Smith & M. Swain (Eds.), *Foreign Language Pedagogy Research: A Commemorative Volume for Claus Faerch*. Clevedon, Avon, England: Multilingual Matters.
- Lightbown, P. & N. Spada. (1990). Focus-on-form and corrective feedback in communicative language teaching: Effects on second language learning. *Studies in Second Language Acquisition*, 12: 429–446.
- Long, M. (1980). Input, interaction and second language acquisition. Doctoral dissertation, University of California, Los Angeles.
- Long, M. (1990). The least a second language acquisition theory needs to explain. *TESOL Quarterly*, 24: 649–666.
- Long, M. & G. Crookes. (1992). Three approaches to task-based syllabus design. *TESOL Quarterly*, 26: 27–56.
- Lyster, R. (1993). *The effect of functional-analytic teaching on aspects of sociolinguistic competence*. Doctoral dissertation, University of Toronto.
- MacLaughlin, D. (1991). Review of *Universal Grammar and Second Language Acquisition*. *Second Language Research*, 7: 245–256.
- MacLaughlin, B. (1990). Restructuring. *Applied Linguistics*, 11: 113–128.
- Meisel, J., H. Clahsen & M. Pienemann. (1981). On determining developmental stages in natural second language acquisition. *Studies in Second Language Acquisition*, 3: 109–135.
- Piabhu, N. S. (1990). There is no best method — Why? *TESOL Quarterly*, 24: 161–176.



- Pienemann, M. (1984). Psychological constraints on the teachability of languages. *Studies in Second Language Acquisition*, 6: 186–214.
- Pienemann, M. (1985). Learnability and syllabus construction. In K. Hyltenstam & M. Pienemann (Eds.), *Modelling and Assessing Second Language Development*. Clevedon, Avon, England: Multilingual Matters.
- Pienemann, M. (1986). Is language teachable? Psycholinguistic experiments and hypotheses. *Australian Working Papers in Language Development*, 1: 1–41
- Rutherford, W. (1987). *Second Language Grammar: Learning and Teaching*. London: Longman.
- Rutherford, W. (1993). Metacognition and language learnability. Paper presented at the Symposium on Metacognition and SLA, Association Internationale Linguistique Appliquée Congress (AILA), Amsterdam.
- Schachter, J. (1986). Three approaches to the study of input. *Language Learning*, 36: 211–225.
- Schachter, J. (1988). Second language acquisition and its relationship to universal grammar. *Applied Linguistics*, 9: 219–235.
- Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics*, 11: 129–158.
- Schwartz, B. (1993). On explicit and negative data effecting and affecting competence and linguistic behavior. *Studies in Second Language Acquisition*, 15: 147–163.
- Schwartz, B. & M. Gubala-Ryzak. (1992). Learnability and grammar reorganization in L2A: Against negative evidence causing the unlearning of verb movement. *Second Language Research*, 8: 1–38.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10: 209–231.
- Sharwood Smith, M. (1991). Speaking to many minds: On the relevance of different types of language information for the L2 learner. *Second Language Research*, 7: 118–132.
- Sharwood Smith, M. (1993). Input enhancement in instructed SLA: Theoretical bases. *Studies in Second Language Acquisition*, 15: 165–179.
- Simblist, M. (1992). Review of W. E. Rutherford's *Second Language Grammar: Learning and Teaching*. *Applied Linguistics*, 13: 230–233.
- Spada, N. & P. Lightbown. (1993). Instruction and the development of questions in L2 classrooms. *Studies in Second Language Acquisition*, 15: 205–224.
- Spada, N., P. Lightbown & L. Ranta. (1991). Input enhancement and L2 question formation. *Applied Linguistics*, 12: 416–432.
- Swain, M. & S. Lapkin. (1989). Aspects of the sociolinguistic performance of early and late French immersion students. In R. Scarcella, E. Anderson & S. Krashen (Eds.), *On the Development of Communicative Competence in a Second Language*. Cambridge, MA: Newbury House.
- Tarone, E. (1988). *Variation in Interlanguage*. London: Edward Arnold.
- Tomasello, M. & C. Herron. (1988). Down the garden path: Inducing and correcting overgeneralization errors in the foreign language classroom. *Applied Psycholinguistics*, 9:

237–246.

- Tomasello, M. & C. Herron. (1989). Feedback for language transfer errors: The garden path technique. *Studies in Second Language Acquisition*, 11: 385–395.
- Tomlin, R. (1990). Functionalism in second language acquisition. *Studies in Second Language Acquisition*, 12: 155–177.
- Trahey, M. & L. White. (1993). Positive evidence and preemption in the second language classroom. *Studies in Second Language Acquisition*, 15: 181–204.
- Valdman, A. (1993). Untitled paper presented at Symposium 85: Issues in Conducting Classroom Research, Association Internationale Linguistique Appliquée Congress (AILA), Amsterdam.
- VanPatten, B. & T. Cadierno. (1993). Explicit instruction and input processing. *Studies in Second Language Acquisition*, 15: 225–243.
- VanPatten, B. & C. Sanz. (1995). From input to output: Processing instruction and communicative tasks. In F. Eckman, D. Highland, P. Lee, J. Mileham & R. Rutkowski-Weber (Eds.), *Second Language Acquisition: Theory and Pedagogy*. Mahwah, NJ: Lawrence Erlbaum Associates, Publisher.
- Wagner-Gough, J. (1975). *Comparative Studies in Second Language Learning*. CAL/ERIC/CLL Series on Languages and Linguistics, 26.
- White, L. (1985). Universal grammar as a source of explanation in second language acquisition. In B. Wheatley, A. Hastings, F. Eckman, L. Bell, G. Krukar & R. Rutkowski (Eds.), *Current Approaches to Second Language Acquisition*. Bloomington: Indiana University Press.
- White, L. (1987). Against comprehensible input: The input hypothesis and the development of second-language competence. *Applied Linguistics*, 8: 95–110.
- White, L. (1989). *Universal Grammar and Second Language Acquisition*. Amsterdam: John Benjamins.
- White, L. (1991). Adverb placement in second language acquisition: Some effects of positive and negative evidence in the classroom. *Second Language Research*, 7: 133–161.
- White, L. (1992). On triggering data in L2 acquisition: A reply to Schwartz & Gubal-Ryzak. *Second Language Research*, 8: 120–137.
- Widdowson, H. (1992). Pedagogic pragmatics: The discourse of the language classroom. Plenary address at the Eighteenth International Conference of the Japan Association of Language Teachers, Kawagoe, Japan.
- Wolfe Quintero, K. (1992). Learnability and the acquisition of extraction in relative clauses and wh-questions. *Studies in Second Language Acquisition*, 14: 39–70.
- Zhou, Y. P. (1992). The effect of explicit instruction on the acquisition of English grammatical structures by Chinese learners. In C. James & P. Garrett (Eds.), *Language Awareness in the Classroom*. London: Longman.
- Zobl, H. (1985). Grammars in search of input and intake. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition*. Rowley, MA: Newbury House.

## Comment after Chapter 6

In the previous article, I proposed teaching grammar as a skill, which I called “grammaring”, a term I had actually introduced a decade earlier. By adding the “-ing”, I intended to emphasize grammar as a process, and to make it analogous to the other skills in language teaching, i.e. reading, writing, speaking, and listening. However, I coined the term “grammaring” for another reason. By coining a new term, I was reflexively illustrating a creative process that users of a language employ all the time. Speakers create new words when they want to make new meanings. This is one reason for thinking of language as a dynamic system — it changes — not only through intentional word coinage, of course, but also through ordinary usage.

In the next chapter, I make a case for seeing language and its development as processes of change. This article was the written version of a paper I had delivered at the Second Language Research Forum in Montreal in 1994. In my paper, I draw on the sciences of chaos and complexity for a dynamic view of natural phenomena. Besides their attention to the dynamicity of change, the sciences are used to study nonlinear systems. It seemed to me that language use and its development are both dynamic and nonlinear processes. Indeed, as I observed in the previous article, the learning of language does not proceed linearly. As any teacher knows, students seem able to do something in the target language one day, but not the next, despite what seems to be the same effort expended. Due to their complex system-level perspective, I felt that I had found in chaos and complexity science a more holistic view that would work to unify some of the fragmentation in SLA. It was not my goal that all researchers would subscribe to this point of view, but that by thinking more holistically, we might be able to avoid an unhelpful reductionism, i.e. taking the SLA process apart piece by piece.

Although they originated in the physical sciences (their principles have antecedents that stretch back across time), they have had huge implications for the way that I think about language and its development. Writing about chaotic systems, Gleick (1987: 24) stated: “Nonlinearity means that the act of playing the game has a way of changing the rules.”

Gleick was not writing about linguistic rules. Even so, these words turned my understanding of language upside down. I had been trained to think of language as a rule-governed system in which the rules operated

top-down to form sentences. As I understood it, although speakers might violate the rules, they were rather fixed (synchronically, that is; of course, they change over time). Chaos and complexity science suggested instead that when we think in terms of nonlinear systems, regular patterns emerge upwards dynamically and continuously. Thus, rather than rules, we have patterns, and rather than top-down control, we have continual bottom-up emergence.

These were just a few of the insights that these new sciences afforded me, which completely changed my thinking about language and its development. In the next chapter, I describe characteristics of complex, dynamic, nonlinear systems. I go on to discuss how these apply to language and then to language acquisition. I show how the perspective on issues in SLA changes as a result of adopting a complex systems view, and I conclude by listing some lessons to be learned.

## **References**

Gleick, J. (1997). *Chaos: Making a New Science*. New York: Penguin Books.

# Chapter 7

## Chaos/Complexity Science and Second Language Acquisition

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### INTRODUCTION

Science exists to explain the fundamental order underlying nature. The most valued explanations have taken the form of cause and effect linkages. For example, Isaac Newton was able to find a cause for the movement of the stars in his simple laws of motion and theory of gravity. Faith in science to account for such a deterministic universe inspired French mathematician Pierre Simon de Laplace to claim that if scientists knew the positions and velocities of all the particles in the universe, they would be able to predict the future for all time (Hall, 1993).

Two major developments in the twentieth century have laid rest to such claims. The first was Heisenberg's uncertainty principle, introduced into quantum physics to describe the limits to which anything at the quantum level could be known for certain. Laplace's claim rested on the condition that scientists be able to measure the position and velocities of all particles in the universe. Heisenberg demonstrated that at the quantum or subatomic level scientists can ascertain either the position or the momentum of a particle, but not both simultaneously, making prediction impossible.

The second development discrediting Laplace's claim came more recently with the discovery of another kind of unpredictability in nature — the unpredictability which accompanies much larger, more complex, nonlinear systems. For instance, it is well known that such global phenomena as the weather do not lend themselves to trustworthy forecasts, not at least at the proximate, local level. It had always been assumed, however, that such forecasts would ultimately be possible when meteorology or the instruments employed in its pursuit became sufficiently sophisticated. This assumption proved unsound when it was discovered that with certain such phenomena, randomness was inherent, gathering more information did not obviate it.

The randomness generated by complex systems has come to be called “chaos”. The study of chaos and the study of the complex systems that manifest it have, according to some, shaken science to its foundation. For the first time, an alternative to the linear, reductionist thinking that has dominated science since Newton appears possible. With access to the computational power of microcomputers, previously intractable problems such as the dynamics of nonlinear systems can be studied. Although such studies have originated in the physical sciences, researchers working in these areas believe that their theories have the potential for immense impact on the more human sciences (Waldrop, 1992: 12–13).

The purpose of this chapter is to call attention to the similarities among complex nonlinear systems occurring in nature and language and language acquisition. While the value of the analogy may only be metaphoric, sometimes “you don’t see something until you have the right metaphor to perceive it” (Bowers, 1990: 132, see also Edge, 1993)<sup>1</sup>. It is my hope that learning about the dynamics of complex nonlinear systems will discourage reductionist explanations in matters of concern to second language acquisition researchers. To this aim, I will begin the chapter by describing features of complex nonlinear systems that chaos/complexity scientists have identified. Next, I will demonstrate that these same features are characteristic of language and language acquisition. By way of illustrating the value of seeing language acquisition as a dynamic, complex and nonlinear process, I will then offer several examples of questions in SLA which might be addressed from this new perspective. Finally, I will conclude by making some personal observations on the implications of this perspective for development of the SLA field.

## FEATURES OF COMPLEX NONLINEAR SYSTEMS

The systems discussed in this chapter can be characterized to varying degrees by the following features: they are dynamic, complex, nonlinear, chaotic, unpredictable, sensitive to initial conditions, open, self-organizing, feedback sensitive, and adaptive. In addition to these ten characteristics, such systems possess strange attractors, which are fractal in shape. I will discuss these features in clusters.

### **Dynamic, Complex, Nonlinear**

Chaos theory, catastrophe theory (Thom, 1972),<sup>2</sup> plectics (Gell

Mann in Berreby, 1994), dynamical systems theory (Abraham, 1994), and complexity theory are all concerned with the behavior of dynamic systems (systems that change with time). As Gleick (1987: 5) puts it, the study of “chaos is a science of process rather than state, of becoming rather than being”.

Now the study of dynamic systems is not new in science. What makes these theories innovative is that their focus is complex systems. These systems are termed “complex” for two reasons. The first follows from what we normally associate with the term “complex” Complex systems often, though not always, comprise a large number of components or agents (Davies, 1988: 22). An example is the human brain comprised of billions of neurons. The second reason such systems are called “complex” is one that might not be as obvious. The behavior of complex systems is more than a product of the behavior of its individual components. In complex systems, each component or agent “finds itself in an environment produced by its interactions with the other agents in the system. It is constantly acting and reacting to what the other agents are doing. And because of that, essentially nothing in its environment is fixed” (Waldrop, 1992: 145). In other words, the behavior of complex systems emerges from the interactions of its components; it is not built in to any one component.

That the behavior is emergent is perhaps best illustrated by Craig Reynolds’ work on “artificial life” (Waldrop, 1992: 241–242). In his computer simulation “boids”, Reynolds attempted to capture the essence of flocking behavior in birds. Each “boid” followed three simple rules having to do with separation, alignment, and cohesion (Reynolds, 1996). What was noteworthy about the rules was that they were all local, all of them were behavioral instructions for the individual agents to follow relative to the other agents in their vicinity none of them said “Form a flock”. Nevertheless, when all the agents invoked the rules concurrently, a flock pattern at the global level emerged. Thus, the traditional approach to science, which attempts to understand the behavior of the whole by examining its parts piecemeal, is inadequate for studying complex systems. The behavior of complex systems arises from the interaction of its components or agents.

Complex systems are also nonlinear. A nonlinear system is one in which the effect is disproportionate to the cause. Conversely, in a linear system a cause of a particular strength results in an effect of equal strength. When a spacecraft is nudged into orbit by firing its thruster rockets, a linear system is responsible. Nonlinear systems can also sometimes exhibit linearity; however, at other times, they may react in a way that is all out of proportion

to the cause. A rolling pebble, for example, can trigger an avalanche. This has been termed the “camel’s back” effect. A simple trigger, one which occurs all the time, might be enough on any given occasion to bring about a great convulsion in the system, or to throw the entire system into a chaotic state.

### **Chaotic, Unpredictable, Sensitive to Initial Conditions**

Chaos refers simply to the period of complete randomness that complex nonlinear systems enter into irregularly and unpredictably. A milder, more benign image than an avalanche to illustrate this concept is that of water dripping from a spigot. With a slight twist of a faucet, the water falls in a regular, even drip. Given slightly more pressure, the drops, while still falling separately, fall in a never-repeating pattern. The periodic drip has given way to a random-seeming pattern (Crutchfield, Farmer, Packard, & Shaw, 1986).

While this chaos may seem predictable — i.e. it always happens when I turn the faucet — the onset of the randomness of complex nonlinear systems is in fact unpredictable. That the randomness will occur is predictable; what is not is exactly when it will occur. We know that avalanches are caused by sliding rock, but it is impossible to predict which rolling pebble will be the one to unleash a massive slide. So it seems that complex nonlinear systems do behave in a regular, orderly way until a critical point is passed, and then they go chaotic. Following such an episode, they may return to order (Briggs, 1992: 19–20).

A major reason for the unpredictable behavior of complex systems is their sensitive dependence on initial conditions. A slight change in initial conditions can have vast implications for future behavior. Indeed, the behavior of systems with different initial conditions, no matter how similar, diverges exponentially as time passes. A phenomenon known popularly as “the butterfly effect” exemplifies this feature and underscores the interdependence of all the components in the system. The butterfly effect is the notion that a butterfly fluttering its wings in a distant part of the world today can transform the local weather pattern next month: “Tiny differences in input could quickly become overwhelming differences in output.” (Gleick, 1987: 8)

### **Open, Self-organizing, Feedback Sensitive, Adaptive**

One of the most discussed laws in physics has been the second law of thermodynamics. The second law states that systems inevitably move towards equilibrium. “And once a system has reached this lowest or equilibrium



state, it tends to remain there forever — a uniform, undifferentiated murk” (Churchland, 1988: 168) with no form, no pattern, no differentiation. The second law was thought to be inexorable. In 1854, German physicist von Helmholtz carried this law to its logical conclusion: the entire universe would eventually, irreversibly, run down or increase in entropy.

At the end of the last century, however, a countermovement grew among biologists, who studied the development of living systems. They observed that living systems were evolving in the opposite direction from disorder into order. Since Darwin, biologists have seen natural selection as virtually the sole source of that order. Then, in the middle of this century, the chemist Prigogine (who later earned the Nobel Prize for his discovery) was able to demonstrate that there was another source of the shift from disorder to order. Provided that complex systems are open and far from the point of equilibrium, spontaneous large-scale restructurings take place in systems that counter the forces of entropy and create new regimes of order and structure (Smith & Gemmill, 1991). How order arises in nature is the central question of the science of complexity today.

What scientists now believe to be true is that the second law applies only to closed systems, systems left to themselves, the object of study of conventional physics. With open systems, systems that are open to new matter and energy infusions, entropy is not inevitable. As open systems evolve, they increase in order and complexity by absorbing energy from the environment. An example in modern cosmology is what transpired after “the big bang”. From the formless miasma of the big bang, the universe has managed to bring forth structure on every scale: galaxies, stars, planets, bacteria, plants, animals, and brains (Waldrop, 1992: 10). Thus, if a nonlinear system is open to a continuous flow of energy, far from its point of equilibrium, then entropy is avoidable. “The flux pumps the system. It forces the system away from its initial chaos, and toward the many forms of order and complexity of which it is capable.” (Churchland, 1988: 169) In fact, unpredictably, highly organized states can suddenly appear:

Near to thermodynamic equilibrium a hot solid or gas behaves like an ordinary lamp with each atom emitting a light randomly and independently. The resulting beam is an incoherent jumble of wave trains each a few metres long. It is possible to drive the system away from equilibrium by “Pumping”, which is a means of giving energy to the atoms to put an excessive number of them into excited states. When this is done, a critical threshold is reached at which the atoms suddenly organize themselves, on a global scale and

execute cooperative behavior to a very high level of precision. Billions of atoms emit wavelets that are exactly in phase, producing a coherent wave train of light that stretches for thousands of miles. (Davies, 1988: 82)

What results is a laser — an example of a self-organizing system, in which particles of light spontaneously group themselves into a single powerful beam.

The order such systems exhibit is shaped by the fact that they are also feedback-sensitive. Perhaps it is in the field of biology where this feedback sensitivity can most readily be perceived. Darwin's great insight was to posit the existence of a basic feedback mechanism built into nature, namely, natural selection. The steady improvement of a species was called "evolution" (Waldrop, 1992: 179). "Positive feedback kicks evolution forward. Meanwhile, negative feedback in evolution keeps mutation changes from spiraling out of control — the checking power of many negative feedback loops simply wipes out most mutations and keeps the design of the species stable for long periods of time." (Briggs, 1992: 117)

It is in the capacity to naturally select and to self-organize that we say complex systems in biology are adaptive (Kauffman, 1991). They do not simply respond passively to events, they actively try to turn whatever happens to their advantage. They are capable of learning, although "the process of learning — testing a model against reality and then modifying it to suit — occurs at different time scales throughout biology" (Berreby, 1994: 26).

### **Strange Attractors, Fractal Shape**

The path that a dynamic system takes can be traced in space and is called an "attractor". It receives this name because it is the pattern to which a dynamic system is attracted. For example, in a closed system, where there is no influx of energy, a bob swinging on the end of a string has a fixed point attractor, eventually the bob will settle down, stop swinging and be "attracted" to a fixed point. A frictionless pendulum, on the other hand, yields a periodic or limit cycle attractor. Its attractor is an orbit defined by the two extremes at either end.

A complex nonlinear system exhibits a different attractor altogether: one which was until recently unknown. Such a system has a "strange" attractor because although its cycle repeats itself like the frictionless pendulum, no cycle ever follows the exact same path or overlaps any other cycle. "The orbits can become very densely packed together, and can in fact approach infinite thinness, but are still constrained within the limits of the

attractor.” (Taylor, 1994: 203) Thus, globally a pattern emerges, but locally it is impossible to predict just what the details will look like. For instance, at the same time that the weather is constantly changing, it also stays within the boundaries of what we call the climate.<sup>3</sup> “We can tell where the system cannot be, and we can identify the states that the system is most likely to be, but we cannot tell exactly where the system will be.” (Mohanam, 1992: 650) As such, a strange attractor can be depicted as “Stochastic behavior occurring within a deterministic system” (Stewart, 1989: 17).

If an attractor is a way of representing the behavior of a system in geometrical form, it stands to reason that different systems will yield geometric figures. While this is true enough, all strange attractors have something in common — their shape is geometrically a fractal, a term coined by the geometer, Benoit Mandelbrot, to mean a fraction that includes all. A fractal is a geometric figure that is self-similar at different levels of scale. The example I have found most helpful to illustrate a fractal is that of a tree. Trees come in all sizes and shapes, it is impossible to predict the exact dimensions of a tree or where the branches (if any) will radiate from the trunk. Not all trees have leaves, and even if they did, we could not predict how many leaves there would be growing from which twigs on which branches, etc. None the less, the combination of arboreal shape, location, behavior, makes us unquestioningly recognize something as a tree. A tree is an example of a complex nonlinear system and *ipso facto* we know that it is a fractal.

It is not difficult to see how a tree is self-similar at different levels of scale. When you gaze at a tree, you see a central trunk and branches spreading out from it. If you were to focus in on a single branch, you would adopt a perspective, one different in scale, but one which yielded essentially the same shape, namely a central stalk and radiating smaller offshoots. Of course, in this case, the offshoots are twigs. When in turn, you look at a twig, the same pattern repeats itself; with a leaf likewise, you would find a central vein with “arteries” radiating outwards. Thus, as you zoom in on any level of magnification, it always reveals a reproduction of itself.

To help with this concept, one might also think of a weather map. Whether it is a map of a large region, such as that taken from a camera mounted on a satellite, or whether it is more of an aerial shot, or even one of the weather scene right above your hometown, the pictures would look very much the same at different levels of scale some swirling white clouds, some clear patches, etc. “These patterns illustrate the fact that the system’s whole movement takes place continuously at every scale.” (Briggs, 1992: 24)

## COMPLEX NONLINEAR SYSTEMS AND LANGUAGE

The study of complex nonlinear systems and the study of language have much in common. While language can be conceptualized as aggregations of paradigmatic and syntagmatic units (e.g. phonemes, morphemes, sentences, etc.), it is also true that a view of language as a dynamic system can be adopted. Saying that language is dynamic borders on the banal for the two usual interpretations of the “dynamic” quality of language are well known. The first common meaning of dynamic as applied to language is that of process — language can be described as an aggregation of static units or products, but their use in actual speech involves an active process, usually referred to as *parole* (Saussure) or performance (Chomsky). Larsen-Freeman (1991b), for example, has coined the term “grammaring” to capture the dynamism of grammar in use. Such an observation is not without precedent in linguistics. Humboldt (1949, cited in Robins, 1967)<sup>4</sup> stresses that “a language is to be identified with a living capability by which speakers produce and understand utterances, not with the observed products of the acts of speaking and writing” (Robins, 1967: 174). Halliday (1985), too, has observed that we would be better served with more dynamic models of grammar. Current popular models do not capture well the dynamism and variability of language in use.

The other common way that language is perceived to be dynamic is when dynamic is equated with growth and change. Adopting this view of language, Rutherford (1987) suggests that for certain purposes, a better metaphor for language than a machine might be an organism; machines are constructed, organisms grow (Rutherford, 1987: 37). Rutherford’s suggestion brings to mind Schleicher’s (1863, cited in Robins, 1967) treatise on Darwinian theory and linguistics in which he regards language “as one of the natural organisms of the world to be treated by the methods of natural science, one moreover that independently of its speakers’ will or consciousness has its periods of growth, maturity, and decline” (Robins, 1967: 181, see also Pinker and Bloom [1990] for a modern day treatment of language employing the biological metaphor of evolution). Whether one is comfortable with the animism Schleicher ascribes to language or not, the point is that language, seen not only from a synchronic, but also from a diachronic perspective, is undeniably dynamic.

Furthermore, the changes which languages undergo diachronically are nonlinear. New forms enter and leave the language in a non-incremental

fashion. Moreover, they do not do so uniformly, so that a synchronic snapshot of language might appear chaotic: different speakers of the language using different forms to mean the same thing. Which new forms are introduced into the language is not completely predictable. We can anticipate change to some extent by noting that innovations, such as new developments in technology, for example, are accompanied by an expansion of lexis to refer to the new concepts or products. We might also look to areas around which there is some insecurity on the part of native speakers (such as the choice between using object pronouns or subject pronouns in English) to understand why some native speakers of English appropriate other forms in order to avoid the choice (for example, English speakers increasingly use reflexive pronouns today for both object pronouns and subject pronouns *Between you and myself* or *Alex and myself went*). The point is, however, that the best we can do is explain the occurrence of change *a posteriori*, not actually look at the language and make exact predictions of what change will transpire next.

While the word dynamic to mean “synchronic process” and “diachronic growth/change” can also be used to describe the complex systems discussed in this chapter (recall the earlier quote from Gleick about “process” not “state” and “becoming” not “being”), there is yet a third interpretation of dynamic, which is inspired by a Chaos/Complexity Theory perspective, and which is not common-place, although not unknown, in the way language is usually construed. This third meaning of dynamic makes no distinction between current use and change/growth; they are isomorphic processes. Every time language is used, it changes. As I write this sentence, and as you read it, we are changing English. “The act of using the language meaningfully has a way of changing the grammar system in the user.” (Diller, 1995: 116) Moreover, as the user’s grammar is changed, this sets in motion a process, which may lead to change at the global level.<sup>5</sup> Rather than using rules to shape discourse, the rules themselves are shaped by the discourse.<sup>6</sup> Thus, the behavior of the system as a whole is the result of the aggregate of local interactions. “A language such as English is a collaborative effort of its speakers, and changes in the system of English are ‘emergent’.” (Diller, 1995: 117) As Gleick (1987: 24) has put it “the act of playing the game has a way of changing the rules”.

Such a view suggests that language grows and organizes itself from the bottom up in an organic way, as do other complex nonlinear systems. While rules can be used to describe such systems, the systems themselves are not the product of rules.<sup>7</sup> In order to understand the dynamics of this “bottom-up approach”, computer scientists have shifted the way they represent

the brain from a computational to a connectionist model. By no longer conceiving of the mind as requiring a central program to direct it and to select the appropriate rules to apply, an entirely different theory of mind can be entertained.

The arborization of the dendrites, the chaotic firing of neurons in the motor cortex, and at least the beginnings of an experimental and a modeling literature suggesting that nervous tissue has fractal geometrical, statistical, and dynamical properties have led neuroscientists to begin to model the brain as a complex, nonlinear system. According to this model, there are weights on the excitatory and inhibitory connections between nodes. Given certain sensory input, certain connection weights will be strengthened. Weights are thus tunable, they fluctuate from second to second. At any given time, the weights are settling into or moving away from certain states.

States that the networks tend to move away from are called "repellers" and states into which the networks "settle" or "relax" are called "attractors". No information is being processed in such an evolution of states. This spontaneous process is stochastic: attractors are associated with a certain probability that the net will settle there, but the settling process is unpredictable. It is of fundamental importance that this spontaneous stochastic movement toward attractors is *not rule governed*. Connectionist machine operations (i.e. performance) do not follow rules (even though the machine's competence can be so described). There is no program ... that determines which state the net will likely settle into, this is quite unlike the case for computers [heretofore which were modeled on a computational theory of the mind] which are heavy with necessity, permitting no exceptions. Instead the net spontaneously *self-organizes* toward attractor states, and under certain conditions, may even enter states never before achieved. Neural nets are light with possibility. (Globus, 1995: 23–24)

Thus, previously "the 'information' of computers [i.e. programs of the input-output sort] ha[d] to do with data structures as strings of exact symbols, i.e. *representations*, that can be logically processed; in contrast, the 'information' of dynamical systems is very different ... [it] has to do with changes in *knowledge* about the system, i.e. with change in our uncertainty about the system state. Brain chaos, then, turns us away from computer computation toward performance systems naturally described by nonlinear dynamics" (Globus, 1995: 99).

It must now be apparent why I have given so much attention to the third interpretation of the term "dynamic". It is this very quality which portends to alter in a fundamental way our model of the brain and our

conception of language. A static algorithm cannot account for the continual, and never-ending growth and complexification of a system that is initiated from the bottom-up. It cannot account for the performance “inconsistencies of competing dialects and registers”, nor the “improvisational metaphors of ordinary language usage” (Diller, 1995: 112). To do so, a dynamic model of performance is needed, which relates individual use to systemic change. We need not therefore await development of a theory of *langue* or competence before tackling the study of *parole* or performance. Indeed, they cannot be studied independently of each other if we want to be faithful to the reality of language (Bernàrdez, 1995). To conclude this portion of the current chapter, I will briefly review other qualities of dynamic systems, which were discussed in the first section of this chapter, and which also hold true for language in my opinion.

As is true of other dynamic nonlinear systems, language is also complex. It satisfies both criteria of complexity: First, it is composed of many different subsystems — phonology, morphology, lexicon, syntax, semantics, pragmatics; Second, the subsystems are interdependent. A change in any one of them can result in a change in the others (Larsen-Freeman, 1989, 1991b, 1994). In other words, the behavior of the whole emerges out of the interaction of the subsystems. Thus, describing each subsystem tells us about the subsystems, it does not do justice to the whole of language.

Complex nonlinear systems exhibit sensitive dependence on their initial conditions, and language is no exception. We might call UG the initial condition of human language — it contains certain substantive universal principles that apply to constrain the shape of human languages. For instance, there are a small number of archetypal or core phonological patterns that apply to all languages, e.g. almost all languages have voicing assimilation of obstruents. These are powerful principles which have a huge impact on defining the “strange attractor” of human language. However, languages also differ. In English, the voiced consonant assimilates to the voiceless, whereas in Spanish and Russian, the first consonant assimilates to the second regardless of the voicing feature (Mohan, 1992). To explain interlinguistic differences like this in a manner consistent with the view being proposed in this chapter, Mohan posits UG “fields of attraction” that permit infinite variation in a finite grammar space. Fields of attraction are by nature gradient, unlike parametric choices which are generally seen to be discrete. The strength each field exerts on a particular language differs, thus allowing for interlinguistic variation. For any given language, the

fields of attraction will define the state that the system is attracted to, i.e. its most natural or unmarked state. Because of them, the changes a language undergoes leave its basic shape intact. Therefore, anything borrowed into the language will be adapted to conform to the permissible phonological sequences and sometimes to the morphosyntactic constraints as well (e.g. *aisukurimu* of Japanese and *Le Drugstore* of French, borrowed from English).

Just as the strange attractors of complex nonlinear systems are fractals so language is a fractal. In fact, all information systems need to be fractal in shape in order to make them compressible and thus shareable (Winter, 1994). In truth, it is its fractality that makes available an infinite amount of behavior or information within a closely circumscribed space (Taylor, 1994: 203). Language then, is no different from other natural phenomena in that its form follows function.

An example of the fractality of language can be seen in Zipf's power law connecting word rank and word frequency for many natural languages. This law states that, "to a very good approximation, relative word frequency ... in a given text is inversely proportional to word rank  $r$  where  $r$  is the  $r$ th word when the words of a language are listed with decreasing frequency" (Schroeder, 1995: 35). In other words, if a word occupies a particular word frequency rank in a given language, then it is likely to reflect that same frequency *in any given text* of that language. Zipf's law is apparently not only applicable to a language in general, but also to specific writers. "For a very competent writer with active vocabulary of 100,000 words, the 10 highest-ranking words occupy 24 percent of a text, while for the basic (newspaper) English with one-tenth the vocabulary (10,000 words), this percentage barely increases (to about 30 percent)." Thus, we see in Zipf's law the self-similarity of scale in language that is intrinsic to fractals in the natural world. The pattern that exists at one level of scale holds for other levels and for the whole system. Furthermore, changes are taking place continuously, and these, too are reflected at every level of scale. As I am writing this chapter I am contributing to the changing frequencies of word use in this chapter and to those in the whole system of English.

## COMPLEX NONLINEAR SYSTEMS AND SECOND LANGUAGE ACQUISITION

There are a number of parallels between complex nonlinear systems and second language acquisition (SLA) as well. First of all, both are



characterized by dynamic processes. Indeed, a challenge in SLA research has been how to capture, with any formalism, the dynamism in evidence in the evolution of learner interlanguages (ILs). Researchers' grammars containing static rules do not do justice to the ever-changing character of learners' internal L2 grammars.<sup>8,9</sup> The third definition of dynamic also holds for learners as it does for proficient speakers of a given language; by virtue of using the target language, it is transformed. Indeed, the very phrase "target language" is misleading because there is no endpoint to which the acquisition can be directed.<sup>10</sup> The target is always moving.<sup>11</sup>

The SLA process is also known to be complex. There are many interacting factors at play which determine the trajectory of the developing IL<sup>12</sup>: the source language, the target language, the markedness of the L1, the markedness of the L2, the amount and type of input, the amount and type of interaction, the amount and type of feedback received, whether it is acquired in untutored or tutored contexts, etc. Then, too, there is a multitude of interacting factors that have been proposed to determine the degree to which the SLA process will be successful: age, aptitude, sociopsychological factors such as motivation and attitude, personality factors, cognitive style, hemisphericity, learning strategies, sex, birth order, interests, etc. (Larsen-Freeman & Long, 1991) Perhaps no one of these by itself is a determining factor;<sup>13</sup> the interaction of them, however, has a very profound effect.

Further, learning linguistic items is not a linear process — learners do not master one item and then move on to another. In fact, the learning curve for a single item is not linear either. The curve is filled with peaks and valleys, progress and backsliding. The classic example of this is when beginners acquiring English correctly produce the past tense of irregular and regular verbs. It is thought that these are mastered incrementally at a lexical level, i.e. learners learn one verb and its ending at a time. After further exposure to the target language, however, chaos ensues. No one knows for sure when it might strike, but sooner or later it takes only one more instance in the input of a past tense verb "to break the camel's back". The result is that where once the interlanguage was characterized by many examples of correct past tense, a period of seemingly random suppliance of the *-ed* follows, often the *-ed* is overgeneralized to irregular verbs, e.g. *sitted*, *eated*, *sleeped*, where earlier correct targets were being produced.<sup>14</sup>

Given that the system is open, however, and given that there is continued input, the interlanguage system is self-organizing and the chaos with regards to the past tense ending, at least (presumably there are

oscillating cycles of lesser and greater chaos going on elsewhere in the system), subsides.<sup>15</sup> In second language acquisition research terms, we speak of the “restructuring” of this aspect of the interlanguage, the return to order, which has taken place. The restoration of order is aided by the fact that the system is feedback sensitive. The absence of positive evidence in the environment or the explicit provision of negative evidence can help learners adapt their interlanguage grammar closer to that of target language users. Conversely, we might say that the absence of learning in a language, fossilization, occurs when the learners’ grammar system becomes closed and settles down to a fixed point attractor.<sup>16</sup> “In biology, of course, the agents are individual organisms, the feedback is provided by natural selection, and the steady improvement of the models is called evolution. But in cognition, the process is essentially the same: the agents are individual minds, the feedback comes from teachers and direct experience, and the improvement is called learning.” (Waldrop, 1992: 179)

While interlanguages of speakers of various first languages learning English as a foreign language have much in common, they also are distinctive, each constrained by the strange attractors of their L1s, which may be greater than the force of the strange attractor of English. Thus, the English pronunciation of a native speaker of Spanish will differ from that of a native speaker of Chinese. Many other fundamental differences mark the challenges present for learners from one native language background as compared with another. Besides the obvious linguistically-based differences are the learners’ cultural backgrounds and reasons for learning (not learning) a second or foreign language in the first place.

Now, the case that I have been attempting to make for the parallelism between complex, dynamic non-linear systems and language/language acquisition may strike some readers as too glib. I confess to some uneasiness with it myself. There is a danger when a new theory comes into being that it can be made into a theory of almost anything. And I plead guilty, as I have already applied it in this chapter to language, the brain, and second language acquisition. Many believe that the promise of Chaos/Complexity Theory is overly optimistic (Horgan, 1995). Perhaps my enthusiasm has caused me to exaggerate its scope of influence. If for the moment, however, we suspend our doubts (Larsen-Freeman, 1983) and entertain the thought that language and language acquisition are like other complex systems in the physical sciences, what do we stand to gain? In reply, let me say that I believe there are issues in SLA that might be illuminated by such a perspective. By

way of illustration, I will limit my discussion to five examples mechanisms of acquisition, definition of learning, the instability and stability of interlanguage, differential success, and the effect of instruction.

## QUESTIONS IN SLA TO BE EXAMINED FROM THIS NEW PERSPECTIVE

### Mechanisms of Acquisition

Seeing language as a complex nonlinear system may cause us to re-evaluate our assumptions about the basic mechanisms (Long, 1990) operating in SLA. For example, a Chaos/Complexity Theory perspective has some bearing on the longtime disagreement concerning language acquisition between innatists and constructivists over what must be hardwired in the brain and what must be present in the environment for language acquisition to take place. In the debate between Piaget and Chomsky (Piatelli-Palmerini, 1980: 140), you may recall, Fodor, adopting an innatist stance, claimed that “it is never possible to learn a richer logic on the basis of a weaker logic, if what you mean by learning is hypothesis formation and confirmation”. The same point could be made about hypothesis selection — i.e. setting the parameters of universal principles — which is triggered by exposure to input. For underlying both is the assumption that the complexity of the final state (grammar) cannot exceed the complexity of the combination of the initial state (universal grammar) and the input (data to which learners are exposed).

... the output of LAD contains principle P. Principle P could not have been inductively arrived at from the input. Therefore, it must have been innately specified as part of LAD. For this conclusion to be valid, we need to appeal to the hidden assumption that every organizational principle found in the output must be present either in the initial state (LAD) or in the input (data). That is to say, LAD is essentially entropic: the complexity of the output cannot exceed the sum total of the complexity of the input and the initial state. (Mohanani, 1992: 649–650)

But, we have already seen that entropy is not inevitable in complex, nonlinear systems. What if language is an example of one of these systems? What if the input data triggers the creation or formation of novel complexities — complexities beyond the complexity of the input? Note that the key word here is “complexity”. It is well established that both L1 and L2 acquirers

produce novel forms, forms they would not have heard in the input, such as the use of *goed* for *went* by learners of English. Mohanan's point, however, is that the novel forms produced by the acquirer are sometimes more formally complex than the target language input, and he asks, rightly, I think, where the complexity comes from.<sup>17</sup>

While neither hypothesis formation nor hypothesis selection may satisfactorily explain the increasing complexification of the learner's system, simple connectionism may offer little assistance in this matter either. A connectionist model can generate new forms — forms that were not present in the input, however, it does so by analogizing from input data to new domains. It seems it cannot explain complexity in the output that is not data driven. We might be better served, then, to think of language acquisition, Mohanan (1992) advises, not as deduction from the adult grammar in the face of available input, nor as pattern matching and extension by analogy, but rather as pattern formation or morphogenesis. However, there is an issue with morphogenesis as well. If language acquisition is a process of pattern formation, and if patterns can be created spontaneously that are more complex than the input data, how is it possible for us to comprehend one another? Why do we not each wind up creating our own language, speaking mutually unintelligible idiolects?

The first answer to this question is that the process of pattern formation happens within a system which constrains its general shape. The second answer is that grammars of speakers in the same community *adapt* to each other. Recall that *adaptation* is also an inherent quality of dynamic, complex nonlinear systems. To sum up Mohanan's position:

The emergence of order/complex organization in linguistic systems is analogous to the emergence of order/complex organization in nonlinguistic systems. The formation of grammar in an individual does not involve a logical problem of deducing propositional knowledge, but involves growth of form in a system that governs the external behavior of the system. Linguistic patterns appear spontaneously in the language faculty, when triggered by the environment, like patterns in snowflakes. Unlike snowflakes, however, linguistic systems exhibit adaptability. Their internal changes are governed by the pressure to conform in their overt behavior to those of the other members of the community. (Mohanan, 1992: 654–655)

In other words, both individual creativity and social interaction<sup>18</sup> combine to influence the shape of the developing grammar. As intuitively appealing as this is, it may very well be that this newest characterization of the acquisition

process — morphogenesis and adaptation — will not withstand the test of time. Also, we would need to determine its relevance for the *second* language acquisition process. Then, too, we need to ask how different this view is from that of Schumann's (1978a) creolization or Andersen's (1983) nativization, processes which purport to involve the creation of a linguistic system at least partly autonomous from the input language. Finally, I see no reason, myself, to abandon hypothesis formation, selection, or analogical reasoning at this point as potential mechanisms involved in SLA. If language is as complex as it is, it is not likely we will find a single process to account for all of the complexity. Nevertheless, I offer morphogenesis-with-adaptation as an example of my point that by embracing a view of language/language acquisition as a complex nonlinear system, we are encouraged to expand our quest for explanatory mechanisms for second language acquisition.

### **Definition of Learning**

How to determine when something has been learned is a very difficult question. My SLA students are amused at the lengths to which SLA researchers go to claim that learning something has taken place. Hakuta (1974), for example, adapting Cazden's definition to his own longitudinal study defined the point of acquisition as the "first of three consecutive two-week samples in which the morpheme is supplied in over 90% of obligatory contexts". While this definition is a commendable attempt at operationalizing "learning", it is flawed, as all such measures are, by limiting learning to target-like production.<sup>19</sup>

But flawed as it is, at least this definition attempts to remain true to the non-linear nature of the SLA process. It allows for backsliding, for instance. However, much of SLA research is not of a longitudinal nature. Learning is said to have occurred if the subjects' performance on a post-test exceeds that of their pre-test. The treatment is alleged to have failed if no gain or negative gain is recorded. For instance, UG researchers, studying the value of negative evidence in aiding learners to reset the parameters of their L1 to the new parameter settings for the L2, have been criticized for failing to show that learners who receive negative evidence made long-term learning gains. Based on the fact that the subjects' performance on a distal post-test was not significantly different from their performance prior to the treatment (i.e. the suppliance of negative evidence), the detractors conclude that the "grammar-building process cannot make use of negative evidence to restructure inter-language grammars" (Schwartz & Gubala-Ryzak, 1992). I, for one, am not sure.

Remember the unleashing-of-the-avalanche image from chaos theory. Many pebbles may roll before the avalanche is set off. With simple pre-test/post-test designs, how will we know if our treatment is an ordinary pebble, or an avalanche trigger? Much learning may take place receptively only to be manifest productively when the requisite data have been taken in. Terrell (1991), Ellis (1993), and Van Patten and Cadierno (1993) have all pointed out that explicit grammar instruction will not likely result in immediate mastery of specific grammatical items, but suggest nevertheless that explicit instruction does have value, namely, in facilitating intake.

Recognition of the definition of learning issue becomes even more urgent when we think about the way we assess language learning. First of all, such assessment is usually done by measuring the target-like appearance of forms. Others have already pointed out the target-centric nature of this enterprise (e.g. Btey-Vroman, 1983). This problem is further compounded because as we have already seen, the learners' internal grammar may have changed without the learners' being able to produce a new form — maybe the triggering pebble has yet to roll. Finally, what has been learned is not a steady state any more than the target language, and learning is therefore always provisional.

### **The Stability/Unstability of Interlanguage**

Much effort in SLA has gone into addressing such questions as “What does systematic mean?” and “How can an interlanguage be termed ‘systematic’ when in most researchers’ data, there appears to be so much variability?” “Is there a cut-off point where the notion of ‘system’ no longer makes sense?” Tarone, Frauenfelder, and Selinker (1976) ask. This question motivated these three researchers to postulate nine logical possibilities between Time 1 and Time 2 by which a learner’s IL could be characterized as stable/unstable. Their definitions again made use of the appearance of a given structure in obligatory contexts. The learner’s production shows stability when there was no change in the distribution of variants over time. So, for example, one possibility for stability would be where a given variant is supplied  $\leq 10$  percent, another when the variant was produced  $\geq 90$  percent in obligatory contexts. An example of instability would be from less than 10 percent suppliance to variable production. Using their nine definitions, Tarone, Frauenfelder, and Selinker found definite patterns of instability in the IL of children in French Immersion Programs in Toronto.

ILs, like all natural languages, are unstable. There is always spontaneous innovation, and there is always borrowing (Tarone, 1990).

“Natural language is unstable and so is subject to invasion by new forms. IL is a special type of natural language in that it is characterized by a very high level of instability. It is subject to constant bombardment by new linguistic forms, many of which are ‘taken in’, when to begin with they exist side by side with existing forms.” (Ellis, 1985: 125) If instability is seen to be a threat to systematicity, the position put forth in this chapter makes matters worse for I am contending that there is even more instability than what surfaces when we recognize that changes are taking place all the time, and that the appearance of novel forms is merely the tip of the iceberg.

While all this instability might have been seen at the time as a threat to the systematicity of ILs, chaos theory is reassuring in this regard. For as Percival (1993) notes, there is *persistent instability* in complex dynamic systems. If we view ILs as complex dynamic systems, a perspective I am advocating, then the problem of reconciling systematicity and instability is eliminated — an unstable system is not an contradiction in terms.

### Individual Differences

A major strand of SLA research has been devoted to the study of differential success among second language learners. Researchers have investigated many variables to account for the observation that not all learners are uniformly successful in acquiring a second language. One of the major questions has revolved around the validity and applicability of the instruments used to measure these variables. Are the measures of cognitive style, the Group Embedded Figures Test, for instance, really applicable to language acquisition? Another issue has been the fact that often rather simple univariate analyses, such as simple correlations between a single individual variable and learner performance on some language proficiency measures are used. As d’Anglejan and Renaud (1985) rightly point out, learner variables inevitably overlap and interact with others, suggesting that we are not getting a true measure of a factor if we isolate it from others. This would certainly be the case if language acquisition is a complex nonlinear process.

In addition, Seliger (1984: 37) contends:

The more variables we identify, the more we attempt to explain the recombinations of these variables through the wonders of computer and multivariate analysis ... While many characteristics have been related correlationally to language achievement, we have no mechanism for deciding which of the phenomena described or reported to be carried out by the learner are in fact those that lead to language acquisition.

Seliger's point is well taken. Progress in understanding SLA will not be made simply by identifying more and more variables that are thought to influence language learners. We have certainly witnessed the lengthening of taxonomies of language-learner characteristics over the years, and we doubtless will continue to add to the lists. Schumann (1976) mentions 4+ factors, by 1989, Spolsky notes 74. However, it is not clear that we have come any closer to unraveling the mysteries of SLA now than before. If SLA is indeed a complex nonlinear process, we will never be able to identify, let alone measure, all of the factors accurately. And even if we could, we would still be unable to predict the outcome of their combination.

### **Effect of Instruction**

Much of the SLA research has dealt with natural or untutored acquisition. Prior to the more recent establishment of classroom-centered SLA research, researchers operated under the assumption that instruction was just one more variable to be dealt with (e.g. Schumann, 1978b), and that when we better understood acquisition in its natural state, we could factor in the effects of instruction.

While it is common practice when faced with complex systems to deal with one definable part at a time, I do not think that the effects of instruction can be factored in later, any more than learner factors can be included after we have figured out the learning process (Larsen-Freeman, 1991a). Remember that in complex nonlinear systems, the behavior of the whole emerges out of the interaction of its parts. Studying the parts in isolation one by one will tell us about each part, but not how they interact.

## **CONCLUSION**

Analogies are only helpful if by knowing something about one member of a pair, we can advance our understanding of the other. It is too early to tell if Chaos/Complexity Theory has the capacity to shed substantive light on conundrums in SLA the way it has on a wide range of complicated phenomena from biochemical processes, to genetic variation, to economic fluctuations (Hall, 1993; Ruelle, 1993). Nevertheless, it has the *potential* to contribute to our awareness about various aspects of language and language acquisition.<sup>20</sup> By way of conclusion, then, I will offer a few of the ways that its potential might be realized. It seems to me that Chaos/Complexity Theory:



## 1 Encourages a Blurring of Boundaries

Linguists have identified a number of dichotomies already explicitly or implicitly dealt with in this chapter: language as mental construct/language as use, *langue/parole*, competence/performance, synchronic/diachronic, innatism/constructivism, individual speaker-hearer/social interaction, etc. Typically, linguists have aligned themselves with one or the other of the members of each pair. Saussure, for example, argues that the linguist's role is to investigate the language system present in language from a synchronic perspective. Chomsky has made it his contribution to argue for a strong innate endowment for language within humans. Vygotsky feels that what is of value lies in social interaction, Chomsky takes the individual speaker-hearer as his focus.

One lesson from chaos theory is that these may be false dichotomies for those interested in the whole of second language acquisition. While it may be essential that the distinctions be preserved for the purposes of linguistic description, Chaos/Complexity Theory encourages a blurring of boundaries in SLA — to see complementarity, and to practice inclusiveness<sup>21</sup> where linguists have seen oppositions and exclusiveness. One of the things I appreciate about a Chaos/Complexity Theory perspective is that it suggests we need to see SLA as *both/and* rather than *either/or*. To cite just one example of a false dichotomy, I have discussed how from a chaos theory perspective, language use and language change are inseparable. Remember “playing the game changes the rules”.

## 2 Warns against Settling for Simple Solutions Prematurely

Closely aligned to the first point, but sufficiently important to warrant one of its own, is the need to resist the temptation to settle for simple solutions to complex problems. While it is true that one criterion by which theories are judged is parsimony, a pursuit of simple explanations for a complex process such as SLA at this point in the evolution of the field is at best premature, it seems to me. For example, as I indicated earlier, I think it is entirely possible that there are various mechanisms involved in SLA and we should not assume that SLA is attributable solely to hypothesis formation/selection *or* analogical reasoning *or* morphogenesis/adaptation, *or* even to a combination of the three for that matter.

## 3 Provides Some Fresh Images for SLA Phenomena

As we have seen, biological metaphors are not new in language

description. The notion that languages are organic, grow, and evolve has been proposed before the advent of chaos theory. However, Chaos/Complexity Theory provides a fresh reprise on this biological theme and some compelling images to go along with it<sup>22</sup>: the murk and stagnation of entropy, the infinite thinness of strange attractors, the self-similarity of scale in fractals. By drawing an analogy between language and complex, nonlinear systems occurring in nature, it follows that languages go through periods of chaos and order as do other living systems. Furthermore, their creative growth occurs at the border between these two (“Life at the Edge of Chaos” is a chapter title in Waldrop, 1992: 198). Raising our awareness about the non-entropic nature of language may force us to recognize that mechanisms that are input-data driven cannot adequately account for complexification of the learner’s system beyond that present in the input. Finally, it is intriguing to consider in what ways language is a fractal and what selective advantage is derived from this.

#### **4 Foregrounds Certain Problems, Obviates Others**

It is clear that we cannot rely on simple pre-test/post-test research designs to measure language gains. Much learning can take place in the form of reduction of uncertainty in the system state without ever manifesting itself in production of a new form. We need to remember the “camel’s back” effect. How to determine when learning takes place is an old problem foregrounded by what we are learning from Chaos/Complexity Theory.

On the other hand, shifting the lens through which we view the world helps us to see that the problem of an unstable system is not a problem after all — that a characteristic of a complex, nonlinear system is persistent turbulence. From a Chaos/Complexity Theory perspective, then, an IL must be conceived as the evolving grammar of the learner adapting to an evolving target grammar, not as one of a set of successive approximations to a steady-state grammar. In other words, we need a camcorder, not a camera to do our research.

#### **5 Discourages Theory Construction through the Aggregation of Simple Univariate Cause — Effect Links<sup>23</sup>**

We know from chaos theory that complex systems are comprised of many interacting parts, the behavior of which (even the tiniest), when combined, is unpredictable. As such, it is futile to expect that by aggregating findings from simple univariate cause — effect links made in laboratory settings that we can build a theory of SLA that will hold when

all the factors are combined. Remember “the butterfly effect”.

## **6 Underscores the Importance of Details**

Because of the sensitive dependence on initial conditions in chaotic systems, we know that the paths of dynamic systems with similar, but not identical, starting points can diverge exponentially at a later time. Thus, Chaos/Complexity Theory underscores the importance of the details. It can be the small things that matter the most. They must not be overlooked.

## **7 Reminds Us to Hold the Whole and to Find a Unit of Analysis That Allows This**

But as we are focused on the details, we must not lose sight of the whole. Because the behavior of a whole complex nonlinear system is not built into any one of its components, it is self-defeating to examine in isolation a part of the whole in order to learn how the whole operates. However, it is not easy to imagine how one might go about studying the whole of SLA. Thus, it seems we need a way to focus on an individual aspect while respecting the complexity of the whole (Gattegno, 1987: 80).

Vygotsky recognized this, of course, which is why he felt that trying to understand consciousness by reducing it to its elementary components was futile. In order to study consciousness, a minimal unit of analysis needed to be established, which was itself a microcosm of consciousness (Lantolf & Appel, 1994: 22). Although Vygotsky’s choice of word meaning as an investigable microcosm was perhaps misguided (Wertsch, 1985), another gift of Chaos/Complexity Theory is recognition of the need for a new unit of analysis within SLA (although the term “unit of analysis” might itself be inappropriate), which somehow focuses on the particular while embracing the whole.

It is true that some of these thoughts/opinions were with me before I began to read about Chaos/Complexity Theory. Others, though, were inspired by what I learned. Readers of this chapter will come to their own conclusions, doubtless different from my own. So much the better — for with the chaos of conflicting opinion, comes growth.

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## Notes

1. This quote from Bowers is taken from a paper in which he muses on the implications of chaos theory for our field. I did not know of this paper when I presented mine in Montreal, but since then have discovered others within our field (Diller, 1990, 1995; Lewis, 1993; Connor-Linton, 1995) who have speculated on the same theme and others within allied fields (Mohanan, 1992; Taylor, 1993, 1994; Bernàrdez, 1995), who have done likewise. Where relevant, I will cite these works.
2. I am grateful to Craig Chaudron for drawing my attention to this work.
3. Although “climatologists worry these days that the weather’s strange attractor (the climate) may one day change its shape as a result of the industrial perturbations caused by human beings” (Briggs, 1992: 140).
4. I appreciate my colleague Elka Todeva’s reminding me of Humboldt’s work.
5. This is the type of change historical linguists try to account for through such means as the great English vowel shift.
6. This explanation for language change is parallel to Hatch’s (1978) claim for SLA that out of participation in conversation, learners learn syntactic structures. I also think it is a perspective not incompatible with Becker’s (1983: 218) suggestion regarding language use “suppose that, instead of shaping discourse according to rules, one really pulls old language from memory and then reshapes it to current context”. And Becker cites Bateson’s (1979: 17) thought that “context shaping ... is just another term for grammar”.
7. See Rumelhart and McClelland (1986). For discussions in SLA, see, e.g. Gasser (1990), Sokolik (1990), and Jensen and Ulbaek (1994).
8. For this reason, Stauble and Larsen-Freeman (1977) suggested the use of variable rules as descriptive devices. Although still product-oriented (as opposed to process), variable rules attempt to portray the changing nature of interlanguage over time.
9. I refer here to “grammars”, but I mean these concepts to apply to the acquisition of any component of the target language system. Nevertheless, it is well known that most of the evidence has been adduced in the area of morphosyntax.
10. And, as Lewis (1993: 58) puts it, the notion of a definable target is an idealization

anyway as there is no such thing as a “homogenous speech community”.

11. This is not to say, of course, that learners cannot make progress in bringing their IL grammars more in alignment with that of native speakers. Presumably, the rate of learning and the rate at which the target language is developing differ.
12. Presumably, it is because of these factors that although both L1 and L2 acquisition are complex, dynamic processes, they do not play out in the same way.
13. Except perhaps for the absolute impact of age on pronunciation ability. Others of these may very well be determining factors at the level of the individual, and many individuals will be able to explain their progress or lack thereof in terms of one or more of these variables.
14. The common occurrence of overgeneralization has always been cited as evidence for a rule-formation view of SLA. It should be noted, however, that the connectionist models have yielded very similar typical developmental patterns for English past tense formation without the need to build in “rules” (Rumelhart & McClelland, 1986). The networks control what looks like rule-governed behavior, but which is simply a reflection of the connections formed on the basis of the relative strengths of various patterns in the input. Such findings make me optimistic that the observed frequency effect for the morpheme accuracy order (Larsen-Freeman, 1976) might be simulated in a similar manner, and that connectionist models will provide a means to accommodate the fact that much of our fluency in spoken language is due to the thousands of prefabricated routines and collocations we control (Pawley & Syder, 1983; Nattinger & DeCarrico, 1992; Weinert, 1995).
15. This would seem to be similar to Piaget’s central constructive mechanism, “equilibration”, however, as it is used in the Piagetian sense, it is the mechanism by which the child moves from one state of equilibrium to the next (Ginsburg & Opper, 1969). By way of contrast, the perspective adopted for this chapter is that there is no state of equilibrium possible. The whole system is constantly in flux and chaotic.
16. Taylor (personal communication) has suggested the analogy between fixed point attractors and fossilization. I am not sure what in chaos theory would account for why a dynamic system stops evolving and becomes fixed. Perhaps it is that the sociopsychological factors in SLA transform the open system to a closed one — which I realize is not an explanation at all.
17. Recall that this is the same question that drives complexity science.
18. Observing that social interaction is necessary in order for the system to develop appears to be similar to Vygotsky’s (1981) and Luria’s (1973) position, although it seems to me that they would claim that it is social interaction alone, or at least primarily, that drives development and that the other half of the partnership — pattern formation of the sort Mohanan is describing — would not be necessary. Of course, unlike Vygotsky and Luria, here we are concerned

- with language development exclusively and it may be that with language development, pattern formation has a greater role to play.
19. It is possible, for example, for a learner to use a more sophisticated form at time 2, compared with time 1, and not receive credit for having learned anything since the form at time 2 remains non-target-like.
  20. I think it has implications for language teaching as well, but these are beyond the scope of this chapter.
  21. For example, Tarone (1990) sees a place for both rationalist and variationist views of SLA.
  22. Indeed, I am certain that my interest in Chaos/Complexity Theory is in part attributable to aesthetics (Schumann, 1982).
  23. To teaching, as well, I hope. I am constantly reminding students, audiences, and myself that teaching does not cause learning.

## References

- Abraham, R. (1994). *Chaos, Gaia, Eros*. New York: HarperCollins Publishers.
- Andersen, R. (Ed.). (1983). *Pidginization and Creolization as Language Acquisition*. Rowley, MA: Newbury House.
- Bateson, G. (1979). *Mind and Nature: A Necessary Unity*. New York: Dutton.
- Becker, A. L. (1983). Toward a post-structuralist view of language learning: A short essay. *Language Learning*, 5(3): 217–220.
- Bernárdez, E. (1995). Complexity and self-regulation processes in language. Paper presented at the ESSE Conference, Glasgow, September.
- Berreby, D. (1994). Murray Gell-Mann. *The New York Times Magazine*, May 8: 24–27.
- Bley-Vroman, R. (1983). The comparative fallacy in interlanguage studies. *Language Learning*, 33: 1–17.
- Bnggs, J. (1992). *Fractals: The Patterns of Chaos*. New York: Simon and Schuster.
- Bowers, R. (1990). Mountains are not cones. In J. Alatis (Ed.), *Georgetown University Round Table on Languages and Linguistics*. Washington, DC: Georgetown University Press.
- Churchland, P. (1988). *Matter and Consciousness*. Cambridge, MA: The MIT Press.
- Connor-Linton, J. (1995). Complexity, linguistics and language teaching. Paper presented at the Georgetown University Round Table on Languages and Linguistics, March 1995.
- Crutchfield, J., J. D. Farmer, N. Packard & R. Shaw. (1986). Chaos. *Scientific American*, 12: 46–57.
- d'Anglejan, A. & C. Renaud. (1985). Learner characteristics and second language acquisition: A multivariate study of adult immigrants and some thoughts on methodology. *Language Learning*, 35: 1–19.
- Davies, P. (1988). *The Cosmic Blueprint*. New York: Simon and Schuster.

- DiDer, K. (1995). Language teaching at the Millenium: The perfect methods vs the garden of variety. Unpublished manuscript.
- Diller, K. (1990). The non-linearity of language-learning and "post-modern" language teaching methods. In H. Burmeister & P. Rounds (Eds.), *Variability in Second Language Acquisition*, Vol. 2. Eugene, Oregon: University of Oregon.
- Edge, J. (1993). The dance of Shiva and the linguistics of relativity. *Applied Linguistics*, 14(1): 43–55.
- Ellis, R. (1985). Sources of variability in interlanguage. *Applied Linguistics*, 6(2): 118–131.
- Ellis, R. (1993). The structural syllabus and second language acquisition. *TESOL Quarterly*, 27: 91–113.
- Frawley, W. & J. Lantolf. (1985). Second language discourse: A Vygotskyan perspective. *Applied Linguistics*, 6(1): 19–44.
- Gasser, M. (1990). Connectionism and universals of second language acquisition. *Studies in Second Language Acquisition*, 12: 179–199.
- Gattegno, C. (1987). *The Science of Education (Part I): Theoretical Considerations*. New York: Educational Solutions, Inc.
- Ginsburg, H. & S. Opper. (1969). *Piaget's Theory of Intellectual Development*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Penguin Books.
- Globus, G. (1995). *The Postmodern Brain*. Amsterdam/Philadelphia: John Benjamins.
- Hakuta, K. (1974). A preliminary report on the development of grammatical morphemes in a Japanese girl learning English as a second language. *Working Papers on Bilingualism*, 3: 18–43.
- Hall, N. (Ed.). (1993). *Exploring Chaos: A Guide to the New Science of Disorder*. New York: Norton and Company.
- Halliday, M. A. K. (1985). *An Introduction to Functional Grammar*. London: Edward Arnold.
- Hatch, E. (1978). Discourse analysis, speech acts and second language acquisition. In W. Ritchie (Ed.), *Second Language Acquisition Research*. New York: Academic Press.
- Horgan, J. (1995). A theory of almost everything. *New York Times*, Book Review Section, October 1.
- Jensen, K. A. & I. Ulbsek. (1994). The learning of the past tense of Danish verbs Language learning in neural networks. *Applied Linguistics*, 15(1): 15–35.
- Kauffman, S. 1991. Antichaos and adaptation. *Scientific American*, August: 78–84.
- Lantolf, J. & G. Appel (Eds.). (1994). *Vygotskian Approaches to Second Language Research*. Norwood, NJ: Ablex.
- Larsen-Freeman, D. (1976). An explanation for the morpheme acquisition order of second language learners. *Language Learning*, 26(1): 125–134.
- Larsen-Freeman, D. (1983). Second language acquisition: Getting the whole picture. In K. Bailey, M. Long & S. Peck (Eds.), *Second Language Acquisition Studies*. Rowley, MA: Newbury House.

- Larsen-Freeman, D. (1989). Pedagogical descriptions of language: Grammar. *Annual Review of Applied Linguistics*, 10: 187–195. Cambridge: Cambridge University Press.
- Larsen-Freeman, D. (1991a). Second language acquisition research: Staking out the territory. *TESOL Quarterly*, 25: 315–350.
- Larsen-Freeman, D. (1991b). Teaching grammar. In M. Celce-Murcia (Ed.), *Teaching English as a Second or Foreign Language* (2<sup>nd</sup> edn.). New York: Newbury House.
- Larsen-Freeman, D. (1994). Second language pedagogy: Grammar. *The Encyclopedia of Language and Linguistics*, Vol. 7. Oxford: Pergamon Press Limited.
- Larsen-Freeman, D. & M. Long. (1991). *An Introduction to Second Language Acquisition Research*. London: Longman.
- Lewis, M. (1993). *The Lexical Approach*. Hove: Language Teaching Publications.
- Long, M. (1990). The least a second language acquisition theory needs to explain. *TESOL Quarterly*, 24: 649–666.
- Luna, A. R. (1973). *The Working Brain: An Introduction to Neuropsychology*. New York: Basic Books.
- Mohanan, K. P. (1992). Emergence of complexity in phonological development. In C. Ferguson, L. Menn & C. Stoel-Gammon (Eds.), *Phonological Development*. Timonium, MD: York Press, Inc.
- Natanger, J. & J. DeCarrico. (1992). *Lexical Phrases and Language Teaching*. Oxford: Oxford University Press.
- Pawley, A. & F. Syder. (1983). Two puzzles for linguistic theory: Nativelike selection and nativelike fluency. In J. Richards & R. Schmidt (Eds.), *Language and Communication*. London: Longman.
- Percival, I. (1993). Chaos: A science for the real world. In N. Hall (Ed.), *Exploring Chaos: A Guide to the New Science of Disorder*. New York: Norton and Company.
- Piatelli-Palmerini, M. (Ed.). (1980). *Language and Learning: The Debate between Jean Piaget and Noam Chomsky*. Cambridge, MA: Harvard University Press.
- Pinker, S. & P. Bloom. (1990). Natural language and natural selection. *Behavioral and Brain Science*, 13: 707–727.
- Reynolds, C. (1996). *Boids: An Update*. Internet Reference.
- Robins, R. H. (1967). *A Short History of Linguistics*. Bloomington: Indiana University Press.
- Ruelle, D. (1993). *Chance and Chaos*. London: Penguin Books.
- Rumelhart, D. & J. McClelland. (1986). On learning the past tense of English verbs. In J. McClelland, D. Rumelhart & the PDP Research Group. *Parallel Distributed Processing: Explorations in the Microstructures of Cognition* (Vol. 2). Cambridge, MA: MIT Press.
- Rutherford, W. (1987). *Second Language Grammar Learning and Teaching*. London: Longman.
- Schroeder, M. (1995). *Self-similarity Chaos, Fractals, Power Laws*. New York: W. H. Freeman & Co.
- Schumann, J. (1976). Second language acquisition research: Getting a more global look at the learner. *Language Learning*, Special Issue, No. 4: 15–28.
- Schumann, J. (1978a). The relationship of pidginization, creolization, and decreolization



- to second language acquisition. *Language Learning*, 28: 367–379.
- Schumann, J. (1978b). Social and psychological factors in second language acquisition. In J. Richards (Ed.), *Understanding Second and Foreign Language Learning*. Rowley, MA: Newbury House.
- Schumann, J. (1982). Art and science in second language acquisition research. In M. Clarke & J. Handscombe (Eds.), *On TESOL '82*. Washington, DC: TESOL.
- Schwartz, B. & M. Gubala-Ryzak. (1992). Learnability and grammar reorganization in L2A: Against negative evidence causing the unlearning of verb movement. *Second Language Research*, 8: 1–38.
- Seliger, H. (1984). Processing universals in second language acquisition. In F. Eckman, L. Bell & D. Nelson (Eds.), *Universals of Second Language Acquisition*. Rowley, MA: Newbury House.
- Smith, C. & G. Gemmill. (1991). Change in the small group: A dissipative structure perspective. *Human Relations*, 44(7): 697–716.
- Sokolik, M. (1990). Learning without rules: PDP and a resolution of the adult language learning paradox. *TESOL Quarterly*, 24: 685–696.
- Spolsky, B. (1989). *Conditions for Second Language Learning*. Oxford: Oxford University Press.
- Stauble, A. & D. Larsen-Freeman. (1977). The use of variable rules in describing the interlanguage of second language learners. *Workpapers in TESL*, UCLA, Vol. 11.
- Stewart, I. (1989). *Does God Play Dice? The Mathematics of Chaos*. Oxford: Basil Blackwell.
- Tarone, E. (1990). On variation in interlanguage: A response to Gregg. *Applied Linguistics*, 11(4): 392–400.
- Tarone, E., U. Frauenfelder & L. Selinker. (1976). Systematicity/variability and stability/instability in interlanguage systems. *Language Learning*, Special Issue, No. 4: 93–134.
- Taylor, M. (1993). Chaos theory, interdisciplinarity and some implications for art and literature. *Kinjo Gakuin Daugaku Ronsyu*. Treatises and Studies by the Faculty of Kinjo Gakuin University Studies in English Language and Literature, Vol. 34: 189–213.
- Taylor, M. (1994). The pit as pendulum Chaos, models, experiments and attractors in Poe's "A Descent into the Maelstrom". *Kutjo Gakuin Daugaku Ronsyu*. Treatises and Studies by the Faculty of Kinjo Gakuin University Studies in English Language and Literature, Vol. 35: 177–209.
- Terrell, T. (1991). The role of grammar in a communicative approach. *Modern Language Journal*, 75: 52–63.
- Thom, R. (1972) *Stabilite Structurelle et Morphogenese* Reading, MA Benjamins. Translated by D. Fowler. *Structural Stability and Morphogenesis*. Reading, MA: Addison-Wesley.
- VanPatten, W. & T. Cadierno. (1993). Explicit instruction and input processing. *Studies in Second Language Acquisition*, 15: 225–243.
- Vygotsky, L. S. (1981). The genesis of higher mental functions. In J. V. Wertsch (Ed.), *The Concept of Activity in Soviet Psychology*. Armonk, NY: ME-Sharpe.
- Waldrop, M. (1992). *Complexity: The Emerging Science at the Edge of Order and Chaos*.

New York: Simon and Schuster.

Weinert, R. (1995). The role of formulaic language in second language acquisition: A review. *Applied Linguistics*, 16(2): 180–205.

Wertsch, J. (1985). *Vygotsky and the Social Formation of Mind*. Cambridge, MA: Harvard University Press.

Winter, D. (1994). *Sacred geometry*. A videotape produced by Crystal Hill, Eden, New York.

## Comment after Chapter 7

Although I was excited about the ideas that chaos and complexity science inspired in me, in truth, I was disappointed that there was no outpouring of support for them initially. There was a ripple of interest from some researchers, and objection raised by others (from scholars who were committed to an innatist UG view), but there was no groundswell of approval, despite my feeling that the ideas stimulated by seeing language and its development as complex systems was far-reaching. Perhaps it was short-sighted of me to expect it to be different. After all, the acceptance of new ideas is a nonlinear process as well, and, now, these days there is much attention given to complex dynamic systems and usage-based linguistics.

In the meantime, there was a debate brewing in second language acquisition over the issue of whether SLA was primarily a cognitive process or a social one. The debate had been fueled by presentations at the International Association of Applied Linguistics Congress in Jyväskylä, Finland in 1996. A seminal paper from the Congress was later published as an article in the *Modern Language Journal* (Firth & Wagner, 1997). A debate in print ensued, which many in the field considered to be a turning point — cognition would no longer be universally embraced as the sole locus of SLA research and insight.

I, myself, came to some of the same ideas as the social theorists, although the origin of my thoughts was chaos and complexity science. Despite a different source, the new ideas in the field represented a profound change in my thinking. As I wrote earlier, I came of academic age during the beginning of the influence of the cognitive revolution on SLA. It would have been relatively easy to resolve the cognitive-versus-social debate in the field by adopting a pluralistic solution and simply acknowledging that SLA is both a cognitive and social process. However, pluralism is an incomplete answer, and not a very satisfying one at that.

In the chapter that follows, I argued that Chaos/Complexity Theory<sup>1</sup> forces us away from easy distinctions, such as the social-versus-cognitive perspective, which may turn out to be false dichotomies. Fortunately, there is a way out. As I implied earlier in this book (when I traced the evolution of analyses in the field from contrastive to error to performance to discourse analysis), when the field is faced with an impasse, we sometimes look for a larger lens that can accommodate competing points of view. I think that this is what a Chaos/Complexity Theory perspective affords. As I stated in the previous article, it suggests that "...the act of playing the game has a way changing the rules" (Gleick, 1987: 24). Of course, I had known about diachronic linguistics, which studies language change over time. I also knew about research on language processing in real time. But, this perspective on nonlinear systems suggested a way to connect them: what I later came to call "organic dynamism". Organic dynamism lies at the nexus of social use of the language over time and the present-day real-time emergent regularities that comprise it.

## Notes

1. For this chapter, I combined chaos and complexity science into Chaos/Complexity Theory.

## References

- Firth, A. & J. Wagner. (1997). On discourse, communication, and (some) fundamental concepts in SLA research. *Modern Language Journal*, 81: 285–300.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Penguin Books.



# Chapter 8

## Language Acquisition and Language Use from a Chaos/Complexity Theory Perspective

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### INTRODUCTION

The field of second language acquisition (SLA) is in a state of turmoil. Heated exchanges are published in our journals, and internecine feuding is widespread. For while an individual/cognitive perspective on language acquisition prevails in SLA research, this “mainstream” view has been under increasing attack, and a more socially situated view of language use/acquisition is increasingly finding favor. At this juncture in the evolution of the SLA field, it would be worthwhile to examine the nature of the debate in order to truly understand what is being contested. This I do in two steps. In the first part of this chapter, I summarize two key issues as they have been put forth by some of the protagonists. Then, to contrast the two issues in a different way, I turn to the third question posed by the organizers of the workshop at which this chapter was originally presented as paper. The question is: How is educational success defined?

Next, I propose that a way to deal with the conflict today is to do what the SLA field has always done on such occasions: to adopt a perspective that is large enough to accommodate the two competing points of view. In this chapter, I offer Chaos/Complexity Theory (C/CT), not as a single grand unifying theory, but as a larger lens through which to view issues of interest to the SLA field. Finally, before concluding, I digress briefly to discuss a parallel debate ongoing in the field of linguistics.

## THE DEBATE IN SLA<sup>1</sup>

Firth and Wagner (1997, 1998) call for what at first appears to be a theoretically balanced approach to the study of SLA — one where both the social and the individual cognitive dimensions of SLA would be treated equally. In order to put forth their case for more representation for the social side, however, it appears that they are seeking to do more than redress a perceived imbalance. To this end, they urge the SLA researchers to reconsider “unquestioningly accepted and well established concepts such as learner, nonnative, and interlanguage”. As they put it, “... we are unable to accept the premises of ‘interlanguage’ — namely, that language learning is a transitional process that has a distinct and visible end” (1998: 91). They add that these problematic concepts are associated with the predominant view in the SLA field, which has been “individualistic and mentalistic”, and that this view thus fails to account in a satisfactory way for interactional and sociolinguistic dimensions of language (Firth & Wagner, 1997: 285). Rampton (1997) calls this “disembedded cognition”. Firth and Wagner contend that, since its founding by Corder, SLA has been much less concerned with what language is used for and much more concerned with individual acquisition and its relation to general human cognitive systems — the acquisition of L2 competence in the Chomskyan sense. “As such, it is flawed,” they write, and “obviates insight into the nature of language, most centrally the language use of second or foreign language speakers” (1997: 285).

The critics find further faults as well (for a discussion of these, see Larsen-Freeman, 2000; Tarone, 2000), but this brief recapitulation captures two of the most trenchant criticisms of mainstream SLA research: the imbalance between the psychological and the social, and the failure to consider language use. Let me now summarize what some of those invited to reply to the criticism had to say. First of all, they responded that a major flaw in Firth and Wagner’s position is that they miss the point — that what SLA aims to do is to explain *language acquisition*, not *language use* (Kasper, 1997; Long, 1997; Gass, 1998). According to Long (1997), “most SLA researchers view the object of inquiry as in large part an internal mental process: *the acquisition of new (linguistic) knowledge*. ... The goal of research on SLA ... is to understand how changes in that internal mental representation are achieved, why they sometimes appear to cease ... and which learner, linguistic, and social factors ... affect and effect the process” (Long, 1997: 319). Long goes on to say, because SLA researchers are concerned with mental processes,

“cognitive variables are inevitably and justifiably a central focus” (1997: 319). Gass (1998), acknowledging that perhaps some parts of language may be socially constructed, adds that SLA researchers subscribe to the view that language is an abstract entity residing in the individual. This position finds support, according to Gass, in the fact that “... there are parts of what we know about language (e.g. what is grammatical and what is ungrammatical) that cannot come from social interaction” (1998: 88).

Apparently unconvinced, in the final exchange of this series Firth and Wagner (1998) lament that “SLA seems to be dominated by Chomskyan thinking to such a degree that others’ frames of reference for the understanding of language and cognition have become inconceivable” (1998: 92).

## DEALING WITH COMPETING VIEWS

The fact that there are competing views in SLA is not remarkable. Indeed, some would find it a very healthy sign (Lantolf, 1996). That there are at least these two major positions prevents either view from remaining or becoming hegemonic. Neither view can dictate what is normal SLA research and what is anomalous. Further, it is certainly not uncommon to find disciplines in which competing points of view co-exist. Thus, perhaps it is the fate of those interested in SLA to live with equally powerful contradictory views as well. However, before we accept this state of affairs as inevitable, it makes sense to see if the two points of view are reconcilable. They may very well be if the terms of a reconciliation would only require that we achieve a balance between psycholinguistic and sociolinguistic perspectives, although it turns out that even accomplishing this may be easier said than done.

For instance, Poulisse (1997) acknowledges that both psycholinguistic and sociolinguistic approaches are important, but considers the psycholinguistic approach as primary and the sociolinguistic approach to be secondary, adding “you first need to describe the basic processes of learning and using language and then to discuss the contextual factors that influence these processes” (1997: 324). Such a position is not going to satisfy the critics of mainstream SLA. Of course, even if a balance were achieved, we would need to be vigilant to ensure that the field does not move beyond the point of equilibrium, resulting in an imbalance in the other direction. With any dualism, hegemony can extend in either direction. As Kirshner and Whitson (1997) point out, “the Vygotskian tradition is similarly weighted toward a deterministic social plane. The source of this weighting is the central tenet

that ‘social relations genetically underlie all higher [mental] functions and their relationships’” (Vygotsky, 1981; in Kirschner & Whitson, 1997: 8).

Awarding either the psychological or the social primary status would do little to quell the debate or to advance the field. However, balancing the two would not end the debate either. This is because there is much more at stake than whether psychological or social factors are given equal attention. There is the second criticism with which to contend — that mainstream SLA has ignored questions of language use. This criticism highlights a fundamental, ontological difference between the two positions. Mainstream SLA makes a distinction between language acquisition and language use, and sees the former its rightful domain. As Gass (1998: 85) puts it, “The research question central to SLA... is: How do people *learn* an L2? — The question is not: How do people *use* an L2, unless the latter is a means of getting at the former.” While the mainstream view emphasizes the inward movement (acquisition process) of the object known as language (product) until some future point at which the product is isomorphic with a target, the newer view makes salient the discursual nature of the learning interaction, with the dividing line between language learning and language use not easily drawn (Firth & Wagner, 1998). This difference can best be appreciated by turning to the question of the definition of educational success, posed by organizers of the workshop.

## A DEFINITION OF EDUCATIONAL SUCCESS

For mainstream SLA researchers, success is defined as acquisition of the rules that bring the learner’s performance into ever greater conformity with the target language — in terms of accuracy of production when compared with native-speaker performance. According to a more recent depiction, success is brought about by the acquisition of memorized sequences or chunks of language. Still, success is measured by the closeness of fit between the interlanguage that a learner produces and the corresponding baseline performance of the native speaker. Such a view of language success, Sfard (1998)<sup>2</sup> tells us, reflects an “acquisition metaphor” of learning, i.e. that human learning is conceived of as an acquisition of something, that something being an *a priori* category such as rules or sequences of language. Once rules or sequences are owned or acquired, according to the acquisition metaphor, they may be applied, transferred (to a different context), and shared with others.

A potential characterization of educational success presented by the challenger to this mainstream view can also be characterized by a



metaphor. Sford calls it “the participation metaphor”. In the participation metaphor, rather than talking about acquiring entities, attention is paid to activities. “In the image of learning that emerges from this linguistic turn, the permanence of *having* gives way to the flux of *doing*. While the concept of acquisition implies that there is a clear endpoint to the process of learning, the new terminology leaves no room” (1998: 6) for such.

This view leads to a different definition of educational success. According to the participation metaphor, learning a language is seen as a process of becoming a member of a certain community. “This entails, above all, the ability to communicate in the language of this community and act according to its norms ... While the AM [acquisition metaphor] stresses the individual mind and what goes ‘into it’, the PM [participation metaphor] shifts the focus to the evolving bond between the individual and others.” (Sford, 1998: 6) Learning is taking part and at the same time becoming part of a greater whole.

It is important to note that the acquisition metaphor and the participation metaphor do not inevitably correspond to the psychological-social dichotomy previously discussed. The reason for this is that the acquisition metaphor makes no distinction between the internalization of rules of language and the internalization of socially established concepts. Psycholinguistic rules and sociolinguistic concepts can both be objects of learning, something to be possessed. Furthermore, whereas the social dimension is salient in the participation metaphor, it is not necessarily absent from research informed by the acquisition metaphor. This, after all, is what some of the mainstream SLA researchers have said in their responses to Firth and Wagner’s criticism (see also the interactionist perspective in SLA, e.g. Gass, 1997).

Instead, the acquisition/use division is ontological in nature, with the two positions reflecting fundamental differences in the way they frame their understanding of learning. Those that operate within an acquisition metaphor study the language acquisition of individuals, and evidence of the individuals’ success is sought in their acquisition of target rules and structures. Those that operate within a participation metaphor study the language use of socially constituted individuals within groups, and seek evidence of success in the learners becoming participants in the discourse of a community. Distinguishing the mainstream and challenger views in this way is more illuminating than construing the dispute solely as a psycholinguistic versus sociolinguistic split.

It is, at the same time, more problematic, for it is far less obvious how such a fundamental difference can be resolved. Perhaps seeking a resolution is not

necessary, of course, as I have already pointed out. One option, therefore, is for each side to pursue its own research agenda, providing the necessary checks and balances for the other. A second option for dealing with the dispute is to have it adjudicated through empiricism (e.g. Long, 1997). However, Sfarid (1998: 12) warns that “empirical evidence is unlikely to serve as an effective weapon in [the SLA] paradigm wars” since the power of data to determine who is right may be confined to the paradigm within which they came into being.<sup>3</sup> Yet a third option exists, one to which the field of SLA has historically resorted.

When faced with challenges to prevailing views in the past, the field of SLA has not replaced a view with its challenger, but rather repeatedly broadened its domain of inquiry (Larsen-Freeman & Long, 1991). When fault was found with the *a priori* contrastive analysis hypothesis, a view of learning was posited that aimed to explain the SLA process through an analysis of learner errors, appealing to contrastive analysis to account for some of them. In turn, error analysis was encompassed by a view that held that only a complete analysis of the learners’ performance, including their errors, would suffice. Performance analysis was subsumed by discourse analysis when it became evident that attention needed to be paid not only to learners’ performance, but also to what sorts of interaction they engaged in.

Thus, with an eye to our history, I suggest that the way out of the acquisition versus use/participation dilemma is to find a larger lens through which to examine issues in our field. And I offer Chaos/Complexity Theory as a metaphorical means for doing so.

## CHAOS/COMPLEXITY THEORY

Chaos/complexity science deals with complex, dynamic, nonlinear systems. It is the “science of process rather than state, of becoming rather than being” (Gleick, 1987: 5). Far more has been written about the new science than can be dealt with here. Therefore, let me just touch upon a few of its qualities germane to the present discussion (see for example, Haken, 1977/1983; Odium 1983; Prigogine & Stengers, 1984; Gleick, 1987; Salthe, 1989; Stewart, 1989; Waldrop, 1992; Hall, 1993; Lemke, 2000).

Unlike traditional scientific approaches that analyze systems into their components and study them individually, Chaos/Complexity Theory considers the synthesis of emergent wholes from studying *the interactions* of the individual components. Outcomes arise that cannot be anticipated from an examination of the parts independently. Neither is it the case that there is

a central executive responsible for managing the discrete parts. Rather, the agents/elements act, react to, and interact with their environment (i.e. the other actors/elements and any features of their environment) without any reference to global goals — they are undertaking purely local transactions. The net result of these local transactions is a pattern that emerges at a global level. Thus, for example, the global pattern of a flock of birds emerges from the local behavior of the individual birds that comprise the flock.

In the abstract viewpoint employed in C/CT, it is assumed that the dynamic processes of systems are independent of their physical manifestation and depend only on the nature of their interactions. In this way, the findings are said to be equally applicable to all forms of systems — inorganic, organic, biological, psychological, or social. Of course, there are significant differences among these systems — agents are intentional and semiotic, for instance, whereas inorganic elements presumably are not. Nevertheless, in the case of both organic and inorganic systems, the emergent features will show equivalent properties relevant to the particular system.

Further, the emergent properties can themselves interact. For example, interacting molecules produce emergent cells; these interact to form organisms, which interact to form societies. In other words, there are a number of nested levels of detail, each needing a different type of label and description, but originating in the same way. The nested levels reflect a fractal pattern — each level of scale is self-similar. Importantly, a change at any one level will have implications for every level.

Complex systems that are open import free energy from the environment to reorganize themselves to increasingly higher orders of complexity. Thus, contrary to the second Law of Thermodynamics, in such systems, entropy, or lack of order, is not inevitable. Indeed, new order can emerge from disorder. When the dynamic systems are far from the point of equilibrium, spontaneous large-scale restructurings can take place. Conversely, when a system is near equilibrium, it displays a certain stability. Minor fluctuations are dampened.

These systems are dynamic. As they move through space/time, they follow a path, called an attractor — the state or pattern that a dynamic system is attracted to. A complex dynamic system exhibits a strange attractor, because its path never crosses itself. Although its cycle repeats itself (like a frictionless pendulum), no cycle ever follows the exact same path or overlaps any other cycle.

Finally, these complex, dynamic systems are nonlinear. This means that the effects resulting from a cause will not be proportional to the cause. Because

of this, the effects of a perturbation bear no relation to its size — a minor change can have global effects, can throw the system into chaos, yet a major one may be absorbed without effect. Moreover, because of their sensitivity to initial conditions, there is an unpredictability inherent in these systems.

## LESSONS FROM A C/CT PERSPECTIVE

There are many lessons to be drawn for work in both the physical and the social sciences from the new sciences of chaos and complexity. I will limit my discussion here to three (for others, see Larsen-Freeman, 1997). First, a C/CT perspective forces us away from reductionism and toward holism. From a C/CT perspective it is meaningless to attempt to understand something by taking it apart, explaining the behavior of the parts, and finally aggregating these partial explanations into an explanation of the whole. Behaviors arise that cannot be anticipated from examining the parts. Furthermore, the parts are interconnected. If one is affected, it will affect the other parts, although not necessarily in a predictable fashion.

A C/CT perspective also forces us away from easy distinctions, which may very well turn out to be false dichotomies (Larsen-Freeman, 1999). For example, in the brief description above, we saw that complex systems are characterized both by a dynamic attractor path and by a fractal pattern. Instead of dichotomizing, we are encouraged to look for interconnections. What connects motion and pattern? Further, what connects the different levels of scale in the nested systems? How can we connect the micro-level of the individual organism with the macrolevel of society? Is there a way to avoid a dualism between the individual and social, for instance?

A final lesson we can derive out of the brief introduction to C/CT is to entertain what it means to be dealing with open systems; systems that are not homeostatic, but, rather, grow more complex. How will conceiving of language as an open system and language acquisition as an open process influence our understanding?

Armed with this new perspective, let us now revisit the SLA controversy that I introduced earlier.

## CONTROVERSY IN SLA REVISITED

Although the SLA controversy has been depicted as pitting psycholinguistic against sociolinguistic perspectives, neither side has claimed

that it can account for the whole of SLA exclusively. This is as it should be, I believe. After all, if language and interlanguage development are (at least metaphorically) complex, dynamic, and nonlinear systems/processes, as I have previously suggested (Larsen-Freeman, 1997),<sup>4</sup> then we would not be doing justice to the whole by singling out one part. It is not the case that we can figure out the cognitive acquisition process and then turn to the social use process, any more than it is the case that we can understand the whole of an organism by understanding its circulatory system. Instead, we should look for how to connect cognitive acquisition and social use, an aim that neither side of the SLA dispute would object to, I am sure.

One hint for how to connect them comes from Gleick's observation (1987: 24) that with complex systems, "... the act of playing the game has a way of changing the rules". Of course, Gleick was not discussing matters concerning language. Applying his observation to such matters, though, could suggest that participation in a process and changes in the rules governing the process take place at one and the same time. Linguists have called this the Labov principle, acknowledging the intimate connection between (synchronic) variation and (diachronic) change (Givón, 1999). Being inspired partly by connectionism, I suggest that language use and language acquisition are also synchronous: the act of using the language has a way of changing the language or, in the case of learners, their interlanguage.

At this point, it would be helpful to digress and consider a parallel, although not identical, controversy in the field of linguistics.

## A DIGRESSION TO LINGUISTICS

Whether to treat language as a system to be acquired or a process in which to be engaged is not a controversy to which linguists are immune. As applied to the grammatical subsystem, a long-standing debate has been taking place, represented by the "*a priori* grammar attitude" and the "emergence of grammar attitude" (Hopper, 1988). Viewed from the perspective of the *a priori* grammar attitude, grammar is seen to be a predetermined discrete set of generative rules, which are logically detachable from language use. The subscribers to the *a priori* grammar attitude conceive of grammar as a static entity, an object, which is fully present at all times in the mind of the speaker. It is therefore essentially atemporal.

In striking contrast, linguists who subscribe to the emergence of grammar position view grammar as a phenomenon "whose status is constantly

being renegotiated in speech and which cannot be distinguished *in principle* from strategies for building discourses” (Hopper, 1988: 118). As Hopper (1998: 156) puts it: “Its forms are not fixed templates, but arise out of face-to-face interaction in ways that reflect the individual speakers’ past experience of these forms, and their assessment of the present context, including especially their interlocutors, whose experience and assessments may be quite different. From the emergent grammar perspective, “language is a real-time activity, whose regularities are always provisional and are continually subject to negotiation, renovation, and abandonment” (Hopper, 1988: 120).

Significantly (1998: 163), “in emergent grammar, because the forms of language do not exist hermetically sealed in the mind of the individual speaker, but are instead distributed during acts of communication among speakers”, it follows, according to Hopper, that the learning of language must be reconceived. “Learning a language is not a question of acquiring grammatical structure but of *expanding a repertoire of communicative contexts*. Consequently, there is no date or age at which the learning of language can be said to be complete. New contexts, and new occasions of negotiation of meaning, occur constantly. A language is not a circumscribed object but a loose confederation of available and overlapping social experiences.” (1998: 171)

It is clear that there is much in Hopper’s view (in the emergentist perspective) that resonates with the participation metaphor. Grammar is regarded as epiphenomenal, a by-product of a communication process. It is not a collection of rules and target forms to be acquired by language learners. Language, or grammar, is not about having; it is about doing; participating in social experiences. Further, echoing Firth and Wagner’s comment cited above, there is no point at which it could be said that the learning of a language is complete.

Likewise, we can find parallels between the *a priori* grammar attitude and the acquisition metaphor. While not all mainstream SLA researchers believe in an innate universal grammar (UG), the mainstream view does accept the existence of *a priori* grammatical rules and structures as rightful targets of an acquisition process. In addition, it sees the target rules and structures as detachable from language use. According to this view, the acquisition of a system allows one to apply it to contexts other than the ones in which it was learned. The knowledge of grammar can therefore be transferred.

Givón (1999), objecting to the absolutism of both the Platonic essentialist *a priori* and the Wittgensteinian emergent grammar viewpoints, asserts that both views represent extremes. Givón maintains that the

facts of grammar in natural language use tend to uphold an adaptive compromise. Grammar is not totally flexible, always negotiated for the occasion, but it can be context-dependent and usage driven. Since language is constrained by its adaptive environment, it must possess a certain rigidity for rapid speech-processing purposes, along with a flexibility that allows for change, adaptive innovation, and learning, not to mention the need to deal with contexts of high informational ambiguity and uncertainty. Thus, any model of grammar must be able to accommodate both rigidity and flexibility.<sup>5</sup>

## C/CT AND THE SLA CONTROVERSY: CONCLUSION

There is much about the participation metaphor/language use/emergent grammar position that fits with C/CT. From the participation metaphor/language use/emergent grammar standpoint, the view that language is not static can easily be accommodated within C/CT. Moreover, the mechanism for change, the interaction of the agents in real-world contexts, is common to all three perspectives and to C/CT. They also share the view that language is an open system, one that is evolving and changing. If this is true of language, it must also be true of its learning — it will never be complete if the target is always moving. However, recall that “the act of playing the game has a way of changing the rules”; thus, from a C/CT perspective, there is also room for a view of language as a set of rules or patterns. Indeed, without this perspective, how is it possible to address not only Givón’s concern about rapid speech processing, but also the fact that there is carry-over in use from one context to another?

Indeed, it is difficult to deny that something does keep repeating itself as we move from situation to situation, context to context (see Long, 1997, on this point). Being prepared to deal with novel contexts that are going to be encountered beyond the classroom is the very purpose of learning. And what about the ubiquitous evidence of the role of L1 transfer in L2 acquisition? How is this accounted for if we are not allowed to talk about carrying anything with us from one situation to another — if each is unique?<sup>6</sup>

Although I have already suggested a compatibility between the language use position and C/CT, the acquisition metaphor/language acquisition/*a priori* position can be accommodated as well. Recall that there is a sensitivity to initial conditions (perhaps a UG?) in such systems. Further, the type of complex systems studied in C/CT exhibit not only

dynamic paths, but also systemic patterns. The pattern and path occur together, in the same way that an eddy in a stream is only visible in the flow of water. Furthermore, as I have proposed before (Larsen-Freeman, 1997), the pattern that language exhibits is the same fractal pattern as other complex, dynamic, nonlinear systems. It is the nested pattern that allows languages to compress a significant amount of information into a small space. It is the pattern that is at least relatively stable from context to context and from time to time. It is the pattern that provides the “rigidity” or stability of language, which Givón believes must offset its flexibility.

In conclusion, a C/CT perspective clearly supports a social participation view of SLA; however, it does not do so to the exclusion of the psychological acquisitionist perspective. Thus, C/CT offers the wider perspective that has served SLA in the past. Importantly, in addition to affording us a wider perspective, the contribution of C/CT is that it encourages us to think in relational terms. It is not merely a question of making room for stability and flux, pattern and dynamism, acquisition and use. Rather, I am led to conclude that members of dichotomous pairs such as these can only be understood in relation to each other.

## Notes

1. In this section, I draw on the exchange that was featured over two issues of *The Modern Language Journal*. However, the criticisms and responses have extended beyond this exchange (see, e.g. Larsen-Freeman, 2000).
2. I am grateful to Rick Donato for calling my attention to this article.
3. For this reason, Liddicoat (1997) points out that simply rebalancing the field of SLA in light of criticisms is insufficient. It would take a reconceptualization, including a concomitant reanalysis of research methods.
4. At the workshop, I learned that one of the participants, Ronald Scollon, made a claim like this for language many years earlier in a working paper (Scollon, 1977).
5. Givón proffers prototype constructions as offering a compromise between the two extremes. Most recently, however, Hopper (2000) has countered this by rejecting the compromise. Hopper notes a need to reverse the “prototype” picture of grammatical constructions. Since in natural, flowing discourse, the visible parts of the canonical construction type appear as fragments, “to view the canonical construction as a prototype and as the source of fragmentary instantiations in discourse is to put the cart before the horse” (2000: 12).
6. Indeed, how the participation metaphor deals with “transfer” is a crucial



question. Although the concept of “transfer” is not sufficiently process-evoking to fit the participation metaphor, Greeno (1997) does discuss it from such a perspective. Defining learning as “improved participation in interactive systems”, he proceeds to account “for transfer in terms of transformations of constraints, affordances, and attunements” (1997: 12). We need more such discussion from the participationist perspective.

## **References**

- Firth, A. & J. Wagner. (1997). On discourse, communication, and (some) fundamental concepts in SLA research. *Modern Language Journal*, 81(3): 285–300.
- Firth, A. & J. Wagner. (1998). SLA property: No trespassing! *Modern Language Journal*, 82(1): 91–94.
- Gass, S. (1997). *Input, Interaction and the Second Language Learner*. Mahwah: Lawrence Erlbaum.
- Gass, S. (1998). Apples and oranges, or, why apples are not oranges and don't need to be: A response to Firth and Wagner. *Modern Language Journal*, 82(1): 81–90.
- Givón, T. (1999). Generativity and variation: The notion “rule of grammar” revisited. In B. MacWhinney (Ed.), *The Emergence of Language*, pp.81–114. Mahwah: Lawrence Erlbaum.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Penguin Books.
- Greeno, J. (1997). On claims that answer the wrong question. *Educational Researcher*, 26(1): 6–17.
- Haken, H. (1977/1983). *Synergetics, an Introduction: Non-equilibrium Phase Transitions and Self-organization in Physics, Chemistry and Biology*. Berlin: Springer-Verlag.
- Hall, N. (Ed.). (1993). *Exploring Chaos: A Guide to the New Science of Disorder*. New York: Norton.
- Hopper, P. (1988). Emergent grammar and the *a priori* grammar postulate. In D. Tannen, *Linguistics in Context* pp.117–134. Norwood: Ablex.
- Hopper, P. (1998). Emergent grammar. In M. Tomasello, *The New Psychology of Language* pp.155–175. Mahwah: Lawrence Erlbaum.
- Hopper, P. (2000). Grammatical constructions and their discourse origins: Prototype or family resemblance. General and Theoretical Paper No. 508, LAUD: Linguistic Agency, Universität Gesamthochschule Essen.
- Kasper, G. (1997). “A” stands for acquisition. *Modern Language Journal*, 81(3): 307–312.
- Kirschner, D. & J. Whitson. (Eds.). (1997). *Situated Cognition: Social, Semiotic, and Psychological Perspectives*. Mahwah: Lawrence Erlbaum.
- Lantolf, J. (1996). SLA theory building: “Letting all the flowers bloom”. *Language Learning*, 46(4): 713–749.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18: 141–165.
- Larsen-Freeman, D. (1999). Chaos/complexity theory: Blurring the boundaries. Paper

- presented at the Chaos/Complexity Perspective on Applied Linguistics Colloquium, American Association for Applied Linguistics Conference, Stamford, CT, March.
- Larsen-Freeman, D. (2000). Second language acquisition and applied linguistics. In W. Grabe (Ed.), *Applied Linguistics as an Emerging Discipline, Annual Review of Applied Linguistics*, Vol. 20: 165–181.
- Larsen-Freeman, D. & M. Long. (1991). *An Introduction to Second Language Acquisition Research*. London: Longman.
- Lemke, J. (2000). Across the scales of time: Artifacts, activities, and meanings in ecosocial systems. *Mind, Culture and Activity*, 7(4): 273–290.
- Liddicoat, A. (1997). Interaction, social structure, and second language use: A response to Firth and Wagner. *Modern Language Journal*, 81 (3): 313–317.
- Long, M. (1997). Construct validity in SLA research. *Modern Language Journal*, 81 (3): 318–323.
- Odlum, H. (1983). *Systems Ecology*. New York: John Wiley.
- Poullisse, N. (1997). Some words in defense of the psycholinguistic approach. *Modern Language Journal*, 81 (3): 324–328.
- Prigogine, I. & I. Stengers. (1984). *From Being to Becoming: Time and Complexity in the Physical Sciences*. New York: W. H. Freeman & Co.
- Rampton, B. (1997). Second language research in late modernity: A response to Firth and Wagner. *Modern Language Journal*, 81(3): 329–333.
- Salthe, S. (1989). Self-organization in hierarchically structured systems. *Systems Research*, 6: 199–208.
- Scollon, R. (1977). Dissipative structures: Chipewyan consonants and the modern consciousness. *Working Papers in Linguistics*, University of Hawaii, 9(3), October–December.
- Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, March: 4–13.
- Stewart, I. (1989). *Does God Play Dice? The Mathematics of Chaos*. Oxford: Basil Blackwell.
- Tarone, E. (2000). Still wrestling with “context” in interlanguage theory. In W. Grabe (Ed.), *Applied Linguistics as an Emerging Discipline, Annual Review of Applied Linguistics*, Vol. 20: 182–198.
- Waldrop, M. (1992). *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York: Simon & Schuster.

## Comment after Chapter 8

I happily taught graduate courses in the MATESOL Program for many years at the highly acclaimed School for International Training (SIT) in Brattleboro, Vermont. It was there that I benefitted from many

important discussions about teaching with my colleagues and students, not the least of which was gaining the insight that “teaching begins with learning” (Larsen-Freeman & Anderson, 2011). Nevertheless, in the interest of coming full circle, in 2002, I accepted an invitation to return to the University of Michigan to be a Professor of Education and later a Professor of Linguistics. Completing the circle, I was also appointed Director of the English Language Institute (ELI) (where I also got to teach EAP to graduate students).

One of my early actions as Director was to work with administrators at the University in order to create a position for Professor Nick Ellis to join us in Ann Arbor. As I have just implied concerning my productive discussions at SIT, I find that it is good to have colleagues with whom to converse about mutual interests. Nick Ellis has been such a colleague. He and I would get together informally every month or so with University of Michigan Professor John Holland, a pioneering contributor to Complexity Theory, and Jinyun Ke, a post-doctoral student that I had appointed to the ELI. Professor Holland later arranged for us to join others in a workshop on language at the famed Santa Fe Institute in Santa Fe, New Mexico. The Institute is the world headquarters for complexity science, counting Nobel Laureates among its associates. Needless to say, it was a very stimulating meeting. These informal and formal discussions encouraged my thinking about complex systems beyond that presented in the 2002 article that you have just read.

In 2005, Professor Ellis and I organized a colloquium for the American Association for Applied Linguistics (AAAL) conference, which met that year at the University of Wisconsin, Madison. AAAL was host of the International Association of Applied Linguistics Congress (AILA, known by its French acronym). For the colloquium, we invited colleagues doing work with complex dynamic systems to present papers. We later published the papers as a special issue of the journal *Applied Linguistics*. What all the presenters had in common was an interest in understanding language and its development as emergent processes.

The article that follows was an introduction to the special issue of the journal. In it, Ellis and I took the position that language is a complex adaptive system (CAS). As a CAS, its patterns emerge out of the ecological interactions of language users. In other words, we assume that the patterns in language are not innate, nor are they triggered solely by exposure to the input. As we wrote in the article:

Language learning and language use are dynamic processes in which regularities and system arise from the interaction of people, brains, selves, societies and cultures using languages in the world. (2006: 577)

In the article, we lay out 12 cases and 12 morals, in which we adduce evidence in support of our position. Important for me was engaging with a new theory of language with which to interpret my finding on the importance of frequency in SLA. The new emergentist or usage-based theory posits that underlying fluent, systematic use of language is the learner's memories of previously experienced utterances. Learners track co-occurrence patterns in the input, and then generalize from them in order to be able to apply the patterns in comprehending and creating utterances beyond those that they have experienced. This explanation seemed different from those I had previously considered. Learning a language was neither the learning of rules nor the formation of habits. I should hasten to add that the lessons I learned at SIT remained with me: the learning of language cannot be attributed to one process; it is, indeed, a multifarious process.

## **References**

Larsen-Freeman, D. & M. Anderson. (2011). *Techniques and Principles of Language Teaching* (3<sup>rd</sup> edn.). Oxford: Oxford University Press.

# Chapter 9

## Language Emergence: Implications for Applied Linguistics

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We share an interest in language. We want to understand it, its origins, structure, functions, use, acquisition, instruction, and change. We seek causes for observed effects. Scientific studies of language representation and competence and of language acquisition and use are complementary. Yet these two theoretical enterprises have traditionally been kept distinct, with models of representation (property theories) focusing on static competence, and models of acquisition (transition theories) and use focusing on dynamic process and performance. This Special Issue is motivated by the belief that our interests in language can better be furthered when it is conceived of as the emergent properties of a multi-agent, complex, dynamic, adaptive system, a conception that usefully conflates a property theory with a transition theory.

### L2 AREAS OF APPLIED LINGUISTICS RESEARCH AND THEIR SIGNIFICANCE

Consider the history of research in the following key areas of Applied Linguistics, and some morals of each quest.

#### **Case 1: Interlanguage Developmental Sequences: The Morpheme Order Studies**

In the 25 years following Brown's (1973) classic descriptions of developmental sequences of first language acquisition, the "morpheme order studies" investigated the order of L2 acquisition of the English grammatical functors, progressive *-ing*, auxiliary *be*, plural *-s*, possessive *-s*, articles *a*, *an*, *the*, third person singular present *-s*, copula, and regular

past *-ed*. These studies show remarkable commonality in the orders of acquisition of these functors across the interlanguage of a wide range of learners of English as a second language, enough for Larsen-Freeman and Long (1991) to conclude that they were sufficiently consistent in their general findings for their commonalities not to be ignored: as the hunter put it, “There is something moving in the bushes” (Larsen-Freeman & Long, 1991). Yet, although each of the factors of input frequency, semantic complexity, grammatical complexity, phonological form, and perceptual salience had been historically considered for their sufficiency of cause, with input frequency being the favored account (Larsen-Freeman, 1976), nevertheless, as Larsen-Freeman concluded, “[a] single explanation seems insufficient to account for the findings” (Larsen-Freeman, 1975). More recently, Goldschneider and DeKeyser (2001) performed a meta-analysis of these studies, investigating whether instead a combination of the five determinants (perceptual salience, semantic complexity, morphophonological regularity, syntactic category, and frequency) could account for the acquisition order. Oral production data from 12 studies, together involving 924 subjects, were pooled. Each of the factors of frequency, salience, and regularity alone was a significant predictor of acquisition order, but each independently only explained a small part (16 — 36 per cent) of the variance: perceptual salience  $r=0.63$ , frequency  $r=0.44$ , morphophonological regularity  $r=0.41$ . Yet when these three factors were combined with semantic complexity and syntactic category in a multiple regression analysis, this combination of five predictors jointly explained a substantial 71 per cent of the variance in acquisition order. Add to these analyses the contribution of language transfer, and still more of the data are accounted for (Ellis, 2006b; Shin & Milroy, 1999), particularly when stage of L2 acquisition is factored in (Taylor, 1975).

### **Moral 1: With Just One Variable $r=0.4$ , No More; No Magic Bullets**

Take a language phenomenon of interest as the dependent variable, take a preferred probable cause, look for the correlation between the two in an appropriate sample of participants. It is rarely greater than 0.4. The “cause” explains just 16 per cent of the variance. Maybe  $R^2=0.25$  with a fair wind, perhaps 36 per cent on a very good day, but it is an uncommon study indeed which gets an  $r$  greater than 0.6. There are no magic bullet explanations for the phenomena of language that concern us. Each variable

is but a small part of a complex picture. The notion of interlanguage has, from its very beginnings (Corder, 1967; Selinker, 1972), been characterized as reflecting the interactions of many sources of different types of knowledge of the L1 and the L2.

### **Case 2: Cross-linguistic Transfer: L2 — L3 Lexical Intrusions**

The determinants of cross-linguistic transfer have been a longstanding goal of our field, from Weinreich (1953) on *interference*, through the rise and fall of the strong version of Contrastive Analysis (James, 1980; Lado, 1957), the consolidation of the research in the major reviews of the 1980s (Gass & Selinker, 1983; Odlin, 1989), the recent surge of psycholinguistic investigations of the bilingual lexicon (Kroll & De Groot, 2005; Schreuder & Weltens, 1993), and now even the particular issue of transfer in third language acquisition (Cenoz *et al.*, 2001; Jarvis, 2000; Murphy, 2003). During L3 learning, language learners often find themselves unintentionally producing interlanguage forms where an L2 lexical item substitutes for that intended from the L3, that is the speaker fails to adequately inhibit the previously learned second language. What are the determinants of this? As we saw with the morpheme order studies, there are many (Jarvis, 2000; Murphy, 2003), and once, again, each on its own explains only a little of the variance. Of the linguistic variables: the more frequent the L2 item, the more likely it will intrude; the more frequent the L3 item, the more it will resist; function words intrude far more than content words; free morphemes interfere more than bound morphemes; if the L2 and L3 are typologically similar, transfer is greater.

However, in addition to the complexity and the fact that each variable explains only a small part of the variance, it is important to note that these variables interact in non-additive ways: L2 and L3 lexical frequency factor in dynamic competition; L2 — L3 transfer of function words is amplified in situations of typological closeness. They are modulated by a wide range of learner-based variables too: varying degrees of L2 and L3 proficiency; amount of L3 exposure and use; language mode (Grosjean, 2001); recency; learner perceptions of the relatedness of L2 and L3 and their linguistic awareness of transferability (psychotypology, Kellerman, 1995); age; educational background; level of formality of context; attentional demands of the task (the more the working memory load of the production task, the less cognitive resources are available to inhibit the L2); and so on. So there are not only many variables, each on its own contributing a part, but also the

variables interact, sometimes overriding each other, sometimes converging as powerful multiple effects (Andersen, 1983; Herdina & Jessner, 2002; Murphy, 2003; Selinker & Lakshmanan, 1993). And they do so always as a function of time (MacWhinney, 1998), time on all scales: in thousands of years — the recency of the diachronic divergence of the L2 and L3 in the evolution of languages, in years — the age of the learners and their length of exposure to the language, in milliseconds — the particular point in language processing in dynamical patterns of interactive-activation, both excitatory and inhibitory (Dijkstra, 2005; Green, 1998; McClelland & Elman, 1986).

### **Moral 2: Complexity; Multivariate Causes; Nonlinear Interactions**

There are many agencies and variables that underpin language phenomena, even as apparently simple a phenomenon as that of cross-linguistic lexical intrusions. Language is complex. Learners are complex. These variables interact over time in a nonlinear fashion, modulating and mediating each other, sometimes attenuating each other, sometimes amplifying each other in positive feedback relationships to the point where their combined weight exceeds the tipping point (Gladwell, 2000), which results in a change of state. Just as there are no magic bullet solutions, so no one discipline of inquiry has the monopoly on language, not literature, not education, not psychology, not linguistics, not ethnography, not even brain science.

### **Case 3: Variability in Tense Marking**

A prominent characteristic of interlanguage in English L2 acquisition is the lack of tense marking. Unmarking in sentences such as *Last year he take the boat*, or *Yesterday he is tired* can be found regardless of the background of the speaker and constitutes a significant hurdle to overcome in L2 learning (Bailey *et al.*, 1974; Dulay & Burt, 1974). But tense marking is not something that learners either do or do not do. There can be considerable variability in its expression, non-random variability resulting from systematic constraints favoring or inhibiting its production (Dulay & Burt, 1974; Wolfram, 1985). Tense marking is favored with irregular forms over regular ones, in part a result of salience and frequency. The phonological environment is important — /t/ or /d/ following a voiceless or voiced consonant as in /kɪst/ “kissed” or /reɪzd/ “raised” respectively, is susceptible to the phonological process of cluster reduction resulting in /kɪs/ or /reɪz/



completely apart from the grammatical process of unmarking, a process which occurs in some native dialects of English (Guy, 1980), in L2 learners (Tarone, 1980), and particularly in L2 learners whose L1 does not have final consonant clusters (Wolfram, 1985). Such cluster reduction is more likely when the following word begins with a consonant as opposed to a vowel, so /kɪs mi/ for “kissed me” is more likely than /kɪs ɪt/ for “kissed it” (Labov, 1969). Frequently occurring irregular verb forms are more often marked for tense than their infrequent counterparts. The more distinct phonetically the past tense irregular form is from the non-past, the more likely it will be marked for tense (in order of salience, suppletive forms *go/went* > internal vowel change *sit/sat* > final consonant replacement *have/had*). *Learner* factors (age of arrival, length of residency), *instructional* factors (the degree to which the learner has been exposed to explicit study of the L2), *discourse* factors (genre type and informational load), social factors (interlocutor norms and status), and *motivational* factors (integrative motivation, respect for teachers, desire to succeed at school) all conspire in the expression of this form, resulting in a great deal of variability and necessitating multi-level and interactional analyses (Hatfield, 1986; Preston, 1996; Tarone, 1997; Young & Bayley, 1996).

### **Moral 3: Ubiquitous Variability; Variable Competence**

Variability pervades language production. But such demonstrations of pattern are too profound to allow us to relegate this to noise and random performance factors. What should we infer about a learner’s linguistic competence if they reliably mark tense on a variety of irregular forms, but not on regular ones? Have they acquired tense or have they not? It does not seem as black or white as that. Psycholinguistic, sociolinguistic, corpus, and probabilistic analyses of these productions seem to make sense of them (Ellis, 2002b; Labov, 1972; Preston, 2000; Tarone, 2002). There is systematicity despite persistent instability (Larsen-Freeman, 1997); however, the systematicity is to be seen in dynamic, contextualized patterns, not only in rule-governed behavior. More sharp than dull, we think; the term “variable competence” (R. Ellis, 1985, 1999) is no oxymoron. Competence and performance both emerge from the dynamic system that is the frequency-tuned conspiracy of memorized exemplars of construction usage, with competence being the integrated sum of prior usage and performance being its dynamic contextualized activation (Ellis, 2006a, 2006b, 2006c).

### Case 4: Motivation and Language Achievement

What is motivation to learn a language and how does it impact upon achievement? This question too has been a long stay in our field, from the pioneering Canadian social psychological analyses of Gardner and Lambert (1972) and their associates, the fractionation of the concept into integrative and instrumental orientations (Gardner, 1985), the further division of the integrative motive into integrativeness, attitudes towards the learning situation, motivational intensity, linguistic self-confidence and self-efficacy (Clément *et al.*, 1994), the determination of the associations between these factors and language achievement (Gardner *et al.*, 1997), and the last decade's development of sophisticated process-oriented models of motivation (Dörnyei, 2001; Dörnyei & Skehan, 2005). These evolutions have been powered by the realizations that any one of these aspects of motivation correlates only marginally (about 0.4) with achievement; that each is but a part of a multi-faceted construct whose parts interact (hence motivation research as the prime area within applied linguistic research for the application of structural equation modeling — confirmatory factor analysis, latent trait models, and causal path analysis); and that an adequate model of student motivation needs to have a rich temporal dimension that can accommodate systematic patterns of transformation and evolution in time, both long- and short-term:

During the lengthy process of mastering certain subject matters, motivation does not remain constant, but is associated with a dynamically changing and evolving mental process, characterized by constant (re)appraisal and balancing of the various internal and external influences that the individual is exposed to. Indeed, even within the duration of a single course of instruction, most learners experience a fluctuation of their enthusiasm/commitment, sometimes on a day-to-day basis. In Ushioda's (1996) words, "within the context of institutionalized learning especially, the common experience would be motivational flux rather than stability". (Dörnyei & Skehan, 2005: 240)

Dörnyei (2001) shows how time, as an organizing principle, offers a natural way of ordering the relevant motivational influences of language learning into distinct stages of a sequence (choice motivations at the pre-actional stage, executive motivations at the actional stage, and motivational retrospection and attribution setting at the post-actional stage); how ignoring time in motivational models results in situations where two theories are equally valid yet contradict one another because they refer to different phases of the motivational process; how much of the recent

work on L2 motivation is rooted in different perceptions of the temporal reality of motivation; and how, by adopting a dynamic model, these various approaches can be successfully synthesized. Motivation is less a trait than a fluid play, an ever-changing one that emerges from the processes of interaction of many agents, internal and external, in the ever-changing complex world of the learner.

#### **Moral 4: Time Is of the Essence; Nothing Should Be Taken out of Context**

To attribute causality to any one variable (or even a constellation of variables) without taking time and context into account is misguided. The fact is that the effect of variables waxes and wanes. The many actors in the cast of language learning have different hours upon the stage, different prominences in different acts and scenes. The play evolves as goals and subgoals are set and met, strong motives once satisfied fade into history, forces gather then dissipate once the battle is done, a brief entrance can change fate from tragedy to farce, a kingdom may be lost all for the want of a horseshoe nail. The correlation between “cause” and “effect” might be negligible at one point in time, or in one particular context, but substantial at others. All individuals, all phenotypes, all genotypes react differently to different environmental conditions, making simple generalizations impossible. There is no one environment; individual agents select their own environments; the world inhabited by living organisms is constantly being changed and reconstructed by the activities of all those organisms (Lewontin, 2000).

#### **Case 5: An SLA Index of Development**

The question of measuring second language development has also been a long-standing and particularly vexing one: what are the features of linguistic performance that enter into making one learner more developmentally advanced than another? Are the features such as expanding vocabulary size or increasing accuracy ones that have independent status in learner performance (Robinson, 2001; Skehan, 1998)? Do such features grow in such a way that they can serve as the basis for a second language acquisition index of development (Hakuta, 1976)?

An SLA index of development, analogous with the MLU of first language acquisition, would be an incredible boon to researchers, replacing the subjective and vague designations of learner populations as “beginning”,

“intermediate”, and “advanced”, which researchers are forced to employ (Larsen-Freeman, 1978). Although language development is not the same as proficiency level, measures of language development ought to be able to distinguish among learners at different levels of proficiency. With a common yardstick, researchers would be able to make statements about the relative influence of different variables for learners exhibiting different developmental portraits.

Because of the enormous value that such an index would bring, much research has been done in the quest for an SLA index of development. Wolfe-Quintero *et al.* (1998) reviewed 39 research studies, which included English and French as both second and foreign languages, Swedish as a second language, and German and Russian as foreign languages. They considered over a hundred measures of fluency, accuracy, and complexity that were used in studies of second language writing. They found that certain of these were the best measures in that they were consistently linear and significant related to program or school levels. These included accuracy and fluency measures such as the average length of T-units, the number of error-free T-units per T-unit (Larsen-Freeman & Strom, 1977), the number of words in error-free T-units, as well as measures of grammatical and lexical complexity, such as the number of dependent clauses per clause and the word types per T-unit (Wolfe-Quintero *et al.*, 1998).

Unfortunately, while some of these proved to be better than others at discriminating different developmental levels for groups, at the level of the individual, the results are less heartening. Clearly, the measures are not always sensitive to individual differences (Larsen-Freeman, 1983), with some learners not conforming to the general patterns of development at all.

### **Moral 5: What Generalizations Exist at the Group Level Often Fail at the Individual Level**

Researchers understandably seek the broadest possible generalizations for their findings. From a dynamic systems perspective, however, individual variability should not be seen as merely noise. Instead, it may be seen as a source of development as well as the specific moment in a developmental process (van Dijk, 2003). Intrinsic in this view is the idea that individual developmental paths, each with all its variation, may be quite different from one another, even though in a “grand sweep” view, these developmental paths seem quite similar (de Bot *et al.*, 2007; Larsen-Freeman, 2006b).

## Case 6: Exemplar-based Learning, Restructuring, and U-shaped Development

Psycholinguistic research demonstrates that language processing in all domains (phonology and phonotactics, reading, spelling, lexis, morphosyntax, formulaic language, language comprehension, grammaticality, sentence production, and syntax) is exquisitely sensitive to frequency of occurrence (Ellis, 2002a). This implies that language acquisition, and language representation too, is exemplar based. The knowledge underlying fluent, systematic, apparently rule-governed use of language is the learner's entire collection of memories of previously experienced utterances. These exemplars are linked, with like kinds being related in such a way as to resonate as abstract linguistic categories, schema, and prototypes. Morphogenesis (the order or structure that emerges beyond the order and structure present in the "input") characterizes the grammaring process ("the act of playing the game has a way of changing the rules") (Larsen-Freeman, 2003). Linguistic regularities emerge as central-tendencies in the conspiracy of this data-base. So Cognitive Linguistic (Barlow & Kemmer, 2000; Croft & Cruise, 2004; Langacker, 1987; Robinson & Ellis, 2007; Taylor, 2002; Ungerer & Schmid, 1996), Construction Grammar (Goldberg, 1995), and Probabilistic and Frequency-based (Bod *et al.*, 2003; Bybee & Hopper, 2001; Ellis, 2002a, 2002b; Jurafsky, 2002; Jurafsky & Martin, 2000) Usage-based theories of language hold that acquisition is the piecemeal learning of many thousands of constructions and the frequency-biased abstraction of regularities within them.

How exactly does the relative frequency of patterns in the input affect acquisition? Token frequency is how often in the input particular words or specific phrases appear; type frequency, on the other hand, refers to the number of distinct lexical items that can be substituted in a given slot in a construction. For example, the "regular" English past tense *-ed* has a very high type frequency because it applies to thousands of different types of verbs whereas the vowel change exemplified in *swam* and *rang* has much lower type frequency. Bybee (1995; Bybee & Thompson, 2000) and the researchers gathered in Bybee and Hopper (2001) show how the productivity of phonological, morphological, and syntactic patterns is a function of their type rather than their token frequency. In contrast, high token frequency promotes the entrenchment or conservation of irregular forms and idioms — the irregular forms only survive because they are high-frequency. Type frequency determines productivity because: (1) the more lexical items that are heard in

a certain position in a construction, the less likely it is that the construction is associated with a particular lexical item and the more likely it is that a general category is formed over the items that occur in that position; (2) the more items the category must cover, the more general are its criterial features and the more likely it is to extend to new items; (3) high type frequency ensures that a construction is used frequently, thus strengthening its representational schema and making it more accessible for further use with new items (Bybee & Thompson, 2000).

One consequence is that development, which for the most part seems gradual and incremental, also evidences sudden changes in performance suggesting fundamental restructuring (McLaughlin, 1990) of the underlying grammar. Consider again past tense marking, but now particularly its growth-curve: Learners initially fail to mark past tense; their first marking involves frequent irregular verbs such as *came* and *went*, next appears regular marking (addition of the default ending) in verbs such as *talked* and *cooked* and the productivity of this schema is evidenced by the disappearance of irregulars from the interlanguage as they are replaced by overextensions (incorrect forms that have regular endings like *goed*, *wented*). The irregulars eventually reappear, their acquisition thus following a “U-shaped” function overall. The stage at which irregulars disappear and are replaced by regularized forms is sudden and suggests that learners’ grammars are restructuring themselves to make everything regular even though such forms as *goed* are not part of the input.

### **Moral 6: Regularities Are Emergent; Growth Is Nonlinear; Cognition Is Adaptive**

Systematic regularities emerge from the conspiracy of exemplars of experience, and consequently growth is often non-linear, with effects being disproportionate to proximal causes. Connectionist, Competition, and Rational models of language explore the ways in which generalizations emerge from the interactions of constructions large and small, the ways in which different cues and their reliabilities compete for activation, and the ways in which the organization of the learner’s model of language is optimized for usage (Anderson, 1989; Anderson & Schooler, 2000; Bates & MacWhinney, 1987; Christiansen & Chater, 2001; Ellis, 1998, 2006a; Elman *et al.*, 1996; MacWhinney, 1987, 1997; MacWhinney & Leinbach, 1991; Plunkett & Marchman, 1993; Rumelhart & McClelland, 1987). Knowledge is only of value if it is organized and marshaled appropriately. The guiding

principle of Rational Analysis (Anderson, 1990) is that the cognitive system optimizes the adaptation of the behavior of the organism, that is that human psychological behavior can be understood in terms of the operation of a mechanism that is “optimally adapted” to its environment in the sense that the behavior of the mechanism is as efficient as it conceivably could be, given the structure of the problem space, and thus our cognitive apparatus provides optimal inference in the presence of uncertainty.

### Case 7: Language Use → Language Change → L2 Learnability

Languages change over time. They change as a result of use. Bybee (1995, 2000; Bybee & Hopper, 2001) argues that grammaticization is a process of automatization of frequently-occurring sequences of linguistic elements. The basic principles of automatization apply to all kinds of motor activities: playing a musical instrument, cooking, or playing an Olympic sport. With repetition, sequences of units that were previously independent come to be processed as a single unit or chunk (Ellis, 1996). This repackaging has two consequences: the identity of the component units is gradually lost, and the whole chunk begins to reduce in form. A phrase such as (*I'm going to* (verb)), which has been frequently used over the last couple of centuries, has been repackaged as a single processing unit. The identity of the component parts is lost (children are often surprised to see that *gonna* is actually spelled *going to*), and the form is substantially reduced.

Frequency is the driving force of language change: (1) Frequency of use leads to weakening of semantic force by habituation; (2) Phonological changes of reduction and fusion of grammaticizing constructions are conditioned by their high frequency; (3) Increased frequency conditions a greater autonomy for a construction, which means that the individual components of the construction (such as *be*, *go*, *to*, or *-ing* in the example of *be going to*) weaken or lose their association with other instances of the same item (as the phrase reduces to *gonna*); (4) The loss of semantic transparency accompanying the rift between the components of the grammaticizing construction and their lexical congeners allows the use of the phrase in new contexts with new pragmatic associations, leading to semantic change; (5) Autonomy of a frequent phrase makes it more entrenched in the language and often conditions the preservation of otherwise obsolete morphosyntactic characteristics (Boyland, 1996; Bybee, 2000; Croft, 2000; Kemmer & Israel, 1994).

The result is that grammatical functors are both difficult to perceive, even in speech that is produced slowly and deliberately (Bates & Goodman,

1997) or directed to children (Goodman *et al.*, 1990), and they lack semantic transparency. These two factors alone are sufficient in making them hard to learn, yet grammatical functors are additionally often of low contingency of form-function mapping and, furthermore, frequently redundant in the interpretation of communication. These variables, together with language transfer (learners' attention to language being tuned by their native language experience) play a large role in explaining the limited success typical of naturalistic L2 acquisition (Ellis, 2006a, 2006b, 2006c), the "Basic Variety" (Klein, 1998) of interlanguage, which, although sufficient for everyday communicative purposes, predominantly comprises just nouns, verbs, and adverbs, with little or no functional inflection and with closed-class items, in particular determiners, subordinating elements, and prepositions, being rare, if present at all. Of course, these features are also explicable socially, as can be seen in the study of English as a Lingua Franca and, with it, the awareness that correctness does not have to be commensurate with native speaker norms (Cook, 2002; Jenkins, 2000; Seidlhofer, 2004).

In sum, dynamic cycles of language use, language change, language perception, and language learning in the interactions of members of language communities results in learning challenges for adult language learners (Ellis, 2008). High frequency use of grammatical functors causes their lenition and erosion. Lower salience cues are harder to perceive and show reduced L2 associative learning because of blocking and overshadowing. What results is the "Basic Variety" of interlanguage from naturalistic learning, an attractor state that can only be escaped by the social recruitment of the dynamics of learner consciousness, attention, and explicit learning, and the desire to conform to native speaker norms.

### **Moral 7: The Very Thing That Makes a Known Language Easy, Makes a New Language Hard; Contrariness Will out**

The fluency with which native speakers use the high frequency forms of their language makes these grammatical constructions predictable in their experience, richly supported by prior knowledge, expectation, and top-down processing. And it is this same facility which, paradoxically, makes these forms particularly difficult for second language learners who aspire to speak as native speakers. The very things that make a known language easy make a new language hard. Some observers, particularly learners themselves suffering the travails of second language acquisition, might say perverse.



### Case 8: The Interface

The interface question is fundamental to Applied Linguistics (N. C. Ellis, 1994). Our answers to it determine how we teach and learn languages. Krashen's (1982) Input Hypothesis argued that adult L2 students of traditional instruction, who can tell more about a language than a native speaker, yet whose technical knowledge of grammar fails to sustain them in speaking and listening, demonstrate that conscious learning about language and subconscious acquisition of language are different things, and that any notion of a "Strong Interface" between the two must be rejected. His extreme "Non-Interface" position thus countered that subconscious acquisition dominates in second language performance and that learning cannot be converted into acquisition. Critical theoretical reactions to Krashen's Input Hypothesis (McLaughlin, 1987), analyses of learners in "grammar-free" immersion L2 and FL programmes demonstrating significant shortcomings in the accuracy of their language (Lightbown *et al.*, 1993), and empirical investigations demonstrating that it is those language forms that are attended to that are subsequently learned, prompted Schmidt (1990) to propose that conscious cognitive effort involving the subjective experience of noticing is a necessary and sufficient condition for the conversion of input to intake in SLA. Schmidt's Noticing Hypothesis was the theoretical motivation for subsequent research efforts, both in laboratory experiments (Hulstijn & DeKeyser, 1997) and in the classroom (Doughty & Williams, 1998), into the role of consciousness in SLA. The limited success of naturalistic learners, together with the demonstrable role of noticing in SLA, obliged some form of a "Weak Interface" position (R. Ellis, 1994; Long, 1991) whereby explicit knowledge plays a role in the perception of, and selective attending to, L2 form by facilitating the processes of "noticing" (i.e. paying attention to specific linguistic features of the input) and by "noticing the gap" (i.e. comparing the noticed features with those the learner typically produces in output (Swain, 2005). Other weak-interface variants additionally identified a role of consciousness in skill-building, with explicit knowledge coaching practice, particularly in initial stages, and this controlled use of declarative knowledge guiding the proceduralization and eventual automatized implicit processing of language as it does in the acquisition of other cognitive skills (DeKeyser, 2001). These matters lie still at the core of Applied Linguistics research.

But with hindsight, *interface* was an unfortunate appellation for this issue. The metaphor connotes physical, structural connections. It has

driven us to look for representations of explicit language, representations of implicit knowledge, separate places in the brain where these two different types of knowledge are stored, and then connections between them. Too much so, perhaps, if the identification of separate neural loci of explicit and implicit language knowledge is taken to support the conclusion of a non-interface position (Paradis, 1994, 2004). Instead we should heed the terms we use in Applied Linguistics to address the mechanisms of interface: *noticing*, *selective attending*, *noticing the gap*, *skill-building*, *coaching*, *processing*, every one of them a gerund, and, with the exception of course of *consciousness* itself, every one a mental action. The process nature of these mechanisms led Larsen-Freeman (2001; Larsen-Freeman & Long, 1991) to coin the term “*grammaring*”. Thus, the search for a structural interface between implicit and explicit language knowledge is as naïve as the search for a single specific neural locus for consciousness. There is no pineal gland for the interface. Consciousness *is* the interface, and like consciousness, the interface is dynamic: it happens transiently during conscious processing, but the influence upon implicit cognition endures thereafter (Ellis, 2005).

### **Moral 8: Learning Is a Process; Consciousness Is the Interface**

Learning is dynamic; it takes place during processing, as Hebb (1949), Craik and Lockhart (1972), Pienemann (1998), and O’Grady (2003) have all reminded us from their neural, cognitive, and linguistic perspectives. There are different forms of language learning, broadly, the implicit tallying and chunking that take place during usage (Ellis, 2002a, 2002b) and the explicit learning in the classroom and that follows communication breakdown (Ellis, 2005: sections 3–4). As for the question of their interface, it occurs through consciousness itself.

### **Case 9: Noticing and Consciousness**

Introspection confirms, indeed returns, the flow of consciousness. Heraclitus said “No man ever steps in the same river twice, for it’s not the same river and he’s not the same man”. So too for the stream of consciousness. There is massive context dependence. Consciousness gives “clout”: when processes compete for ongoing control of the body, the one with the greatest clout dominates the scene until a process with even greater clout displaces it (Dennett, 2001). Functional brain imaging

techniques demonstrate the dynamic nature of the neural correlates of consciousness, a surge of activity, widespread and multi-focal, involving a coalition of forebrain neurons involved in working memory and planning, interconnected via widespread cortico-cortico and cortico-thalamic feedback loops with sets of neurons in sensory and motor regions that code for particular features (Dehaene *et al.*, 2001; Eichenbaum, 2002; Frackowiak *et al.*, 2004; Kanwisher, 2001; Koch, 2004; Rees, 2001; Rees *et al.*, 2002). Any one percept, real or imagined, corresponds to a winning coalition of the essential features coded by these different but related brain regions, reinforcing the firing activity of its member neurons, probably by synchronizing their spiking discharge, and suppresses competing ones in a winner-takes-all fashion. At any one moment the winning coalition, expressed in the content of consciousness at that point in its stream, is briefly sustained for a discrete epoch of somewhere between 20 and 200 msec before it is replaced by another coalition in the ongoing stream of snapshots of consciousness. Stabilization of the coalition seems to be achieved by massive feedback known as “re-entrant signaling”, perhaps involving thalamo-cortical loops, that is synchronized in rhythmic action potential discharge in the 30–60, Hz gamma band of EEG frequency. There is considerable ongoing research into this “gamma band” activity both as an index of attentive awareness and as a mechanism for solving the binding problem (Crick & Koch, 2003; Dehaene & Changeux, 2004; Edelman, 1989; Edelman & Tononi, 2000; Koch, 2004; Singer, 1999). Consciousness is perhaps the prototype example of an emergent phenomenon. The units of consciousness might be identifiable as patterns of brain synchrony in time.

“What is Mind? No Matter”, punned Berkeley. This is the “stuff” of noticing. Our conscious experience is what allows us to build novel linguistic representations from usage. Baars (1988, 1997) introduced “Global Works-pace Theory” by describing the likenesses between our cognitive architecture and a working theater. The entire stage of the theater corresponds to working memory, the immediate memory system in which we talk to ourselves, visualize places and people, and plan actions. In the working theater, focal consciousness acts as a “bright spot” on the stage. Conscious events hang around, monopolizing time “in the limelight”. The bright spot is further surrounded by a “fringe” (Mangan, 1993) or “penumbra” (James, 1890; Koch, 2004: ch. 14) of associated, vaguely conscious events. Information from the bright spot is globally distributed

to the vast audience of all of the unconscious modules we use to adapt to the world. A theater combines very limited events taking place on stage with a vast audience, just as consciousness involves limited information that creates access to a vast number of unconscious sources of knowledge. Consciousness is the publicity organ of the brain. It is a facility for accessing, disseminating, and exchanging information, and for exercising global coordination and control. This is the interface, the “stuff” of learning.

### **Moral 9: Emergent Consciousness as the “Stuff of Learning”; Massive Context Dependence**

Applied Linguistics needs to redress the balance, from knowledge as static representation stored in particular locations to knowledge as processing involving the dynamic mutual influence of inter-related types of information as they activate and inhibit each other over time — as Sir Charles Sherrington, Nobel Laureate for Neurology and author of *The Integrative Action of the Nervous System* put it nigh a century ago, “an enchanted loom, where millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern though never an abiding one; a shifting harmony of subpatterns”.

### **Case 10: Sociocultural Factors; Scaffolding; Action, Reaction and Negotiated Discourse; Socialized Consciousness**

The low salience of grammatical forms, the less than perfect contingency between their forms and functions, cue competition and redundancy, transfer, learned attention, and automatization all conspire to prevent usage-based acquisition from being as effective in L2 as it is in L1 (Ellis, 2006b). The usual social-interactional or pedagogical reactions to the resultant non-nativelike utterances involve an interaction-partner (Gass & Varonis, 1994) or instructor (Doughty & Williams, 1998) intentionally bringing additional evidence to the attention of the learner by some clarification request, or negative feedback, or correction, or focus-on-form, or explicit instruction, recruiting consciousness to overcome the implicit routines that are non-optimal for L2. Analyses of classroom, mother — child, and NS — NNS interactions demonstrate how conversation partners can scaffold the acquisition of novel vocabulary and other constructions by focusing attention on perceptual referents or shades of meaning and their corresponding linguistic forms (Baldwin,

1996; Chun *et al.*, 1982; Ellis, 2000; Gass, 1997; Gelman *et al.*, 1998; Long, 1983; Oliver, 1995; Swain & Lapkin, 1998; Tomasello, 1999; Tomasello & Akhtar, 2000). An interlocutor has various means of making the input more comprehensible: (1) by modifying speech, (2) by providing linguistic and extralinguistic context, (3) by orienting the communication to the “here and now” and, (4) by modifying the interactional structure of the conversation (Long, 1982). Of course, learners are not passive recipients of modified input, but rather are agents of their own learning, playing an active role in negotiating meaning and selective attending (Larsen-Freeman, 1985). Interaction in which participants’ attention is focused on resolving a communication problem, and the consequent negotiation of form and meaning “connects input, internal learner capacities, particularly selective attention, and output in productive ways” (Long, 1996).

Learning is ever thus. It takes place in a social context, involving action, reaction, collaborative interaction, intersubjectivity, and mutually assisted performance (Donato, 1994; Lantolf, 2006; Lantolf & Appel, 1994; Lantolf & Pavlenko, 1995; Lantolf & Thorne, 2006; Ricento, 1995; van Geert, 1994). Speech, speakers, and social relationships are inseparable (Norton, 1997). Activity theory emphasizes how individual learning is an emergent, holistic property of a dynamic system comprising many influences, both social, individual, and contextual (Lantolf & Appel, 1994). Action provides a context within which the individual and society, mental functioning and sociocultural context can be understood as interrelated moments (Wertsch, 1998; Wertsch *et al.*, 1995). Uttering invokes feedback that is socially provided (Tarone, 1997) and that recruits the learner’s consciousness. Indeed consciousness itself can be viewed as the end product of socialization (Vygotsky, 1980; Wertsch, 1985). Thus SLA is also Dialectic (Kramsch, 2002; Lantolf & Pavlenko, 1995; Lantolf & Thorne, 2006; Larsen-Freeman, 2002; Swain, 2000), involving the learner in a conscious tension between the conflicting forces of their current interlanguage productions and the evidence of feedback, either linguistic, pragmatic, or metalinguistic, that allows socially scaffolded development.

### **Moral 10: Socioculturally Situated Cognition; Consciousness and Development as Social Constructions; Dialectics**

Language is socially constructed. Language use, social roles, language learning, and conscious experience are all socially situated, negotiated, scaffolded, and guided. They emerge in the dynamic play of social

intercourse. Our expectations, systematized and automatized by prior experience, provide the thesis, our model of language, and we speak accordingly. If intelligibly and appropriately done, we get one type of social reaction, and conversation focuses further on the intended message, meaning and communication. If not, we may get another type of social reaction, one that may undermine our confidence, but one that helpfully focuses our attention on what we do not yet know how to do. Through the provision of negative feedback, be it a clarification request or possibly a recast, some dialectic, an antithesis which contradicts or negates our thesis, our model of language, and the tension between the two, being resolved by means of synthesis, promotes the development of our language resources. Of course, for some socially-oriented researchers, success in learning is not defined by development of a well-constructed model of language, but rather by the development of language as a resource for participation in the activities of everyday life (Larsen-Freeman, 2002; Zuengler & Miller, 2006).

### **Case 11: L2 Learners → Language Change**

Although it is said that all languages are equally complex, more properly, though perhaps less politically correctly, “all languages are complex to some degree” (McWhorter, 2002). Some languages are easier for adults to learn, in an absolute sense, than others. “If one were given a month to learn a language of one’s choice, I think one would select Norwegian rather than Faroese, Spanish rather than Latin, and Sranan rather than English.” (Trudgill, 1983) The languages most easily learned are those that have undergone more contact, because more adult language contact means more adult language learning. Linguistic evolution proceeded by natural selection from among the competing alternatives made available from the idiolects of individual speakers which vary among them. Since adults are typically less successful than children at language learning, adult language learning typically means simplification, most obviously manifested in a loss of redundancy and irregularity and an increase in transparency (Trudgill, 2002a; 2002b: ch. 7). The “Basic Variety” of interlanguage (Klein, 1998; Perdue, 1993) shows similarities with pidgins (Schumann, 1978) because pidgins are the languages that result from maximal contact and adult language learning (McWhorter, 2001). Veronique (1999, 2001) and Becker and Veenstra (2003) detail many parallels between the grammatical structures of French Based Creoles and the Basic Variety of interlanguage of learners of French as a second language, particularly in the 1:1 iconicity of their mapping

of function and form (Andersen, 1984), their controller-first, focus last constituent ordering principles, their lack of verbal morphology, and the order of development of their means of temporal reference. Some creoles evolve as the complexification of pidgins resulting from the habitual use by children learning it as their native tongue. Others, such as the Atlantic and Indian Ocean French-related creoles developed from the interactions of adult speakers of nonstandard varieties of the target language and non-natives (Mufwene, 2001). Creoles have systematic grammar, but not so many syntactic features as do languages such as West African Fula with 16 grammatical genders, or morphophonological features such as the complex system of consonant mutations of Welsh, or phonological features such as the tonal languages of South East Asia, all of these being languages that have had much longer to evolve their grammatical elaborations and diachronically motivated but synchronically obscure irregularities. Creoles typically have little or no inflection, they have little or no tone distinguishing words or expressing grammar, and their prefix/suffix+root combinations are semantically predictable (McWhorter, 2001, 2002: ch. 5).

In contrast, the older a language, the more complexity it has, that is the more it overtly signals distinctions beyond communicative necessity. The most elaborate languages in these respects are those older, more isolated languages that are spoken by groups of people whose interactions are primarily with other speakers of the language and which thus are learned as native languages by children whose plastic brains are ready to optimally represent them. But their linguistic complexities pose great difficulties to second language learners, prejudiced by L1 transfer and entrenchment. It is no accident that Faroese, as a low-contact language not subject to adult language learning, has maintained a degree of inflectional complexity which Norwegian has lost. Stasis allows a language, left to its own devices, to develop historical baggage — linguistic overgrowths that, however interesting and valuable are strictly incidental to the needs of human exchange and expression. In the same way that in nature, niche-stability during the flat periods of punctuated evolution allows the continuation of elaborate vestigial forms while competition selects them out, so in language, isolation allows the slow accretion of complexity and its maintenance, while large amounts of external contact and adult language learning select out the less functional linguistic overdevelopments, such as what is happening these days in the development of English as a *Lingua Franca* (Seidlhofer, 2004).

What we are able to process is determined not only by the input, but also by our knowledge. Bartlett (1932) catalogued the distortions that take place as a story is repeatedly retold, one person telling the next person, and so on. In successive serial reproductions, information that fits a subject's existing experiences is well remembered, but that which is not is either rationalized or forgotten. The same is true of linguistic structure as it is repeated by second language learners (hence elicited imitation as an effective way of assessing interlanguage development; Bley-Vroman & Chaudron (1994)). The natural exchange of language therefore changes language, filtering it through the understanding of successive speakers and listeners: "Languages are 'streamlined' when history leads them to be learned more as second languages than as first ones, which abbreviates some of the more difficult parts of their grammars." (McWhorter, 2004) Thus the interaction of language complexity by language age by adult language learning is continuous rather than categorical.

### **Moral 11: Language Has the Properties of Complex Adaptive Systems in Being Open, Adaptive, Reciprocal, and Self-organizing**

As complex, adaptive systems, languages emerge, evolve, and change over time (Larsen-Freeman, 1997; Lee & Schumann, 2003, 2005). Just as they are socially constructed, so too they are honed by social discourse. They adapt to their speakers. Because children are better language learners than adults, languages that adults can learn are simpler than languages that only children can learn. Thus the circle is unbroken. The system is open, adaptive, reciprocal, and self-organizing. Languages evolve according to evolutionary principles of competition and selection (Croft, 2000; Mufwene, 2001). But adult language learners are not merely subject to these phenomena, they play a very active role (Donato, 2000; Larsen-Freeman, 2003): Second language acquisition by adults changes the very nature of language itself.

### **Case 12: Discourse**

Applied Linguists are interested not only in how languages are acquired, but also in how they are used, with some applied linguists making no distinction between the two at all (Larsen-Freeman, 2004). Applied linguists, with their concern for language in use, must recognize and deal with the situatedness of discourse. The context of discourse both constructs



and constrains what is done with language (Cameron, 1996; Duranti & Goodwin, 1992).

In examining discourse, applied linguists have typically examined forms of attested language, be they single language texts or large corpora of such texts. The latter are especially helpful, of course, in assuring the dependability of the data (Larsen-Freeman, 2006). However, attested data cannot tell us what transpired in the language up until the construction of the text, nor where it is destined. While this may seem obvious and forgivable, from a complexity theory perspective, by limiting our investigations to attested language, we miss the perpetually changing, perpetually dynamic nature of language (Larsen-Freeman, 2008). In order to understand the context of oral discourse, at least, “we must start from its ‘behavior’ in the dialogic dynamics of contextualized interaction: that is, as people talk with each other” (Cameron & Deignan, 2006). This is precisely the position of conversation analysts who look at “how syntax for conversation is deployed by members to achieve particular, situated courses of action” (Markee & Kasper, 2004: 495).

Thus, although some applied linguists have taken a dynamic view of situatedness of discourse, a complex systems view offers a new way of understanding how people use language for real world purposes. Individuals in interactions can be seen as forming self-organizing and co-adapting systems, in which new understandings and new ways of speaking or writing, or indeed of language subsystems themselves, emerge over time (Larsen-Freeman & Cameron, 2008).

**Moral 12: “In Order to Qualify as Emergentist, an Account of Language Functioning Must Tell Us Where a Language Behavior ‘Comes from’” (MacWhinney, 1999: xii)**

Understanding how language forms contribute to and emerge from discourse, not only tells us about language; understanding how language is used may help us understand better how people think, how they make sense of the world and each other, and how they communicate (Cameron, 2003).

## **LANGUAGE EMERGENCE**

Each of the morals above is a characteristic of an emergent system. As such, each phenomenon is dynamic, complex, nonlinear, chaotic (at times), unpredictable, sensitive to initial conditions, open, self-organizing, feedback

sensitive, adaptive, characterized by strange attractors, which are fractal in shape (Larsen-Freeman, 1997). In short, language is a complex adaptive system. It comprises the ecological interactions of many players: people who want to communicate and a world to be talked about. It operates across many different levels (neurons, brains, and bodies; phonemes, morphemes, lexemes, constructions, interactions, and discourses), different human conglomerations (individuals, social groups, networks, and cultures), and different timescales (evolutionary, epigenetic, ontogenetic, interactional, neuro-synchronic, diachronic). As a complex system, its systematicities are emergent following adaptive, Darwinian principles. Chaos/Complexity Theory illuminates Applied Linguistics (Larsen-Freeman, 1997; Larsen-Freeman & Cameron, 2008), as does Dynamic Systems Theory (de Bot *et al.*, 2007; Herdina & Jessner, 2002), as do theories of the Emergence of Language (Ellis, 1998; MacWhinney, 1998, 1999, 2001). Each emergent level cannot come into being except by involving the levels that lie below it, and at each higher level there are new and emergent kinds of relatedness that are not found below: language cannot be understood in neurological or physical terms alone, nevertheless, neurobiology and physics play essential roles in the complex interrelations; equally from the top down, although language cannot be understood purely in experiential terms, nevertheless, phenomenology is an essential part too.

Changes in the system are engendered by agents' adaptation to their environment (van Lier, 2004), often including the reciprocal feedback that they receive as a result of their joint activities. Language is more dance than reference book; language use is more dance than two fax machines exchanging information (de Bot *et al.*, 2007). Thus, the natural character of the linguistic system can be defined as a dynamic adaptedness to a specific context (Tucker & Hirsch-Pasek, 1993). It is the imperfect relationship between what the context demands and what the system provides that drives the system forward through successive reorganizations. Due to its self-organizing property, the new organization of the language system emerges qualitatively different and novel from earlier organizations. Such a conception of language makes it easier to behold and represent change in progress and to explain the systematicity that emerges:

Language learning can be viewed as a complex and dynamic process in which various components emerge at various levels. (Marchman & Thai, 2005: 150)

Development is a process of emergence. (Elman *et al.*, 1996: 359)

Alternative approaches emphasize the ways in which the formal structures of language emerge from the interaction of social patterns, patterns implicit in the input, and pressures arising from the biology of the cognitive system. The emergentist approach to language acquisition views language as structure arising from interacting constraints. (MacWhinney, 1998: 200)

Emergentists believe that simple learning mechanisms, operating in and across the human systems for perception, motor-action and cognition as they are exposed to language data as part of a communicatively-rich human social environment by an organism eager to exploit the functionality of language, suffice to drive the emergence of complex language representations. (Ellis, 1998: 657)

Emergentism, as used in an Applied Linguistics context, assumes that the patterns of language development and of language use are neither innately prespecified in language learners/users nor are they triggered solely by exposure to input. Instead, language behavior is said to emerge from the interaction between the agent and the agent's environment. (Larsen-Freeman & Cameron, 2008)

Language learning and language use are dynamic processes in which regularities and system arise from the interaction of people, brains, selves, societies and cultures using languages in the world. The Applied Linguistics field is still evolving: which flowers thrive, how kempt the borders should be, who is entitled to tend them, and whether there should be a management strategy for this ecology, well, time will tell (Doughty & Long, 2003; Firth & Wagner, 1997, 1998; Gass, 1998; Gregg, 1993, 2005; Gregg *et al.*, 1997; Jordan, 2003, 2004; Lantolf, 1996, 2002; Long, 1997; Sealey & Carter, 2004).

Each research methodology has its advantages. Ethnography brings together the individual, society, and consciousness in time and place, but it ignores implicit motivations that introspection cannot access (Nisbett & Wilson, 1977). Brain imaging illustrates the dynamic patterns of neural activity involved in mental processing, but it isolates the learner's brain from society and its normal ecology of function. Laboratory experimentation allows the controlled logic of the scientific method, but it sacrifices ecological validity in this goal. And so on. We need to bring these methods together, to strive after the linking relations, to develop the kind of account that Wertsch, a Socioculturalist, called "translation at the crossroads that would make it possible to *link, but not reduce*, one perspective to another" (Wertsch, 1998). The same message "Interactions all the way down", "Emergentism all the way down" has been championed from the other Cognitive Science side of the traditional divide, where Elman, Bates, Johnson, Karmiloff-Smith, Parisi, and Plunkett, representing variously Connectionism, Developmental Psychology,

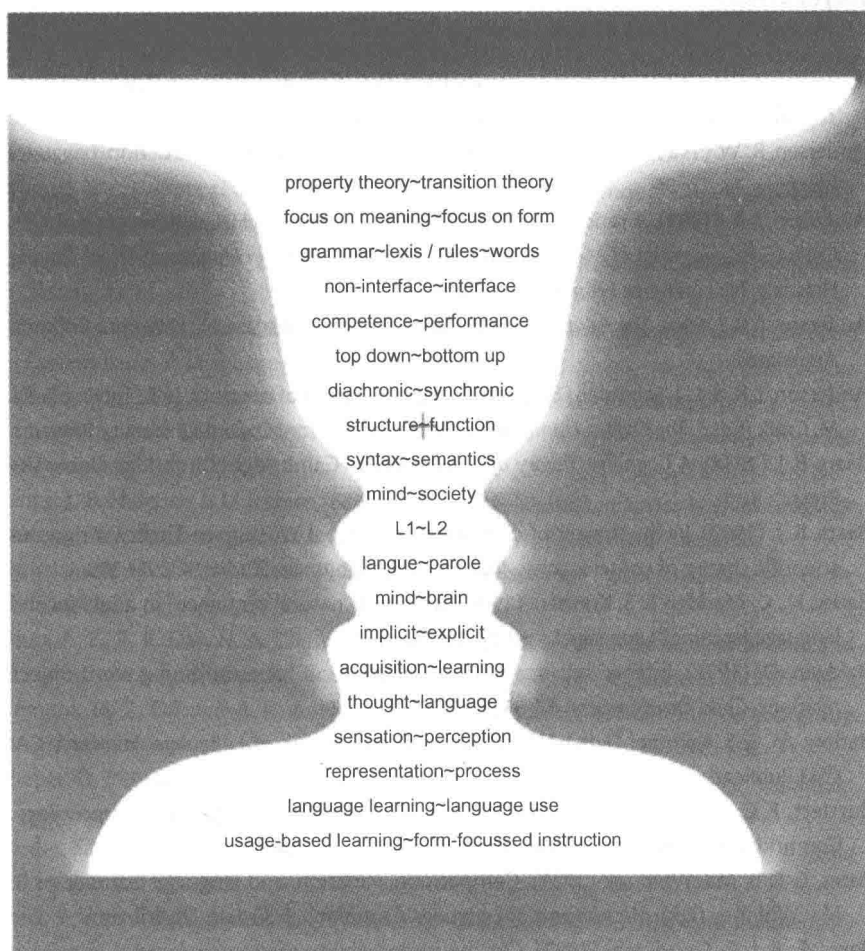
NeuroScience, Mathematical Modeling, and Dynamical Systems, developed a framework for cognition based on dynamics, growth, and learning in *Rethinking Innateness* (Elman *et al.*, 1996; Tomasello & Slobin, 2005). The valid investigation of the construct of language requires the synergy of all these approaches.

## DUALISM AND THE COMPLEMENTARY NATURE

When considering interface (Case 8), we alluded to Descartes' Dualism, the separation of "res cogitans" (God and the human soul) and "res extensa" (the corporeal world). Dualism pervades scientific thinking. Humans divide their world into contraries and perceive and interpret these as mutually exclusive. Applied Linguistics too is driven by such either/or dichotomies — Figure 1 illustrates but a few, beginning as we did here, with the property theory/transition theory antinomy. But these contraries too are emergent attractor states. We accept that meteorological phenomena involve local physical interactions of heat, molecules of water, gaseous air, and planetary spin, and from these emerge high pressure and low pressure systems, warm and cold fronts; thus it makes sense to summarize at this level and to talk in such terms when forecasting the weather. Human thinking, like nature, appears to partition things, events, and ideas into pairs. But these pairs are emergent, and they are complementary, more mutually dependent than mutually exclusive. They drive change, with the "action" taking place in between in complex coordination dynamics (Kelso, 1997; Kelso & Engström, 2006).

Throughout history, many have recognized that truth may well lie in between such polar opposites. In fact, one feature of dynamic systems theory is superposition, which means that a phenomenon is characterized by two (apparently) incompatible properties at the same time (van Geert & Steenbeek, 2005). Failure to accept this perspective leads to researchers picking sides in debates such as whether it is genes or the environment which can be used to explain development. Superposition, in fact, suggests that genes and environment are locked in a complex chain of steps over time and that they cannot be conceived of as variables that make mutually independent contributions to development. Heraclitus summarized the dynamic nature of learning: "All things come into being through opposition, and all are in flux like a river." The philosophical analysis of dialectics has a rich tradition, flowing from Plato, Socrates, Hegel, Kant, Vygotsky, and

Figure 1: Complementary pairs in Applied Linguistics



Wertsch into applied linguistics in the work of Lantolf, Kramsch, and others (Kramsch, 2002; Lantolf, 2006; Lantolf & Thorne, 2006). The science of complex systems (Holland, 1998; Kauffman, 1995), dynamic systems (Thelen & Smith, 1994), connectionism (Elman *et al.*, 1996), chaos-complexity theory (Cooper, 1999; Larsen-Freeman, 2002; Waldrop, 1992), and emergentism (Bates & MacWhinney, 1987; MacWhinney, 1999), is somewhat younger. The confluence of these philosophical and scientific streams, we believe, provides new ways to understand complementary pairs such as those in Figure 1, and the ways that language, the shared focus of our inquiries, might be better understood as an emergent system.

## References

- Andersen, R. W. (1983). Transfer to somewhere. In S. Gass & L. Selinker (Eds.), *Language Transfer in Language Learning*. Rowley, MA: Newbury House.
- Andersen, R. W. (1984). The one to one principle of interlanguage construction. *Language Learning*, 34: 77–95.
- Anderson, J. R. (1989). A rational analysis of human memory. In H. L. I. Roediger & F. I. M. Craik (Eds.), *Varieties of Memory and Consciousness: Essays in Honour of Endel Tulving*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Anderson, J. R. (1990). *The Adaptive Character of Thought*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Anderson, J. R. & L. J. Schooler. (2000). The adaptive nature of memory. In E. Tulving & F. I. M. Craik (Eds.), *The Oxford Handbook of Memory*. London: Oxford University Press.
- Baars, B. J. (1988). *A Cognitive Theory of Consciousness*. Cambridge: Cambridge University Press.
- Baars, B. J. (1997). In the theater of consciousness: Global Workspace Theory, a rigorous scientific theory of consciousness. *Journal of Consciousness Studies*, 4: 292–309.
- Bailey, N., C. Madden & S. Krashen. (1974). Is there a “natural sequence” in adult second language learning? *Language Learning*, 24: 235–243.
- Baldwin, D. (1996). Infants’ reliance on a social criterion for establishing word-object relations. *Child Development*, 67: 3135–3153.
- Barlow, M. & S. Kemmer (Eds.). (2000). *Usage Based Models of Language*. Stanford, CA: CSLI Publications.
- Bartlett, F. C. (1932). *Remembering: A Study in Experimental and Social Psychology*. Cambridge: Cambridge University Press.
- Bates, E. & B. MacWhinney. (1987). Competition, variation, and language learning. In B. MacWhinney (Ed.), *Mechanisms of Language Acquisition*. Hillsdale, NJ: Erlbaum.
- Bates, E. & J. C. Goodman. (1997). On the inseparability of grammar and the lexicon: Evidence from acquisition, aphasia and real-time processing. *Language and Cognitive Processes*, 12: 507–586.
- Becker, A. & T. Veenstra. (2003). Creole prototypes as basic varieties and inflectional morphology. In C. Dimroth & M. Starren (Eds.), *Information Structure and the Dynamics of Language Acquisition*. Amsterdam: John Benjamins.
- Bley-Vroman, R. & C. Chaudron. (1994). Elicited imitation as a measure of L2 competence in A. D. Cohen, S. M. Gass & E. Tarone (Eds.), *Research Methodology in Second-language Acquisition*. Hillsdale, NJ: Lawrence Erlbaum.
- Bod, R., J. Hay & S. Jannedy. (Eds.). (2003). *Probabilistic Linguistics*. Cambridge, MA: MIT Press.
- Boyland, J. T. (1996). *Morphosyntactic Change in Progress: A Psycholinguistic Approach*. University of California.

- Brown, R. (1973). *A First Language: The Early Stages*. Cambridge, MA: Harvard University Press.
- Bybee, J. (1995). Regular morphology and the lexicon. *Language and Cognitive Processes*, 10: 425–455.
- Bybee, J. (2000). Mechanisms of change in Grammaticalization: The role of frequency. University of New Mexico.
- Bybee, J. & P. Hopper (Eds.). (2001). *Frequency and the Emergence of Linguistic Structure*. Amsterdam: Benjamins.
- Bybee, J. & S. Thompson. (2000). Three frequency effects in syntax. *Berkeley Linguistic Society*, 23: 65–85.
- Cameron, L. (1996). Discourse context and the development of metaphor in children. *Current Issues in Language and Society*, 3: 49–64.
- Cameron, L. (2003). *Metaphor in Educational Discourse*. London: Continuum.
- Cameron, L. & A. Deignan. (2006). The emergence of metaphor in discourse. *Applied Linguistics*, 27(4): 590–619.
- Cenoz, J., B. Hufeisen & U. Jessner. (Eds.). (2001). *Cross-linguistic Influence in Third Language Acquisition: Psycholinguistic Perspectives*. Clevedon, UK: Multilingual Matters.
- Christiansen, M. H. & N. Chater (Eds.). (2001). *Connectionist Psycholinguistics*. Westport, CO: Ablex.
- Chun, A. E., R. R. Day, N. A. Chenoweth & S. Luppescu. (1982). Errors, interaction, and corrections: A study of native — nonnative conversations. *TESOL Quarterly*, 16: 537–546.
- Clément, R., Z. Dörnyei & K. A. Noels. (1994). Motivation, self-confidence and group cohesion in the foreign language classroom. *Language Learning*, 44: 417–448.
- Cooper, D. (1999). *Linguistic Attractors: The Cognitive Dynamics of Language Acquisition and Change*. Amsterdam: Benjamins.
- Corder, S. P. (1967). The significance of learners' errors. *International Review of Applied Linguistics*, 5: 161–169.
- Craik, F. I. M. & R. S. Lockhart. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, 11: 671–684.
- Crick, F. C. & C. Koch. (2003). A framework for consciousness. *Nature Neuroscience*, 6: 119–126.
- Croft, W. (2000). *Explaining Language Change: An Evolutionary Approach*. London: Longman.
- Croft, W. & A. Cruise. (2004). *Cognitive Linguistics*. Cambridge: Cambridge University Press.
- de Bot, K., W. Lowie & M. Verspoor. (2007). A Dynamic Systems Approach to Second Language Acquisition. *Bilingualism: Language and Cognition*, 10: 7–21.
- Dehaene, S. & J.-P. Changeux. (2004). Neural mechanisms for access to consciousness. In M. Gazzaniga (Ed.), *The Cognitive Neurosciences*. Cambridge, MA: MIT Press.
- Dehaene, S., L. Naccache, L. Cohen, D. L. Bihan, J. F. Mangin, J. B. Poline & D. Riviere. (2001). Cerebral mechanisms of word masking and unconscious repetition priming. *Nature Neuroscience*, 4(7): 678–680.

- DeKeyser, R. (2001). Automaticity and automatization. In P. Robinson (Ed.), *Cognition and Second Language Acquisition*. Cambridge: Cambridge University Press.
- Dennett, D. C. (2001). Are we explaining consciousness yet? *Cognition*, 79: 222–237.
- Dijkstra, A. (2005). Bilingual visual word recognition and lexical access. In J. F. Kroll & A. M. B. De Groot (Eds.), *Handbook of Bilingualism: Psycholinguistic Approaches*. Oxford: Oxford University Press.
- Donato, R. (1994). Collective scaffolding in second language learning. In J. Lantolf & G. Appel (Eds.), *Vygotskian Approaches to Second Language Research*. Norwood, NJ: Ablex Publishing Corporation.
- Donato, R. (2000). Sociocultural contributions to understanding the foreign and second language classrooms. In J. Lantolf (Ed.), *Sociocultural Theory and Second Language Learning*. Oxford: Oxford University Press.
- Dörnyei, Z. (2001). *Teaching and Researching Motivation*. Harlow: Longman.
- Dörnyei, Z. & P. Skehan. (2005). Individual differences in second language learning. In C. Doughty & M. Long (Eds.), *Handbook of Second Language Acquisition*. Oxford: Blackwell.
- Doughty, C. & J. Williams (Eds.). (1998). *Focus on Form in Classroom Second Language Acquisition*. New York: Cambridge University Press.
- Doughty, C. & M. Long (Eds.). (2003). *The Handbook of Second Language Acquisition*. Oxford: Blackwell.
- Dulay, H. C. & M. K. Burt. (1974). Natural sequences in child second language acquisition. *Language Learning*, 24: 37–53.
- Duranti, A. & C. Goodwin. (1992). *Rethinking Context*. Cambridge: Cambridge University Press.
- Edelman, G. M. (1989). *The Remembered Present: A Biological Theory of Consciousness*. New York: Basic Books.
- Edelman, G. M. & G. Tononi. (2000). *A Universe of Consciousness*. New York: Basic Books.
- Eichenbaum, H. (2002). *The Cognitive Neuroscience of Memory*. New York: Oxford University Press.
- Ellis, N. C. (1996). Sequencing in SLA: Phonological memory, chunking, and points of order. *Studies in Second Language Acquisition*, 18(1): 91–126.
- Ellis, N. C. (1998). Emergentism, connectionism and language learning. *Language Learning*, 48(4): 631–664.
- Ellis, N. C. (2002a). Frequency effects in language processing: A review with implications for theories of implicit and explicit language acquisition. *Studies in Second Language Acquisition*, 24(2): 143–188.
- Ellis, N. C. (2002b). Reflections on frequency effects in language processing. *Studies in Second Language Acquisition*, 24(2): 297–339.
- Ellis, N. C. (2005). At the interface: Dynamic interactions of explicit and implicit language knowledge. *Studies in Second Language Acquisition*, 27: 305–352.
- Ellis, N. C. (2006a). Language acquisition as rational contingency learning. *Applied*



- Linguistics*, 27(1): 1–24.
- Ellis, N. C. (2006b). Selective attention and transfer phenomena in SLA: Contingency cue competition, salience, interference, overshadowing, blocking, and perceptual learning. *Applied Linguistics*, 27(2): 1–31.
- Ellis, N. C. (2006c). Cognitive perspectives on SLA: The Associative Cognitive CREED. *AILA Review*, 19: 100–121.
- Ellis, N. C. (2008). The dynamics of language use, language change, and first and second language acquisition. *Modern Language Journal*, 92: 232–249.
- Ellis, N. C. (Ed.). (1994). *Implicit and Explicit Learning of Languages*. San Diego, CA: Academic Press.
- Ellis, R. (1985). A variable competence model of second language acquisition. *IRAL: International Review of Applied Linguistics in Language Teaching*, 23(1): 47–59.
- Ellis, R. (1994). A theory of instructed second language acquisition. In N. C. Ellis (Ed.), *Implicit and Explicit Learning of Languages*. San Diego, CA: Academic.
- Ellis, R. (1999). Item versus system learning: Explaining free variation. *Applied Linguistics*, 20: 460–480.
- Ellis, R. (2000). *Learning a Second Language through Interaction*. Amsterdam: J. Benjamins.
- Elman, J. L., E. A. Bates, M. H. Johnson, A. Karmiloff-Smith, D. Parisi & K. Plunkett. (1996). *Rethinking Innateness: A Connectionist Perspective on Development*. Cambridge, MA: MIT Press.
- Firth, A. & J. Wagner. (1997). On discourse, communication, and (some) fundamental concepts in SLA research. *The Modern Language Journal*, 81: 285–300.
- Firth, A. & J. Wagner. (1998). SLA property: No trespassing! *The Modern Language Journal*, 82: 91–94.
- Frackowiak, R. S. J., K. J. Friston, C. D. Frith, R. J. Dolan, C. J. Price, S. Zeki, J. Ashburner & W. Penny. (Eds.). (2004). *Human Brain Function*. London: Academic Press.
- Gardner, R. C. (1985). *Social Psychology and Second Language Learning: The Role of Attitudes and Motivation*. London: Edward Arnold.
- Gardner, R. C. & W. E. Lambert. (1972). *Attitudes and Motivation in Second Language Learning*. Rowley, MA: Newbury House.
- Gardner, R. C., P. F. Tremblay & A.-M. Masgoret. (1997). Towards a full model of second language learning: An empirical investigation. *The Modern Language Journal*, 81: 344–362.
- Gass, S. (1997). *Input, Interaction, and the Development of Second Languages*. Mahwah, NJ: Erlbaum.
- Gass, S. (1998). Apples and oranges: Or why apples are not orange and don't need to be: A response to Firth and Wagner. *The Modern Language Journal*, 82: 83–90.
- Gass, S. & L. Selinker (Eds.). (1983). *Language Transfer in Language Learning*. Rowley, MA: Newbury House.
- Gass, S. & E. Varonis. (1994). Input, interaction and second language production. *Studies in Second Language Acquisition*, 16: 283–302.

- Gelman, S. A., J. D. Coley, K. S. Rosengren, E. Hartman & A. Pappas. (1998). *Beyond Labeling: The Role of Maternal Input in the Acquisition of Richly Structured Categories*. *Monographs of the Society for Research in Child Development*, Serial No. 253, 63(1).
- Gladwell, M. (2000). *The Tipping Point: How Little Things Can Make a Big Difference*. New York, NY: Little, Brown and Company.
- Goldberg, A. E. (1995). *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: University of Chicago Press.
- Goldschneider, J. M. & R. DeKeyser. (2001). Explaining the "natural order of L2 morpheme acquisition" in English: A meta-analysis of multiple determinants. *Language Learning*, 51: 1–50.
- Goodman, J. C., H. C. Nusbaum, L. Lee & K. Broihier. (1990). The effects of syntactic and discourse variables on the segmental intelligibility of speech. Proceedings of the 1990 International Conference on Spoken Language Processing, Kobe, Japan, The Acoustical Society of Japan.
- Green, D. W. (1998). Mental control of the bilingual lexico-semantic system. *Bilingualism: Language & Cognition*, 1: 67–81.
- Gregg, K. R. (1993). Taking explanation seriously; or, Let a couple of flowers bloom. *Applied Linguistics*, 14: 276–294.
- Gregg, K. R. (2005). A response to Jordan's (2004) *Explanatory Adequacy and Theories of Second Language Acquisition*. *Applied Linguistics*, 26: 121–124.
- Gregg, K. R., M. H. Long, S. Jordan & A. Beretta. (1997). Rationality and its discontents in SLA. *Applied Linguistics*, 18: 539–559.
- Grosjean, F. (2001). The bilingual's language modes. In J. Nicol (Ed.), *One Mind, Two Languages: Bilingual Language Processing*. Oxford: Blackwell.
- Guy, G. (1980). Variation in the group and individual: The case of final stop deletion. In W. Labov (Ed.), *Locating Language in Time and Space*. New York: Academic Press.
- Hakuta, K. (1976). A case study of a Japanese child learning ESL. *Language Learning*, 26: 321–352.
- Hatfield, D. H. (1986). Tense marking in the spoken English of Vietnamese refugees. Linguistics. Unpublished Doctoral Dissertation. Georgetown University.
- Hebb, D. O. (1949). *The Organization of Behavior*. New York: John Wiley & Sons.
- Herdina, P. & U. Jessner. (2002). *A Dynamic Model of Multilingualism: Perspectives of Change in Psycholinguistics*. Clevedon, UK: Multilingual Matters Ltd.
- Holland, J. H. (1998). *Emergence: From Chaos to Order*. Oxford: Oxford University Press.
- Hulstijn, J. & R. DeKeyser (Eds.). (1997). Testing SLA theory in the research laboratory. *Studies in Second Language Acquisition*, 19 (2) (Special Issue).
- James, C. (1980). *Contrastive Analysis*. London: Longman.
- James, W. (1890). *The Principles of Psychology*. New York: Holt.
- Jarvis, S. (2000). Methodological rigor in the study of transfer: Identifying L1 influence on the interlanguage lexicon. *Language Learning*, 50: 245–309.
- Jarvis, S. (2006, 8 February). Exploring the scope of lexical transfer. From <http://oak.cats>.

- ohiou.edu/\_jarvis/.
- Jenkins, J. (2000). *The Phonology of English as an International Language*. Oxford: Oxford University Press.
- Jordan, G. (2003). *Theory Construction in Second Language Acquisition*. Amsterdam: John Benjamins Publishing Company.
- Jordan, G. (2004). Explanatory adequacy and theories of SLA. *Applied Linguistics*, 25: 539–543.
- Jurafsky, D. (2002). Probabilistic modeling in psycholinguistics: Linguistic comprehension and production. In R. Bod, J. Hay & S. Jannedy (Eds.), *Probabilistic Linguistics*. Harvard, MA: MIT Press.
- Jurafsky, D. & J. H. Martin. (2000). *Speech and Language Processing: An Introduction to Natural Language Processing, Speech Recognition, and Computational Linguistics*. Englewood Cliffs, NJ: Prentice-Hall.
- Kanwisher, N. (2001). Neural events and perceptual awareness. *Cognition*, 79: 89–113.
- Kauffman, S. A. (1995). *At Home in the Universe: The Search for the Laws of Self-organization and Complexity*. Oxford: Oxford University Press.
- Kellerman, E. (1995). Crosslinguistic influence: Transfer to nowhere? *Annual Review of Applied Linguistics*, 15: 125–150.
- Kelso, J. A. S. (1997). *Dynamic Patterns: The Self-organization of Brain and Behavior*. Cambridge, MA: A Bradford Book, MIT Press.
- Kelso, J. A. S. & D. A. Engström. (2006). *The Complementary Nature*. Boston, MA: MIT Press.
- Kemmer, S. & M. Israel. (1994). Variation and the usage-based model. 30<sup>th</sup> regional meeting of the Chicago Linguistics Society, Chicago, Chicago Linguistics Society.
- Klein, W. (1998). The contribution of second language acquisition research. *Language Learning*, 48: 527–550.
- Koch, C. (2004). *The Quest for Consciousness: A Neurobiological Approach*. Englewood, CO: Roberts and Company.
- Kramsch, C. (Ed.). (2002). *Language Acquisition and Language Socialization: Ecological Perspectives*. London: Continuum.
- Krashen, S. D. (1982). *Principles and Practice in Second Language Acquisition*. Oxford: Pergamon.
- Kroll, J. F. & A. M. B. De Groot (Eds.). (2005). *Handbook of Bilingualism: Psycholinguistic Approaches*. Oxford: Oxford University Press.
- Labov, W. (1969). *A Study of Non-Standard English*. Champaign, IL: National Council of Teachers of English.
- Labov, W. (1972). *Sociolinguistic Patterns*. Philadelphia: University of Pennsylvania Press.
- Lado, R. (1957). *Linguistics across Cultures: Applied Linguistics for Language Teachers*. Ann Arbor: University of Michigan Press.
- Langacker, R. W. (1987). *Foundations of Cognitive Grammar: Vol. 1. Theoretical Prerequisites*. Stanford, CA: Stanford University Press.
- Lantolf, J. (1996). Second language theory building: Letting all the flowers bloom!

- Language Learning*, 46: 713–749.
- Lantolf, J. (2002). Commentary from the Flower Garden: Responding to Gregg 2000. *Second Language Research*, 18: 113–119.
- Lantolf, J. (2006). Sociocultural theory and L2: State of the art. *Studies in Second Language Acquisition*, 28: 67–109.
- Lantolf, J. & G. Appel (Eds.). (1994). *Vygotskian Approaches to Second Language Research*. Norwood NJ: Ablex Publishing Corporation.
- Lantolf, J. & A. Pavlenko. (1995). Sociocultural theory and second language acquisition. *Annual Review of Applied Linguistics*, 15: 38–53.
- Lantolf, J. & S. Thorne. (2006). *Sociocultural Theory and the Genesis of Second Language Development*. Oxford: Oxford University Press.
- Larsen-Freeman, D. (1975). The acquisition of grammatical morphemes by adult ESL students. *TESOL Quarterly*, 9: 409–419.
- Larsen-Freeman, D. (1976). An explanation for the morpheme acquisition order of second language learners. *Language Learning*, 26: 125–134.
- Larsen-Freeman, D. (1978). Evidence of the need for a second language acquisition index of development. In W. Ritchie (Ed.), *Second Language Acquisition Research: Issues and Implications*. New York: Academic Press.
- Larsen-Freeman, D. (1983). Assessing global second language proficiency. In H. Seliger & M. Long (Eds.), *Classroom Oriented Research in Second Language Acquisition*. Rowley, MA: Newbury House Publishers, Inc.
- Larsen-Freeman, D. (1985). State of the art on input in second language acquisition. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition*. Rowley, MA: Newbury House Publishers, Inc.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18: 141–165.
- Larsen-Freeman, D. (2001). Teaching grammar. In M. Celce-Murcia (Ed.), *Teaching English as a Second or Foreign Language*. Boston: Heinle & Heinle.
- Larsen-Freeman, D. (2002). Language acquisition and language use from a chaos/complexity theory perspective. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization*. London: Continuum.
- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Grammar*. Boston: Heinle & Heinle.
- Larsen-Freeman, D. (2004). CA for SLA? It all depends. *The Modern Language Journal*, 88: 603–607.
- Larsen-Freeman, D. (2006a). Functional grammar: On the value and limitations of dependability, inference, and generalizability. In M. Chalhoub-Deville, C. Chapelle & P. Duff (Eds.), *Inference and Generalizability in Applied Linguistics*. Amsterdam: Benjamins.
- Larsen-Freeman, D. (2006b). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, 27: 590–619.

- Larsen-Freeman, D. (2008). On the need for a new understanding of language and its development. *Journal of Applied Linguistics*, 3: 281–304.
- Larsen-Freeman, D. & V. Strom. (1977). The construction of a second language acquisition index of development. *Language Learning*, 27: 123–134.
- Larsen-Freeman, D. & M. Long. (1991). *An Introduction to Second Language Acquisition Research*. New York: Longman.
- Larsen-Freeman, D. & L. Cameron. (2008). *Complex Systems and Applied Linguistics*. Oxford: Oxford University Press.
- Lee, N. & J. Schumann. (2003). *The Evolution of Language and of the Symbolosphere as Complex, Adaptive Systems*. American Association for Applied Linguistics.
- Lee, N. & J. Schumann. (2005). The interactional instinct: The evolution and acquisition of language. Congress of the International Association for Applied Linguistics.
- Lewontin, R. (2000). *The Triple Helix: Gene, Organism and Environment*. Boston MA: Harvard University Press.
- Lightbown, P. M., N. Spada & L. White. (1993). The role of instruction in second language acquisition. *Studies in Second Language Acquisition*, 15 (Special issue).
- Long, M. H. (1982). Native speaker/non-native speaker conversation in the second language classroom. In M. Long & J. Richards (Eds.), *Methodology in TESOL: A Book of Readings*. New York: Newbury House.
- Long, M. H. (1983). Linguistic and conversational adjustments to non-native speakers. *Studies in Second Language Acquisition*, 5: 177–193.
- Long, M. H. (1991). Focus on form: A design feature in language teaching methodology. In K. D. Bot, R. Ginsberg & C. Kramsch (Eds.), *Foreign Language Research in Cross-Cultural Perspective*. Amsterdam: Benjamins.
- Long, M. H. (1996). The role of linguistic environment in second language acquisition. In W. Ritchie & T. Bhatia (Eds.), *Handbook of Second Language Acquisition*. San Diego: Academic.
- Long, M. H. (1997). Construct validity in SLA: A response to Firth and Wagner. *The Modern Language Journal*, 81: 318–323.
- MacWhinney, B. (1987). The Competition Model. In B. MacWhinney (Ed.), *Mechanisms of Language Acquisition*. Hillsdale, NJ: Erlbaum.
- MacWhinney, B. (1997). Second language acquisition and the Competition Model. In A. M. B. De Groot & J. F. Kroll (Eds.), *Tutorials in Bilingualism: Psycholinguistic Perspectives*. Mahwah, NJ: Lawrence Erlbaum Associates.
- MacWhinney, B. (1998). Models of the emergence of language. *Annual Review of Psychology*, 49: 199–227.
- MacWhinney, B. (2001). Emergentist approaches to language. In J. Bybee & P. Hopper (Eds.), *Frequency and the Emergence of Linguistic Structure*. Amsterdam, Netherlands: Benjamins.
- MacWhinney, B. (Ed.). (1999). *The Emergence of Language*. Hillsdale, NJ: Erlbaum.
- MacWhinney, B. & J. Leinbach. (1991). Implementations are not conceptualizations: Revising the verb learning model. *Cognition*, 40(1–2): 121–157.

- Mangan, B. (1993). Taking phenomenology seriously: The “fringe” and its implications for cognitive research. *Consciousness and Cognition*, 2: 89–108.
- Marchman, V. & D. Thal. (2005). Words and grammar. In M. Tomasello & D. Slobin (Eds.), *Beyond Nature — Nurture: Essays in Honor of Elizabeth Bates*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Markee, N. & G. Kasper. (2004). Classroom talks: An introduction. *The Modern Language Journal*, 88: 491–500.
- McClelland, J. L. & J. L. Elman. (1986). The TRACE model of speech perception. *Cognitive Psychology*, 18(1): 1–86.
- McLaughlin, B. (1987). *Theories of Second Language Learning*. London: Arnold.
- McLaughlin, B. (1990). Restructuring. *Applied Linguistics*, 11: 113–128.
- McWhorter, J. (2001). The world’s simplest grammars are creole grammars. *Language Typology*, 5: 125–166.
- McWhorter, J. (2002). *The Power of Babel: A Natural History of Language*. San Francisco, CA: W. H. Freeman & Co.
- McWhorter, J. (2004). *The story of human language Lecture 24: Language Interrupted*. The Great Courses. The Teaching Company Limited Partnership.
- Mufwene, S. S. (2001). *The Ecology of Language Evolution*. Cambridge: Cambridge University Press.
- Murphy, S. (2003). Second language transfer during third language acquisition. *Working Papers in TESOL and Applied Linguistics*, 3(2).
- Nisbett, R. E. & T. D. Wilson. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84: 231–259.
- Norton, B. (1997). Language, identity, and the ownership of English. *TESOL Quarterly*, 31: 409–430.
- Odlin, T. (1989). *Language Transfer*. New York: Cambridge University Press.
- O’Grady, W. (2003). The radical middle: Nativism without Universal Grammar. In C. Doughty & M. H. Long (Eds.), *Handbook of Second Language Acquisition*. Oxford: Blackwell.
- Oliver, R. (1995). Negative feedback in child NS/NNS conversation. *Studies in Second Language Acquisition*, 18: 459–481.
- Paradis, M. (1994). Neurolinguistic aspects of implicit and explicit memory: Implications for bilingualism and SLA. In N. C. Ellis (Ed.), *Implicit and Explicit Learning of Languages*. London: Academic Press.
- Paradis, M. (2004). *A Neurolinguistic Theory of Bilingualism*. Amsterdam: John Benjamins.
- Perdue, C. (Ed.). (1993). *Adult Language Acquisition: Crosslinguistic Perspectives*. Cambridge: Cambridge University Press.
- Pienemann, M. (1998). *Language Processing and Second Language Development: Processability Theory*. Amsterdam: Benjamins.
- Plunkett, K. & V. A. Marchman. (1993). From rote learning to system building: Acquiring verb morphology in children and connectionist nets. *Cognition*, 48: 21–69.

- Preston, D. (1996). Variationist perspectives on second language acquisition. In R. Bayley & D. R. Preston (Eds.), *Second Language Acquisition and Linguistic Variation*. Amsterdam: Benjamins.
- Preston, D. (2000). A variationist perspective on SLA: Psycholinguistic concerns. In R. Kaplan (Ed.), *Oxford Handbook of Applied Linguistics*. Oxford: Oxford University Press.
- Rees, G. (2001). Neuroimaging of visual awareness in patients and normal subjects. *Current Opinion in Neurobiology*, 11: 150–156.
- Rees, G., G. Kreiman & C. Koch. (2002). Neural correlates of consciousness in humans. *Nature Reviews: Neuroscience*, 3: 261–270.
- Ricento, T. (1995). Considerations of Identity in L2 Learning. In E. Hinkel (Ed.), *Handbook of Research on Second Language Teaching and Learning*. Mahwah, NJ: Erlbaum.
- Robinson, P. (Ed.). (2001). *Cognition and Second Language Instruction*. Cambridge: Cambridge University Press.
- Robinson, P. & N. C. Ellis (Eds.). (2007). *Handbook of Cognitive Linguistics and Second Language Acquisition*. Hillsdale, NJ: Lawrence Erlbaum.
- Rumelhart, D. E. & J. L. McClelland. (1987). Learning the past tenses of English verbs: Implicit rules or parallel distributed processing? In B. MacWhinney (Ed.), *Mechanisms of Language Acquisition*. Hillsdale, NJ: Erlbaum.
- Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics*, 11: 129–158.
- Schreuder, R. & B. Weltens (Eds.). (1993). *The Bilingual Lexicon*. Amsterdam: John Benjamins.
- Schumann, J. H. (1978). *The Pidginisation Process: A Model for Second Language Acquisition*. Rowley, MA: Newbury House.
- Sealey, A. & B. Carter. (2004). *Applied Linguistics as Social Science*. London: Continuum.
- Seidlhofer, B. (2004). Research perspectives on teaching English as a Lingua Franca. *Annual Review of Applied Linguistics*, 24: 209–239.
- Selinker, L. (1972). Interlanguage. *IRAL, International Review of Applied Linguistics in Language Teaching*, 10: 209–231.
- Selinker, L. & U. Lakshmanan. (1993). Language transfer and fossilization: The “Multiple Effects Principle”. In S. Gass & L. Selinker (Eds.), *Language Transfer in Language Learning*. Philadelphia, PA: John Benjamins.
- Shin, S. J. & L. Milroy. (1999). Bilingual language acquisition by Korean school children in New York City. *Bilingualism: Language and Cognition*, 2: 147–167.
- Singer, W. (1999). Neural synchrony: A versatile code for the definition of relations? *Neuron*, 24: 49–65.
- Skehan, P. (1998). *A Cognitive Approach to Language Learning*. Oxford: Oxford University Press.
- Swain, M. (2000). The output hypothesis and beyond: Mediating acquisition through collaborative dialogue. In J. Lantolf (Ed.), *Sociocultural Theory and Second Language Learning*. Oxford: Oxford University Press.

- Swain, M. (2005). The output hypothesis: Theory and research. In E. Hinkel (Ed.), *Handbook of Research in Second Language Teaching and Learning*. Mahwah, NJ: Lawrence Erlbaum.
- Swain, M. & S. Lapkin. (1998). Interaction and second language learning: Two adolescent French immersion students working together. *The Modern Language Journal*, 82: 320–337.
- Tarone, E. (1980). Some influence on the syllable structure of interlanguage phonology. *International Review of Applied Linguistics*, 18: 139–152.
- Tarone, E. (1997). Analyzing IL in natural settings: A sociolinguistic perspective of second-language acquisition. *Communication and Cognition*, 30: 137–150.
- Tarone, E. (2002). Frequency effects, noticing, and creativity: Factors in a variationist interlanguage framework. *Studies in Second Language Acquisition*, 24: 287–296.
- Taylor, B. P. (1975). The use of overgeneralization and transfer learning strategies by elementary and intermediate students in ESL. *Language Learning*, 25: 73–108.
- Taylor, J. R. (2002). *Cognitive Grammar*. Oxford: Oxford University Press.
- Thelen, E. & L. B. Smith. (1994). *A Dynamic Systems Approach to the Development of Cognition and Action*. Cambridge, MA: MIT Press.
- Tomasello, M. (1999). *The Cultural Origins of Human Cognition*. Boston, MA: Harvard University Press.
- Tomasello, M. & N. Akhtar. (2000). Five questions for any theory of word learning. In R. Golinkoff (Ed.), *Becoming a Word Learner: A Debate on Lexical Acquisition*. Oxford: Oxford University Press.
- Tomasello, M. & D. I. Slobin (Eds.). (2005). *Beyond Nature Nurture: Essays in Honor of Elizabeth Bates*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Trudgill, P. (1983). *On Dialect: Social and Geographical Perspectives*. Oxford: Basil Blackwell.
- Trudgill, P. (2002a). Linguistic and social typology. In J. K. Chambers, P. Trudgill & N. Schilling-Estes (Eds.), *The Handbook of Language Variation and Change*. Oxford: Blackwell.
- Trudgill, P. (2002b). *Sociolinguistic Variation and Change*. Edinburgh: Edinburgh University Press.
- Tucker, M. & K. Hirsch-Pasek. (1993). Systems and language: Implications for acquisition. In B. Smith & E. Thelen (Eds.), *A Dynamical Systems Approach to Development*. Cambridge, MA: MIT Press.
- Ungerer, F. & H. J. Schmid. (1996). *An Introduction to Cognitive Linguistics*. London: Longman.
- Ushioda, E. (1996). Developing a dynamic concept of motivation. In T. Hickey & J. Williams (Eds.), *Language Education and Society in a Changing World*. Clevedon: Multilingual Matters.
- van Dijk, M. (2003). *Child language cuts capers: Variability and ambiguity in early child development*. University of Groningen.
- van Geert, P. (1994). Vygotskian dynamics of development. *Human Development*, 37: 346–365.



- van Geert, P. & H. Steenbeek. (2005). A complexity and dynamic systems approach to developmental assessment, modeling and research. In K. W. Fischer, A. Battro & P. Lena (Eds.), *Mind, Brain, and Education*. Cambridge: Cambridge University Press.
- van Lier, L. (2004). *The Ecology and Semiotics of Language Learning*. Dordrecht: Kluwer Academic Publishers.
- Veronique, D. (1999). L'émergence de catégories grammaticales dans les langues créoles: grammaticalisation et réanalyse. In J. Lang & Neumann-Holzschuh (Eds.), *Reanalyse und Grammatikalisierung in den Romanischen Sprachen*. Tübingen: Max Niemeyer Verlag.
- Veronique, D. (2001). Genèse(s) et changement(s) grammaticaux: quelques modestes leçonstirés de l'émergence des créoles et de l'acquisition des langues étrangères. In M. Matthey (Ed.), *Le changement linguistique. Évolution, Variation, Hétérogénéité*. Travaux Neufchâtelois de Linguistique, 34/35.
- Vygotsky, L. S. (1980). *Mind in Society: The Development of Higher Mental Processes*. Boston, MA: Harvard University Press.
- Waldrop, M. (1992). *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York, NY: Simon & Schuster.
- Weinreich, U. (1953). *Languages in Contact*. The Hague: Mouton.
- Wertsch, J. V. (1985). *Culture, Communication, and Cognition: Vygotskian Perspectives*. Cambridge: Cambridge University Press.
- Wertsch, J. V. (1998). *Mind as Action*. Oxford: Oxford University Press.
- Wertsch, J. V., P. Del Rio & A. Alvarez. (Eds.). (1995). *Sociocultural Studies of Mind*. Cambridge: Cambridge University Press.
- Wolfe-Quintero, K., S. Inagaki & H.-Y. Kim. (1998). *Second Language Development in Writing: Measures of Fluency, Accuracy, and Complexity*. Honolulu, HI: University of Hawai'i Press.
- Wolfram, W. (1985). Variability in tense marking: A case for the obvious. *Language Learning*, 35: 229–253.
- Young, R. & R. Bayley. (1996). VARBRUL analysis for second language acquisition research. In R. Bayley & D. R. Preston (Eds.), *Second Language Acquisition and Linguistic Variation*. Amsterdam: Benjamins.
- Zuengler, J. & E. Miller. (2006). Cognitive and sociocultural perspectives: Two parallel SLA worlds? *TESOL Quarterly*, 40: 35–58.

## Comment after Chapter 9

In the same issue of the journal *Applied Linguistics*, in which the article that you have just read appeared (Summer Issue, 2006), I published a report of research I had conducted with five students, all women from

China. They had accompanied their husbands to Ann Arbor, Michigan because their spouses were enrolled in graduate degree programs at the University of Michigan. The women were professionals themselves, and they wanted to spend their time in Ann Arbor productively. They approached me as Director of the English Language Institute to see if we would be willing to create a course where they could work to improve their intermediate-level English. A post-doctoral student at the ELI, Agnieszka Kowaluk, volunteered to teach such a course. In return for the instruction, we asked of the students that they allow us to study their language development, to which they agreed.

You can read the design and results of this longitudinal study in the next chapter. What was especially striking to me was to see how differently the women performed. The women were similar in that they had a common native language, gender, level of education, and English proficiency. They also were taking the same English course at the Institute. And yet, there was a great deal of variability in their performances. The women appeared to have different learning trajectories and different end results. Perhaps this shouldn't have been so surprising (it probably wouldn't be to most language teachers), but not only was a great deal of inter-learner variability evident, there was also much intra-learner variability, with learners' performance on linguistic measures fluctuating over time. To me, both types of variability, inter- and intra-, provided evidence of the students' adapting their language resources in different ways as they told their stories. The result was that the language resources of each woman were uniquely transformed. This interpretation, that the language learning process was much more heterogeneous than uniform, was consistent with my ever-growing interest in and allegiance to a complex, dynamic adaptive view of language acquisition, one informed by Chaos/Complexity Theory. In the next chapter, I contrast this perspective with the more traditional "developmental ladder" view of SLA, which sees SLA as a process of increasing conformity to a uniform target language, accomplished by learners who traverse the interlanguage continuum in the same way.

## The Emergence of Complexity, Fluency, and Accuracy in the Oral and Written Production of Five Chinese Learners of English

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Seeing language as a complex, dynamic system and language use/acquisition as dynamic adaptedness (a “make-do” solution) to a specific context proves a useful way of understanding change in progress, such as that which occurs with a developing L2 system. This emergentist shift of perspective provides another way of understanding previously observed characteristics of learner language, that is that its development is not discrete and stage-like but more like the waxing and waning of patterns; that, from a target-language perspective, certain aspects of the behavior are progressive, others, regressive; that change can be gradual and it can be sudden; and that the latter notably heralds the emergence of a new order qualitatively different and novel from earlier organizations. In addition, when group data are disaggregated, it is clear that there are many paths to development. By closely examining the oral and written production of five Chinese learners of English, the emergence of complexity, fluency, and accuracy can be seen, not as the unfolding of some prearranged plan, but rather as the system adapting to a changing context, in which the language resources of each individual are uniquely transformed through use.

### INTRODUCTION

One of the challenges of working on second language acquisition (SLA) is to capture the ongoing emergence of complexity, fluency, and accuracy in

learner language. The desire to investigate “motors of change” (Thelen & Smith, 1994) contributes to the challenge. While much has been learned about the SLA process since its inception, most researchers in the field have operated within a “developmental ladder” metaphor (Fischer *et al.*, 2003) and under certain assumptions and postulates that follow from it, assumptions concerning linguistic competence that we have inherited from linguistics and postulates arising from first and early second language acquisition research, in particular that:

1. there are fixed, homogeneous native and target languages;
2. SLA is a process of increasing conformity to a uniform target language;
3. there are discrete stages through which learners traverse along the way;
4. progress can best be defined in terms of one dimension of one subsystem, i.e. accuracy in morphosyntax (as opposed to, say, the dimensions of fluency or complexity, and the subsystems of lexis, phonology, and discourse, or more likely, the interaction of all the above);
5. language is purely a cognitive resource;
6. learners move through the process in a fairly consistent manner; indeed, that
7. it is possible to adopt a two-phase research agenda, concentrating first on understanding learning and later on accounting for learners’ differential success.<sup>1</sup>

Of course, no single researcher may subscribe to all these assumptions and postulates. In fact, many of these assumptions have been challenged over the years, and here I can but cite a few examples. For instance, Bley-Vroman (1983) argued some years ago that it was inappropriate to adopt a target-centric perspective and assume that learners’ language develops through a series of stages, each of which more closely approximates the target language. Then, too, it has long been known that any putative stages in SLA are not discrete, but rather characterized by “scouting” and “trailing” behavior (Stauble & Larsen-Freeman, 1978; Huebner, 1985). Furthermore, more recently, there have been forceful arguments made for a more socially-constructed view of SLA (e.g. Lantolf, 1994; Firth & Wagner, 1997). Finally, right from the beginning, despite the two-pronged nature of its research agenda (split between foci on learning and on learners), Selinker warned that “A theory of second language learning that does not provide a central place for individual differences among learners *cannot* be considered acceptable” (Selinker, 1972: 213, fn. 8).

While at least some of the assumptions have thus been challenged, and others likely will as the field evolves, emergentism (at least one that is informed by the Chaos/Complexity Theory perspective on it that I hold<sup>2</sup>) does so wholesale, rather than piecemeal. In other words, it does not refute these

assumptions one by one, but rather, from the beginning, adopts a different metaphor or supra-theory (Larsen-Freeman & Cameron, 2008), one in which development is seen as a complex process of dynamic construction within multiple ranges in multiple directions (Fischer *et al.*, 2003).

In contrast to the seven assumptions stemming from the developmental ladder metaphor, the assumptions underlying a complex, dynamic systems view are as follows:

1. Language is not fixed, but is rather a dynamic system. Language evolves and changes in the dynamics of language use between and among individuals. This is true for both the language of native speakers and for the L2 of language learners (Larsen-Freeman, 1997). Language grows and organizes itself from the bottom up in an organic way, as do other complex systems. Adaptation in local communities produces emergence of certain variegated stabilities of structure, meaning and pragmatics, but overall there is little that is fixed about language. Therefore SLA is not a matter of conformity to uniformity (Larsen-Freeman, 1997, 2003). Language as a homogeneous, static system is a normative fiction (Klein, 1998).
2. Although progress in SLA may be viewed as the degree to which a language learner's interlanguage aligns with the target language (TL), there will never be complete convergence between the two systems. For one thing, there may be little reason for a learner to attempt to emulate native-speaker norms (Cook, 2002; Seidlhofer, 2004), and for another, there is no fixed, homogeneous target end state to language evolution or development (Larsen-Freeman, 2005). That is not to say that there are no constraints operating to define the trajectory of language development. Since many complex systems exhibit sensitive dependence on their initial conditions, language is likely to be shaped by certain substantive universal principles, which, when combined with their specific instantiation in the L1, exert a powerful influence on L2 development (Larsen-Freeman, 1997). However, the process of second language acquisition is also likely to involve morphogenesis, the creation of novel forms (Larsen-Freeman, 2003), one in which learners actively transform their linguistic world, not just conform to it (Donato, 2000).
3. There are no discrete stages in which learners' performance is invariant, although there are periods where certain forms are dominant, periods that have been referred to as stages in the acquisition of certain grammatical structures.<sup>3</sup> There appears to be a need for the necessary building blocks to be in place in sufficient critical mass to move to a period where a different form dominates (Marchman & Bates, 1994). The dominance of certain structures may arise through a gradual building up process or

through a period of fluctuation among competing forms, followed by a phase shift in the system when a certain critical threshold is crossed, and some wider reorganization is triggered. The sudden discontinuity of the phase shift illustrates the nonlinearity of complex systems.

4. Because language is complex, progress cannot be totally accounted for by performance in any one subsystem. What is evident at any one time is “the interaction of multiple complex dynamic systems, working on multiple timescales and levels (Larsen-Freeman, 1997; Lemke, 2000)” (Cameron & Deignan, 2006). Furthermore, there are also many dimensions to language proficiency — accuracy, fluency, and complexity being three that are theorized to have independent status in L2 performance in that learners can have different goals at different times when performing in an L2 (Skehan, 1998; Robinson, 2001). Linguistic subsystems, dimensions of language proficiency, and even individual elements of language interact in ways that are supportive, competitive, and conditional (van Geert & Steenbeek, 2005a). They are supportive in that development in one of these subsystems, dimensions, or elements might depend upon the development in another. We see this in first language acquisition, for example, in the relationship between lexical spurts and grammatical development. Seeing the two subsystems as “connected growers” (Robinson & Mervis, 1998) is important to understanding not only static relations between variables, but also relations that change throughout the course of development. However, while mutual, the relationship is not necessarily symmetrical, in that after a while, the development in one subsystem may have a competitive relationship with development in another. The competition is due to the inherent limited resources that humans can and will invest in learning a new skill or solving a task (Robinson & Mervis, 1998), such as humans’ limited working memories, attention, and time-on-task (MacWhinney, 1999; van Geert, 2003), so that, for example, at one point in time, higher performance on one dimension of proficiency, say accuracy, can seemingly detract from performance in others, say fluency and complexity.
5. Language is both a cognitive and a social resource (Larsen-Freeman, 2002; Atkinson, 2002). The view of language as a cognitive resource has been long-standing in SLA since it arose in its modern form with the cognitive revolution in linguistics. More recently, the case has been made for viewing language as a social resource (Firth & Wagner, 1997). That language is social in nature stems from the fact that it is used for social action within a context of language use, where pressures and affordances, learners’ identities, goals and affective states will all have a profound effect on language performance (van Lier, 2004; Cameron & Deignan, 2006).

6. Learners do not progress through stages of development in a consistent manner. There is a great deal of variation at one time in learners' performances and clear instability over time. Variation and fluctuation are important characteristics of dynamic systems (Thelen & Smith, 1994; van Geert & van Dijk, 2002) and should not be dismissed as measurement error. The fluctuation and variability is in part because language learners dynamically adapt their linguistic resources to the context, and the context is always changing (Tarone, 1979). Thus, there is a dynamic interplay between a person's abilities and context affordances (Clark, 1997; van Geert & Steenbeek, 2005a). While it is possible to separate context and person for the purpose of analysis, such separation requires the untenable assumption that the two are independent (van Geert & Steenbeek, 2005a). Therefore, performance is by nature contingent and a "make-do" solution to the situation at hand (Thelen & Smith, 1994). The persistent instability of complex systems (Percival, 1993) is due to the fact that a person's use of language resources changes them.
7. Individual developmental paths, then, each with all its variation, may be quite different one from one another, even though in a "grand sweep" view, these developmental paths appear quite similar (de Bot *et al.*, 2007). One consequence of this is that generalizations about learning are elusive and not likely to hold regardless of individual differences (Larsen-Freeman, 1985). Some of the individual differences naturally follow from the fact that individuals tend to actively select and manipulate the contexts in which they function (van Geert & Steenbeek, 2005a). In fact, it could be said that individuals not only determine what aspects of the outside world are relevant to them, but they actively construct a world around themselves and are constantly altering it (Lewontin, 2000).

Once again, we have a situation where other SLA researchers have made similar points. In addition to those I have already referred to above, let me acknowledge Tarone (1979, 1988), R. Ellis (1985, 1987), and Young (1991) for their work pointing to the importance of variability in learner performance, McLaughlin (1990) for his important observation that at certain points in development, interlanguages undergo a phase shift and restructure, and Pienemann (1998) for demonstrating that development depends on the availability of prior cognitive resources.

However, to reiterate what I wrote earlier, what is being presented here is not a piecemeal weighing of these assumptions, but a wholesale perspective shift, from a developmental ladder to an emergentist perspective, one that sees linguistic signs not as "autonomous objects of any kind, either

social or psychological”, but as “contextualized products of the integration of various activities by [particular] individuals in particular communicative situations. It logically follows that they are continually created to meet new needs and circumstances” (Toolan in Leather & van Dam, 2003). The dynamism of language central to this position frames questions concerning SLA in a rather different way.

## THE STUDY

Having made a theoretical commitment, I acknowledge that the issue of finding a suitable methodology with which to capture and investigate the “fuzziness” (van Geert & Steenbeek, 2005b) and dynamism of language development is a challenging one. For assistance, I turned to van Gelder and Port (1995), who offer three approaches to the study of dynamical systems: quantitative modeling, qualitative modeling, and dynamical description. In this issue of *Applied Linguistics* are articles whose authors have adopted a modeling approach. The third approach, dynamical description, is one that I have employed in the study I report here. Dynamical description “provides a general conceptual apparatus for understanding the way systems — including, in particular, nonlinear systems — change over time” (van Gelder & Port, 1995: 17).

This study is a first attempt to grapple with the conceptual apparatus and tools to understand complex systems in action in second language learning. Of course, I am not the only one who is working on this problem (see, for example, de Bot *et al.*, 2005), and there are others, especially in L1 acquisition, on whose work I have drawn (Robinson & Mervis, 1998; van Geert & van Dijk, 2002).

## METHOD

For a dynamical description, it is desirable to use a time-series design, that is a series of observations of participants that are frequent enough to capture the relevant properties underlying the developmental process (van Geert & Steenbeek, 2005b). To this basic design, I have added the feature of having students perform the same task at different points in time.

I concede that a repeated-task design makes it difficult to distinguish performance differences due to task repetition from those of more general language development. Bygate (2001), for instance, has demonstrated how complexity and fluency (but not accuracy) improves when learners repeat a task, and Yuan and Ellis (2003), among others, have shown how planning



time affects task performance. However, using the same task several times was one way of dealing with the fact that “even subtle differences in a task can affect performance profoundly” (Thelen & Corbetta, 2002: 61), leaving unanswered the question of whether the subject has control over the language resources or not. I wanted to be able to look at performance variability that might be an “important harbinger of change, or indeed the manifestation of the very process of change” (Thelen & Corbetta, 2002: 61), not variable performance that could be due to differences in tasks or contexts. Still, of course, I had no control over how the participants chose to engage with or carry out the task, their fluid attitudes and motivation being part of the changing context.

### **Participants**

The participants in my study were five learners of English from the People’s Republic of China. Here they will be referred to by the letters R, U, Y, H, and L. The learners were all female, with ages ranging from 27 to 37. They were all professionals, who were partners of graduate students at a large mid-west university in the United States. Their English language proficiency could be characterized impressionistically as high intermediate. They were keen to improve their English since their professional careers were put on hold as they accompanied their spouses to the United States.

Their instruction consisted of a class meeting once a week for two and a half hours over a 10-month period. In addition, once a month the teacher met with each student in a private tutorial, lasting one hour. A communicative grammar textbook was used in class, and the instructional program had 2 basic grammatical foci: the verb tense-aspect system and article usage. Between classes, students had homework from the textbook, which consisted of reading grammatical focus boxes and completing the corresponding exercises. Other between-class assignments included 5 minutes a day of work on pronunciation (listening to the radio or eavesdropping and concentrating on a particular word or sound that was said differently from the way the student might say it), free reading for 15 minutes a day, one hour of daily listening to the radio or watching television, and every other week, reading a magazine article for the purpose of identifying unfamiliar words.

### **Procedures**

The participants were asked to carry out the same tasks four times over a six-month time period, or in other words, to do the same tasks once

every six weeks. The participants were asked to write a narrative about a past episode that they wanted to share, without worrying about whether or not it was in perfect English and without consulting a dictionary. Three days after writing each story (i.e. the same story each time), the participants were asked to tell the story orally. Both renditions were untimed. Furthermore, the participants received no feedback on their performance. Their oral performance was recorded and transcribed, but the data being reported on here will largely be drawn from the written narratives.

### Expectations

As this is an exploratory study, there are no hypotheses being tested. Nonetheless, there are expectations about what might be found. Among them, I expected to find:

1. some stable patterns and some variation in learner production; the stability, of course, does not have to be native-like;
2. different learner orientations in terms of the subsystems and dimensions of proficiency in which they progress and regress from a target-centric perspective;
3. the use of a variegated set of language patterns, since I am making no assumption that what is psycholinguistically real for learners is identical to what is descriptively real for linguists;
4. the waxing and waning of such language patterns; language learning is an iterative process (de Bot *et al.*, 2007) and is more like a spiraling process, revisiting the same territory again and again, instead of a linear, additive process;
5. a smoother, ascending line at the group level than I would find at the individual level, with a great deal of intraindividual (within one individual on different measures) and interindividual (between individuals on one measure) variation; furthermore, I would expect that both types of variation would change over time because in a complex, dynamic system, certain factors can have almost negligible effects at certain points in time, and much more dramatic ones at others;
6. nonlinearity, evidenced by sudden shifts in the use of forms, despite no change in the effort expended — for example, because the learners worked on the English verb tense-aspect system does not mean that the “amount” of verb tense-aspect learning would be commensurate with the effort put forth; of course, because of the interconnectedness of the subsystems of language, other dimensions of language might benefit or suffer from the attention given to a different part of the system;

7. competition among subsystems, proficiency dimensions, and language elements, in that two or more of these will be competing for the same limited resources and so for the limited duration of this study, these may see differing amounts of “air time”;
8. no linguistic rigor mortis — even if a certain stability were achieved by learners in this study with regards to one aspect of language, I would expect some instability once parameters in the context shift, for example, if the learner’s audience changes.

## DATA ANALYSES

From a complex systems perspective, I needed to be concerned with both macro- and micro-level perspectives. At the macro-level, I used quantitative measures to see in a general way how the system changes and organizes over time. At the micro-level, I examined learner performance from a qualitative standpoint, concerned with the details of how the use of language changes to yield new performances.

### Quantitative

Measures calculated for all five participants’ written stories were fluency (average number of words per t-unit, a t-unit being a minimal terminal unit or independent clause with whatever dependent clauses, phrases, and words are attached to or embedded within it), grammatical complexity (average number of clauses per t-unit), accuracy (the proportion of error-free t-units to t-units), and vocabulary complexity (a sophisticated type-token ratio — word types per square root of two times the words — that takes the length of the sample into account to avoid the problem that regular type-token ratios are affected by length (Ellis & Barkhuizen, 2005). These indices have been determined to be best measures of second language development in writing (see, for example, Larsen-Freeman & Strom, 1977; Wolfe-Quintero *et al.*, 1998).

### Qualitative

Both the written and the oral narratives were analyzed into “idea units”, mostly full clauses, “a message segment consisting of a topic and comment that is separated from contiguous units syntactically or intonationally” (Ellis & Barkhuizen, 2005: 154). Arraying the corresponding idea units side by side for each telling of the story reveals how the narrative is constructed each time

and how it differs over time.<sup>4</sup> In order to allow for comparability, the most syntactically succinct idea unit was entered into the table first, and then the other idea units were mapped against this one. This means that the succinct anchor unit in one telling of the story might be realized as several idea units in another version of the narrative; nonetheless, the single idea unit and the multiple idea units were entered side by side in single rows of the table in order to facilitate comparability. Two researchers divided the data into idea units. While inter-rater reliability was not calculated, any differences were discussed and reconciled.

Of course, sometimes the idea in an idea unit is not conveyed from one telling to the next. When this occurs, there are open cells. At other times, the same idea unit is present, but it is not told in exactly the same chronological order from one telling to the next, making it difficult to align and compare idea units. Fortunately, in this particular set of data, this did not occur very often, and when it did, the cells next to the discontinuous idea units were left empty. Despite these difficulties, arraying the data in this way shows how participants use their linguistic resources at one time and how they are employed differently over time.

## RESULTS

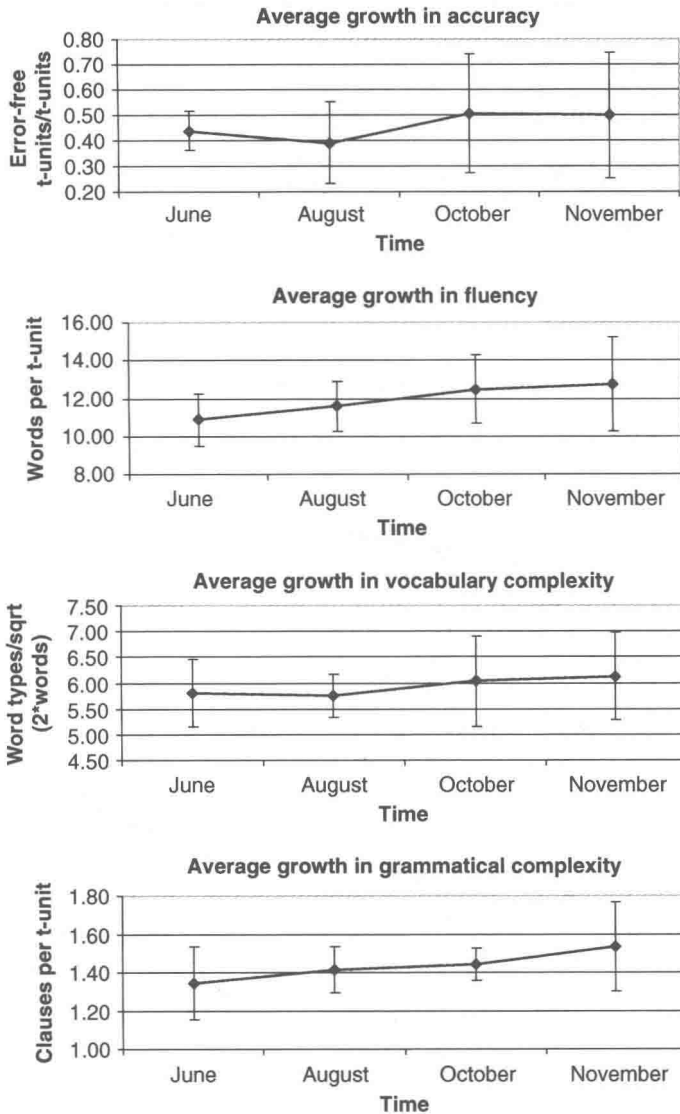
### Quantitative

Foreign language teachers and learners can take heart. Group averages on the four measures, shown in Figure 1, indicate that learners are making improvements in each. Over the six-month period of this study, participants are writing more fluently and accurately, and their writing has become more complex in grammar and in vocabulary. Of course, it is well known that group averages can conceal a great deal of variability, which can be seen by the standard deviations mapped onto Figure 1.

Viewing the data in this way shows that averaging group data as I have done has its limitations. Group data may often describe a process, or a functional relation, that has no validity for any individual (Sidman, 1960). Thus, if we were to disaggregate the data, we would see a rather different picture.

#### *Interindividual variability*

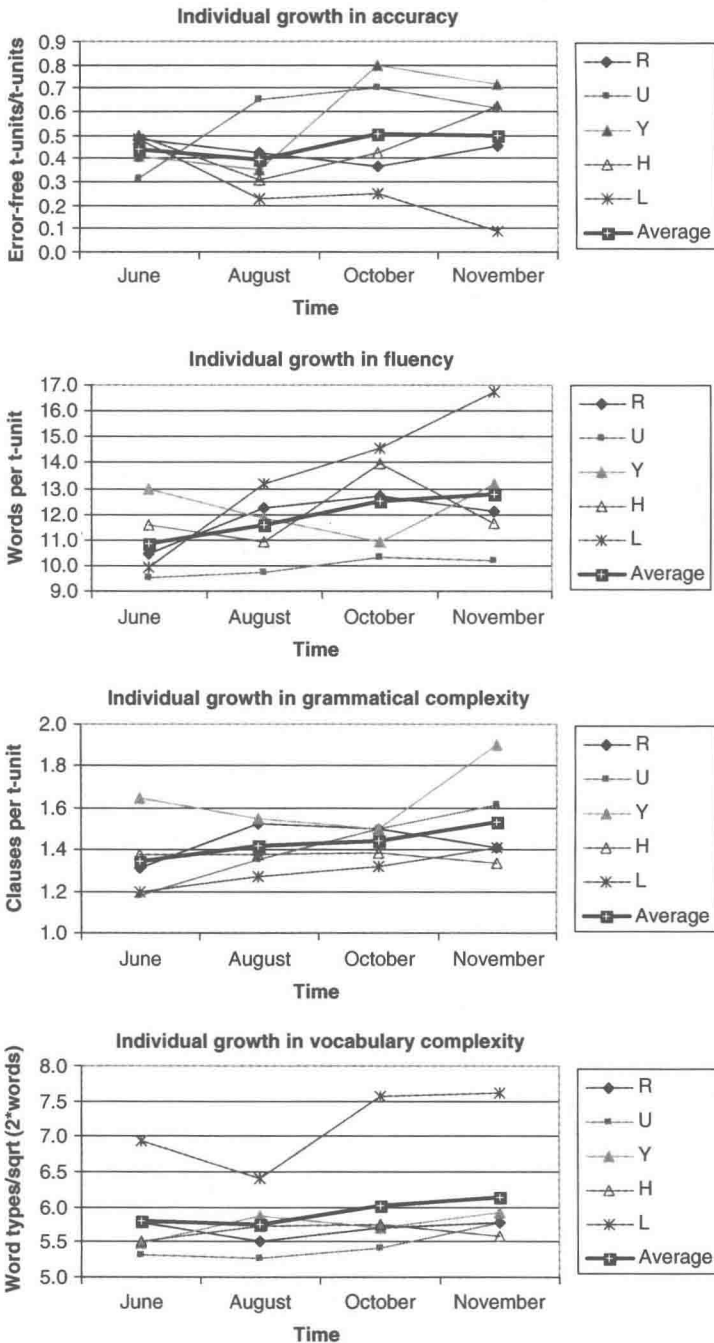
Interindividual variability is clearly reflected in the different trajectories in Figure 2. Whereas group averages can be represented by a more or less

Figure 1: Group averages ( $\pm 1$  SD) over time on four indices using written data

smoothly ascending curve, some individual performances regress and progress, and others remain somewhat unchanged over time.

The graphs in Figure 2 show that the assumption of progressive conformity to target language norms does not pertain. In its place, we see that different participants are following different routes to SLA. Even in L1 acquisition, of course, this is the case.

**Figure 2: Interindividual variation over time and the average for five participants on four indices using written data**



Although [developmental milestones] may characterize the timing and sequence of events *on the average* (“the modal child”; Fenson *et al.*, 1994: 1), the reality is that there is massive variation in both *when and how* children move through these important language milestones. (Marchman & Thal, 2005: 145)

Such variation is only magnified in SLA, where there is an influential L1, not to mention a cognitive and experiential maturity on the part of learners that affect the process. Thus, although it could be said that the learners were exposed to similar instructional procedures during the course of this study, they actually exhibit diverging patterns of development, due perhaps to the way that individuals have chosen to allocate their limited resources.

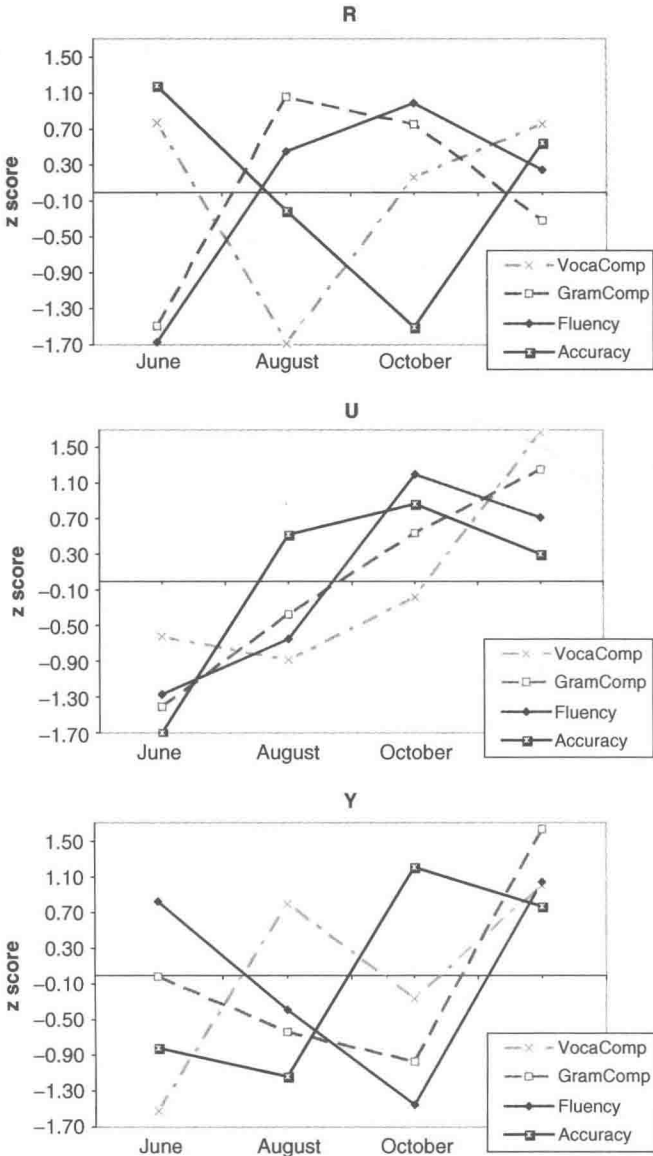
#### *Intraindividual variability*

Traditionally, intraindividual variability was seen as a form of measurement error. However, from a complex dynamic systems approach, intraindividual variability is an important source of information about the underlying developmental process (van Geert & Steenbeek, 2005b; Bassano & van Geert, unpublished manuscript).

To highlight the intraindividual differences at differing data collection points, let me display the data collected for this present study from yet another vantage point. This time, I show each subject’s performance on the written version of the story over time, transforming the performance measures to z-scores in order to ensure the comparability across the four indices of fluency, grammatical complexity, vocabulary complexity, and accuracy (Figure 3). Averaged data may obscure individual differences, but averaged data within the individual, on the other hand, do at least provide a true description of the behavior of the individual within the limits of the measure employed (Sidman, 1960).

Clearly, viewing the learner profiles this way shows the distinctive orientations and paths that learners exhibit over time. However, although there is intraindividual variability from one time to the next, it is also possible to identify attractors or preferred paths within individual performances. This can best be seen by mapping the performance of the five participants on two of the indices. When grammatical complexity is plotted against vocabulary complexity (Figure 4), for example, it is clear that subject L has focused on vocabulary complexity (whether consciously or not) while all the others were doing the same with grammatical complexity, although meeting with varying degrees of success. Plotting fluency against grammatical complexity (Figure 5) shows

**Figure 3: Intraindividual variation over time for five participants on four indices using written data**



that participant L improved in fluency, subject U made more gains in grammatical complexity, and the others fell somewhere between.

Thus, L, a 27-year-old with a master's degree in biology earned in the PRC, has improved in what might be called an expressive dimension



Figure 3: Continued

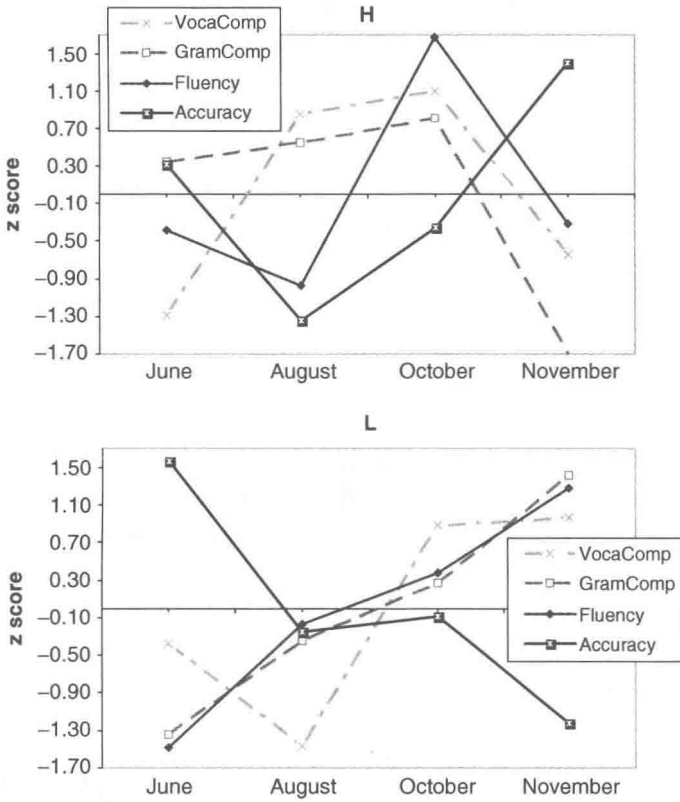
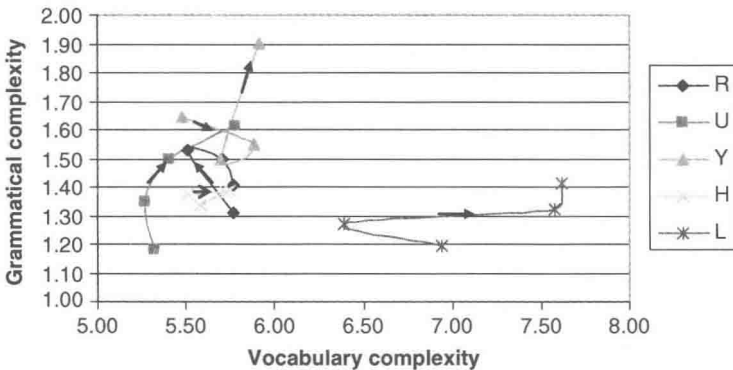
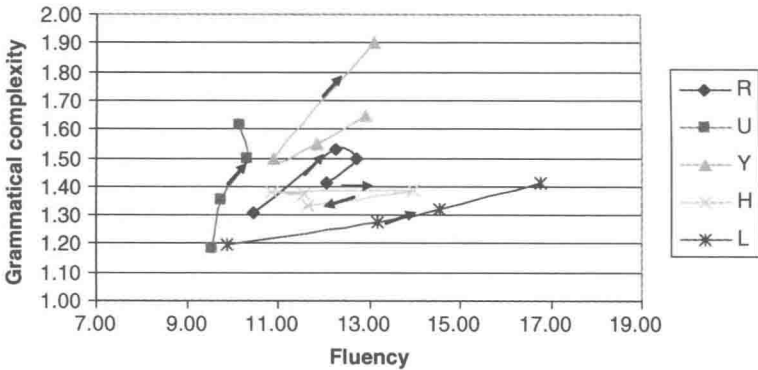


Figure 4: Change of grammatical complexity compared with vocabulary complexity for five participants using written data



**Figure 5: Change of fluency compared with grammatical complexity for five participants using written data**



(fluency and vocabulary complexity), whereas subject U, a 37-year-old engineer, appears to have developed in grammatical complexity, while her level of expressiveness — fluency and vocabulary complexity — have remained rather unchanged.

In sum, the quantitative analyses reveal that while overall the group is making progress, at least if progress is defined as becoming more fluent, accurate, and complex from a target-language perspective, each member of the group is following a somewhat different path.

Since this study is exploratory, I decided to borrow techniques from L1 researchers and display these same data from other perspectives. Although no significant gains were made between data collection points (an unsurprising finding), it was interesting, nevertheless, to calculate the *rate of change* over time. This is calculated by setting the first data collection point (i.e. June) as the baseline, with a value of 0. The rate of change is then calculated by taking the difference between the next point (here August) and the previous point and dividing it by the previous data point. For example, as can be seen in Figure 2, U's accuracy score in June is 0.32. In August, it is 0.65, so the rate of change is  $(0.65-0.32)/0.32 = 1.04$ , which is plotted as the second data point in the graph, that is for August. The results can be seen in Figure 6.

It seems, therefore, that the rate of change fluctuates for different participants at different times. Figure 6 also reveals that the largest rate change occurs for accuracy. This sensitivity could be due to many factors, such as the fact that the participants were receiving language instruction, their differential valuing of accuracy over fluency and complexity, etc. It is

**Figure 6: Rate of change on four indices for five participants over time using written data**

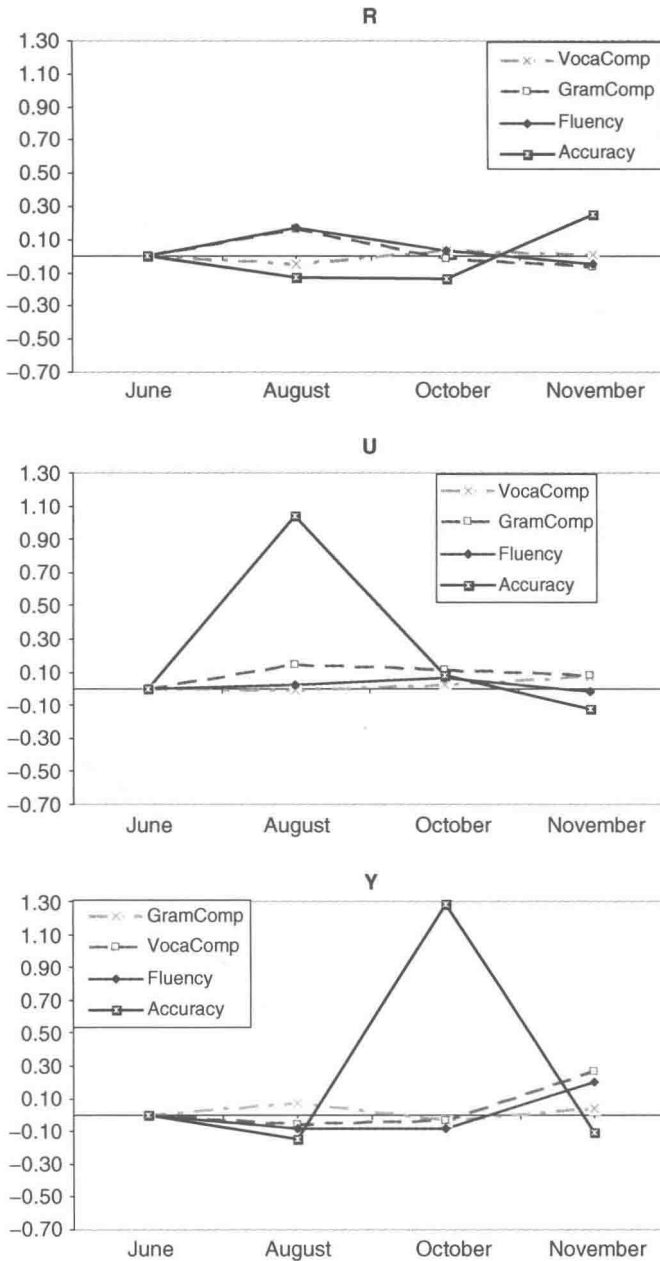
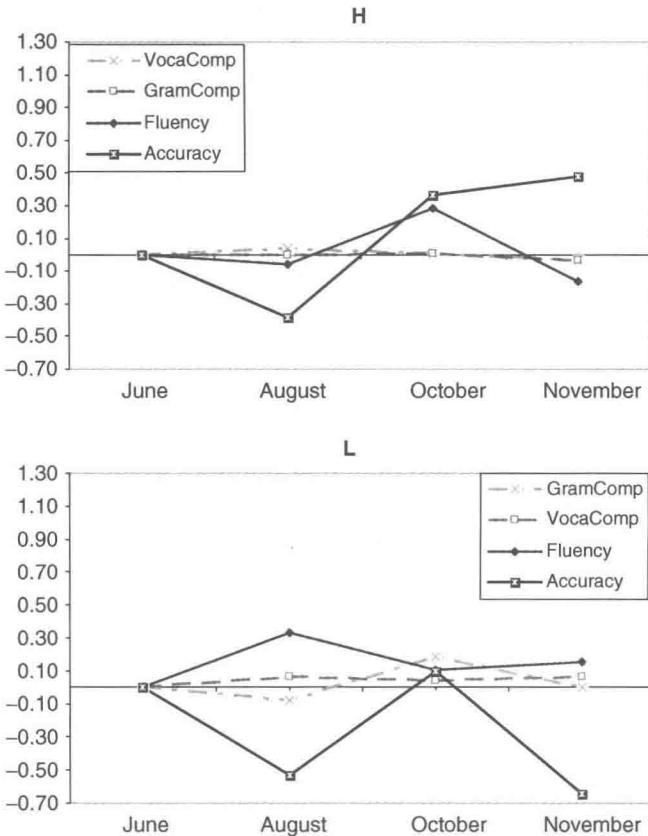


Figure 6: Continued



also possible that measures of fluency and complexity show less change, perhaps because these speakers are close to asymptote in the development in these dimensions. With children acquiring their L1, on the other hand, we might obtain an entirely different picture, with vocabulary and grammatical complexity growing more rapidly.

### Qualitative

Space will not permit a comprehensive analysis of the qualitative data; therefore, I will draw selectively on the data to illustrate the approach and to call attention to certain language performance features that one would expect to find, given a complex systems approach.

The first set of data comes from R, a 28-year-old Chinese speaker who has lived in the United States for two years. She has earned a bachelor's

degree in mathematics from a university in the PRC and a master's degree in statistics from a university in the USA. Table 1 contains the first nine idea units from her written story, reproduced from handwritten versions of the story and arrayed in tabular form to facilitate comparisons. All features of the original, including misspellings, have been preserved.

**Table 1: Participant R — Written story data at four times (first nine idea units)**

	June	August	October	November
1		Five years ago, my husband came to the U. S to persue his Ph. D. degree,	Five years ago, my husband went to the United State to pursue his doctoral degree.	More than five years ago, I followed my husband's step to pursue Ph.D. degree in physics,
2	On Septemper 30th, 1999, I came to the United States by myself.	then after two months, I also came to meet him.	Two months later, I followed him to get here.	so I had to company him overseas.
3				However, I did not want to live here because of my poor English.
4	I was so excited when I saw my husband who was waiting for me on the exit gate in the airport.	When I saw my husband at the airport, I was so excited.	When I saw him at the airport, I was very excited, because we would begin our new live in the new land.	
5			Before we left our country, my husband had already made a plan for me.	Before we came here, my husband and I discussed about my future.
6			The plan was that I passed the TOEFL first, then attend a graduate school.	He wanted me to take the TOEFL so that I could apply for a graduate school.
7				Then I looked for a job with master's degree.

(continued)

	June	August	October	November
8			I didn't like this plan actually, since I was not good at English.	I told him that it would be very hard for me;
9				However, he wished I could do it as what he said.

The most salient difference is that the October and November written narratives contain idea units that are absent in the June and August versions. Another salient difference is in the time line of the narrative, with the October and November stories having a more complex time line and point of view from that of earlier versions. The more complex time line shows clearly in idea units #5 and #6, where the narrator is at a time now, looking back beyond “we left our country”, which was five years ago. Notice the accurate and meaningful use of the past perfect in #5 in October. It is made clear that from that point in past time, there was a future plan, which included taking the TOEFL and attending graduate school. The use of “would” in idea unit #8 for the November story reflects a sophisticated use of a modal to look to the future from the past, and there are other such usages throughout the October and November stories.

Clearly, if morphosyntactic sophistication were the sole criterion of success, then R is making progress. However, there are other interesting changes going on as well, perhaps best appreciated by adopting a more emic perspective. When one does, one also sees a shift in the way that R chooses to orient herself with regard to her husband and to how she reports the circumstances in the story. For instance, the data in R's narrative reveal a deictic shift in the choice of the verb from the country of current residence (“came”) to the country of origin (“went”). Notice, too, that the orientation that is adopted is maintained fairly consistently within a story. For instance, in October, when “went” is used in idea unit #1, China as the reference point is maintained in idea unit #5, “Before we left our country ...”. This contrasts with the perspective in the story told in November, where the story teller says “Before we came here ...”.

Interestingly, there is also a shift in subjectivity in idea unit #1 (from “My husband” as agent in August and October to “I followed my husband ...” in November). Later, in idea unit #5, the way the story is portrayed shifts from R's husband having made a plan for her (October) to her and

her husband discussing her future together (November). Given that this is a story-telling task, where the teacher is the intended reader, R may be using language to gain the approbation of the teacher by granting herself a greater role in determining her future with successive iterations of the tale.

There are other segments of idea units that persevere from one telling to the next. For instance, the opening time phrase (“Five years ago”) in idea unit #1 is identical in August and October, and slightly altered in November (“More than five years ago”). Then, too, in idea unit #4, notice the use of the same clauses “I was so excited” and “when I saw my husband”, although their sequence differs, appropriately so, given the need to maintain the theme-rheme relationship with the preceding clause in idea unit #2.

It is probably worth mentioning at this point that the differences that I am calling attention to are variegated — morphemes, words, phrases, clauses, partial utterances, abstract semantic categories, etc. — as there is no way to know which, if any, of these are psychologically real units for the learner (Tomasello, 2000). We should not therefore limit ourselves to analyzing learner language into conventional linguistic units of one type (although admittedly it is difficult to resist doing so) assuming that learners’ units are isomorphic with those of linguists.

**Table 2: Participant Y — Written story data at four times (first five idea units)**

	June	August	October	November
1	My husband and I had been dating for 5 years before we decided to get married.	My husband and I had been dating for 4 years before we decided to get married.	My husband and I had been dating for about 4 years before we decided to get married.	My husband and I had been dating for four years before we decided to marry.
2		At that time, we were both students and didn't have much money.	At that time, we were both students, and didn't have much money.	We were both students then, so we didn't have much money and tried to save every penny for our marriage.
3			We didn't want to spend money on Cab.	

(continued)

	June	August	October	November
4	I remember the day we went to apply marriage certificate was terrible cold.	I remember the day when we went to apply marriage licence was terrible cold.		I still remember the day when we went to apply marriage certificate was terrible chilly,
5	My husband and I rode bikes for a half hour to the office issuing marriage certificate.	The office was about an hour of biking away. We decided to get there by bike.	Even though the office that issued marriage license was an hour away, we still decided to ride bicycles.	the office was one hour away. We rode our bike to the office anyway

Another pattern prevalent in SLA is the appearance in performance data of an ephemeral language form, which may be an L1 or L2 form or which may differ from both the L1 and the L2. What follows are possible examples of both types of variation in the first five idea units in the written story of learner, Y, a 31-year-old accountant (Table 2).

The motivation for the shift from “get married” in idea unit #1 in the June, August, and October versions of the story to “marry” in the November story is not clear as both forms are acceptable in the L2. However, perhaps the shift in idea unit #2 from “many money”, a form not found in the L1 or the L2, to “much money” between the August and October versions of the story can be said to represent a reorganization of the system. For one thing, “much money” is used again in December.

Further evidence of this being the result of an internal restructuring comes from examining the same idea unit #2 in the oral data. Notice that “many money” is used in the first two versions of the story, consistent with the written version of the story. Then, just as with the written version, in the oral versions of the story told in November and December, Y uses the target phrase “much money” (Table 3).

Other differences over time (although not always the motivation for them) can be easily seen, but space will not permit a detailed account of them. As for using language for social action, it is interesting to note that in the oral renditions of the story in October and November, Y frames the genre for the listener in idea unit #1. She says, “My story is about ...” in October, and “I am gonna tell ...” in November. Perhaps Y is motivated to do so in an attempt to increase intersubjectivity with the audience (the teacher) who is present in the immediate spatial and temporal context.



**Table 3: Participant Y — Oral story data at four times (first four idea units)**

	June	August	October	November
1	My husband and I had been dating for 5 years before we decided to get married.	My husband and I had been dating before we decided to get married.	My story is about how my husband and I got our marriage certificate for about four years before we decided to get married.	Today, I'm gonna to tell story about how I got my marriage certificate. My husband and I had been dating for 4 years before we decided to get married.
2	Because at that time we were both students so we were pretty poor without many money.	At that time, we were both students so we were poor and didn't have many money.	At that time, were both students, so we didn't have too much money and wanted to save every penny.	At that time we were both students. We didn't have much money so we tried to save every penny.
3	I remember the day when we went to apply marriage certificate. Was a terrible cold.	I remembered when we went to the government office to apply our marriage license it was winter and it was terrible cold.	I remember it was winter when we went to apply marriage certificate.	I remember it was winter when we decided to apply for the marriage certificate.
4	So we ride a bicycle for half hour to get the office ...	Because we didn't want to spend money on cab we decided to ride bike to the office.	The office was about one hour away from our place and my husband and I rode bike to there, because we didn't want to spend money on a cab.	The office was about one hour from our place. We rode our bikes to there because we didn't want to spend money on cab.

**Table 4: Participant U — Written story data at four times (first idea unit)**

	June	August	October	November
1	Two years ago, I lived <b>in</b> Detroit.	Two years ago, I lived <b>at</b> Detroit.	I lived <b>in</b> Detroit two years ago.	When I came to the U. S. A three years ago, I lived <b>at</b> Detroit.

**Table 5: Participant U — Oral story data at four times (first idea unit)**

	June	August	October	November
1	Two years ago, I lived <b>at</b> Detroit ...	When I came to United States three years ago I lived <b>in</b> Detroit.	Three years ago I came to the United State and I lived <b>in</b> Detroit.	When I came to the United States I lived <b>at</b> Detroit.

In any event, it is easy to see other differences among the different versions of the story. What one would like to know as an applied linguist is if any of this variation is indicative of the bifurcations that signal the instability alluded to earlier, the instability that precedes a phase shift in the system. It is here where a pedagogical intervention might be optimal. This may be especially true when the variation that is taking place within a short period of time (i.e. within the three days between the writing and telling of the story) mirrors that over the six months of this study. For instance, the alternation in use of the prepositions “in” and “at” by U, a 37-year-old engineer (Tables 4 and 5), suggests that she might benefit from focused instruction on the difference between using the two prepositions in locative phrases. Such a pattern invites a microgenetic experiment, “where the researcher deliberately facilitates (or even retards) the discovery of ... new ways” of behaving “through coaching, training, practice, or scaffolding support” (Thelen & Corbetta, 2002: 6) to see what effect it has on the system.

Of course, had a successful pedagogic intervention taken place with U, there is no guarantee that it would necessarily work with the other learners. Depending on when it occurs and with whom, a similar intervention can lead to highly diverging patterns of development (de Bot *et al.*, 2005: 14). Teachers know this, and researchers also know this from the many classroom-based SLA studies, such as those using focus-on-form interventions. In any case, the alternation between “in” and “at” illustrates the “effect of competition between sometimes deeply entrenched rivals” (Sharwood Smith & Truscott, 2005: 237), such as that that obtains here where the native language does not make the distinction at all.

I will use an image from Chaos/Complexity Theory, that of a fractal, to make one final point. A fractal is a geometric figure that exhibits self-similarity at different levels of scale or magnifications. One important dimension of the self-similarity is that it suggests that even when things appear to be static at one level, there may be continuous dynamics within the

system at another level, just as we might not see a tree growing if we watch it, even for a long time, yet we know, in fact, that at another level of scale, there is a great deal of growth taking place. It is clear that across participants in this study “in” and “at” are in competition, and no growth seems to be taking place. This is true also at the individual level over time. At least for U, there appears to be a bi-modal attractor (Bassano & van Geert, unpublished manuscript) operating, with “in” dominating at one time, giving way to a dominant “at” at another time. However, when we take the level of magnification one level lower, to one subject at a single point in time, we see that the system is not as fixed as it might seem. What might at first be called free variation, with “in” and “at” competing for “air time”, lessens when we examine the instances of “in” and “at” one by one. There still is some variation that is not easily explicable; for instance, in June, U uses “in Detroit” in writing twice, but “at Detroit” in speech once. From a target-centric perspective, she also incorrectly puts “in” in the phrase “in that celebration” in June. However, in this same month, U uses “in” correctly when it is in a fixed phrase. She says “keep in touch”, at one point in the oral telling of her story. Also, when she uses “at” correctly in June, she does so where there could be no other logically semantic alternative, that is she says “sit down at a table” and “stared at me”. “In” simply would not work semantically in these contexts, although here again, these two might also have been learned as fixed forms (i.e. the co-occurrences of verb+preposition), instead of through any sort of semantic generalization. What this approach does show is that U has some pieces that might allow her to build toward a more target-like system. It also shows what insights can be obtained by careful analysis at different levels of magnification, including at the level of individual performance over time of the sort that Bardovi-Harlig (2000) has done with the English tense-aspect system.

## DISCUSSION

The eight expectations I laid out earlier were all met. When the quantitative data were averaged and plotted on graphs for the five participants in this study, the graphs showed curves over time that differed from those of individuals. It is not uncommon in SLA to compare macro-level group averages at different points in time, and if reliable differences are found in mean levels of performance, to conclude that development has occurred. The micro-level description of the individual’s development is not always addressed. We have seen from the graphs in this study that it is necessary

to ask if individual participants follow the same developmental pathway as does the group. Although cross-sectional research can be useful in helping to define the tightness of the constraints on the process and in terms of group development, in a dynamic or complex systems developmental approach, one must also view the “individual and his or her behavioral changes over time” (Thelen & Smith, 1994: 97–98).<sup>5</sup>

Of course, using a time-series design with participants who speak the same L1 and are at roughly the same language proficiency, as I have done here, is not new to SLA research. It is clear, though, that cross-sectional and case study research are complementary. The former can only give us a picture of the “grand sweep of development” where global structure and similarities across participants can be seen. We need, in addition, to take in “a view from below” where the “messy little details” lie. It is by looking at these that we see that behavior is variable and context dependent (van Dijk cited in de Bot *et al.*, 2007). Further, “it is very well possible that if we look close enough that the general developmental stages individuals go through are much less similar than we have assumed so far” (de Bot *et al.*, 2005: 24), and may, instead of being governed by rules, be “pastiche of various kinds of item-based constructions” (Tomasello, 2000: 76).

Whether or not the messy little details, the continuities and discontinuities, are indicative of lasting development is, of course, unclear.<sup>6</sup> The differences might be due to a range of factors other than learning, for example the fading of memory of the previous story, recent language experiences that influence the narrator’s telling, changing opinions of the events as time passes, etc. Still, a traditional way of looking at improved learner performance on repeated tasks is to say that a learner is increasingly able to perform his or her competence, whereas the approach that I am putting forward in this chapter argues for a dynamic view of performance/competence. If a student shows improvement on a particular task over time, then what we can say is that the student has developed greater language resources with which to accomplish the task. The important question remains, of course, as to whether improvement on a task can be generalized to other language use situations. The point not to be missed, however, is that from the vantage point of a complex systems approach, improved performance is not merely a question of a learner’s enhanced access to his or her steady-state competence. A learner/user’s language resources (competence, if you must) change synchronously with their use.

In addition, I have speculated that some of the variation can be

attributed to (social) factors outside the linguistic system and some to internal restructuring of the system.<sup>7</sup> As an example of the former, I pointed out how R's report of her own agency in the development of future plans increased from one telling of her story to the next. As for the latter, there may be little apparent change in interlanguage, until one day, given sufficient probabilistic input, the system spontaneously self-organizes (as we saw with "many" changing to "much"), and under certain conditions, may even enter attractor states never before experienced. One of the tenets of this approach is that it is at the bifurcations or discontinuities, when the process is relatively unstable or chaotic, that the organism is free to explore new behaviors in response to task demands. Indeed, it is the flexibility to discover new solutions that is the source of novel forms (Thelen, 1995). However, the system may self-organize with respect to one area of language only. "Presumably there are oscillating cycles of lesser and greater chaos going on elsewhere in the system" (Larsen-Freeman, 1997: 151), and "extended periods where alternative forms exist side by side" (Sharwood Smith & Truscott, 2005: 237) as we saw with the alternation in use of "at" and "in".

How the variability and specific adaptations of "make-do" solutions at one time lead to the instability and stability of over-time development is of course the central concern of SLA and will remain so. But to study this, we will need individual micro-developmental studies, which seek to understand the mechanisms by which learners "forgo old ways of behaving and adapt new ones" (Thelen & Corbetta, 2002: 60). Micro-development studies require much denser data collection intervals than I have managed here. From these micro-developmental studies, one would also hope that both functional or unsupported performances, as I report on here, could be compared with optimal performances such as those that are scaffolded by others. Indeed, Fischer and Yan (2002) maintain that it is the discontinuities in optimal performance that are true indicators of "stage-like" changes (see, for example, Lantolf & Poehner, 2004 on dynamic assessment).

## CONCLUSION

I have presented a different view concerning what language is and how SLA transpires, a view which I believe will make an important contribution to applied linguistics. For one thing, a structural theory of static competence

does not easily lend itself to explanations of developmental change.

Within the framework of structural theory, developmental studies have the following typical form: older and younger children are tested in a task and the mean performances at the two age levels are calculated. The typical finding is that younger children perform less well than older children. These mean differences in performance are considered to be the developmental facts to be explained. There are other kinds of data that *could* be the principal data of developmental psychology — the trajectories of change of individual children ... or the magnitude of between-subject variability and changes in that variability with task and age ... However, these sorts of data are not the relevant data for structural theorists to find the global order — the common structure — that transcends individual uses of presumed knowledge structure. (Smith & Thelen, 1993: 155)

I have argued that we need a more dynamic view of language and of its learning. We need to look at the “messy little details” that make up the “here and now” of real time. We need to take into account learners’ goals and intentions. We need to consider the tasks that we ask them to perform and to consider each performance anew — stable and predictable in part, but at the same time, variable, flexible, and dynamically adapted to fit the situation. The messiness is not “noise”, but rather a natural part of dynamically emergent behavior assembled by the individual with a dynamic history of engaging in such tasks, with his or her own self-identified (or jointly identified) target of opportunities for growth. And, we likely need the tools of multivariate analysis to help us sort all this out. It should be noted in closing that many of the phenomena that I have called attention to in this exploratory study have been attested to as characteristic of interlanguage systems previously. It could, therefore, legitimately be asked if the tools and perspective that I have brought to bear on these data yield any significant new results. A more important question at this point, however, might be to ask if viewing language and its learning in this way allows us to understand SLA in a different, more compelling and potentially more fruitful way. If so, applied linguists may soon find ourselves explaining SLA in the following way:

Patterns in interlanguage emerge from the complexity and frequency<sup>8</sup> in the L1 and L2 and their energetic status, shaped by individual learner orientations and contextual variables. As such, no particular subsystem of language has a priori priority, and no dimension of language proficiency has a priori privilege “since it is the particular coalition of elements [and dimensions] from which the coherence arises”(Thelen & Bates, 2003:

381). The patterns are variegated, and “softly assembled”, that is the product of dynamic adaptation to a specific context (Tucker & Hirsch-Pasek, 1993). They are “created and dissolved as tasks and environments change” (Thelen & Bates, 2003: 381). Some patterns are preferred; others are more ephemeral. Thus, developmental change seems “not so much the stage-like progression of new accomplishments as the waxing and waning of patterns, some stable and adaptive and others fleeting and seen only under special conditions” (Thelen & Bates, 2003: 380).

Intrinsic to this view is the idea that individual developmental paths, each with all its variation, may be quite different from one another, even though in a “grand sweep” view these developmental paths are quite similar. I will let Marchman and Thal (2005) make the point that:

language learning can be viewed as a complex and dynamic process in which various components emerge at various levels, to various degrees, and at various times. Individual differences are a natural consequence of learning within such a framework because of the dynamic and multi-faceted nature of the emergent system. Slight differences in the relative rate, strength, or timing (chronotopic constraints) of the component achievements can result in relatively significant differences between individuals in behavioral outcomes ... Instead, from an emergentist view, children differ in language learning skill not because of domain-specific knowledge that they either have or don't have, but because of variations in how and when the pieces of the process were *put together* during learning. (Marchman & Thal, 2005: 150)

Therefore, it seems to me, as Alton Becker (1996), in his impressive collection of essays, has written:

If we are interested in language in full context — real language — we must take care not to exclude the individual voice, which is the only place where self-correction, that is, change, happens — where the living organism interacts with the environment. (Becker, 1996: 300)

I will call upon two women, Liz Bates and Esther Thelen, whom, sadly, we have lost recently, but who had been so helpful in giving me the language to express emergentist assumptions, to have the final word:

Every new state depends on the states that preceded it ... the ideas of “soft-assembly” and historical contingency offer a way of conceptualizing both the global and universal changes in development as well as the local, variable, and individual pathways. (Thelen & Bates, 2003: 382)

## Notes

1. With regard to this last point, I note that from the genesis of the field of second language acquisition, the study of SLA was to: (1) account for the acquisition process, and (2) account for the differential success of learners (Hatch, 1974). These two foci have been widely interpreted by the research community as constituting two separate research agendas.
2. I should acknowledge that much of my earlier work was conducted from the developmental ladder perspective, and it has only been during the last decade or so, since discovering chaos/complexity/dynamic systems theories that my thinking has been transformed.
3. Roger Brown, whose research in first language acquisition provided the impetus for much initial SLA work, observed that in L1 acquisition, “the learning involved must be conceived of as generally gradual change in a set of probabilities rather than the sudden acquisition of general rules (1973: 388). Nonetheless, he reported his findings as a criterion-driven series of stages” (Berdan, 1996: 237).
4. I thank Lynne Cameron for suggesting this approach. Let me also acknowledge Agnieszka Kowaluk’s assistance with data collection and transcription, Jinyun Ke’s contribution to the figures, and Nick Ellis and two anonymous reviewers for their helpful comments on an earlier draft of this chapter.
5. I suppose that socio-cultural theorists would make that case for the unit of analysis being the individual interacting with others.
6. Presumably, multivariate analyses will help us sort this out (Tarone, personal communication).
7. Of course it is not the case either that variability has been ignored in SLA development; researchers operating from a sociolinguistic point of view have accorded it important theoretical status all along (e.g. Tarone, 1988; R. Ellis, 1987; Young, 1991), although some (e.g. R. Ellis, 1985) have called it a problem.
8. See, for example, Larsen-Freeman, 1976; N. Ellis, 2002.

## References

- Atkinson, D. (2002). Toward a sociocognitive approach to second language acquisition. *The Modern Language Journal*, 86: 525–545.
- Bardovi-Harlig, K. (2000). *Tense and Aspect in Second Language Acquisition: Form, Meaning, and Use* (Language Learning Monograph Series). Oxford: Blackwell.
- Bassano, D. & P. van Geert. (Unpublished manuscript). Modeling continuity and discontinuity in utterance length: A quantitative approach to changes, transitions,



- and intra-individual variability in early grammatical development.
- Becker, A. (1996). *Beyond Translation*. Ann Arbor, MI: University of Michigan Press.
- Berdan, R. (1996). Disentangling language acquisition from language variation. In D. Preston & R. Bayley (Eds.), *Second Language Acquisition and Linguistic Variation*. Amsterdam/Philadelphia: John Benjamins Publishing Company.
- Bley-Vroman, R. (1983). The comparative fallacy in interlanguage studies: The case of systematicity. *Language Learning*, 33: 1–17.
- Brown, R. (1973). *A First Language*. Cambridge, MA: Harvard University Press.
- Bygate, M. (2001). Effects of task repetition on the structure and control of oral language. In M. Bygate, P. Skehan & M. Swain (Eds.), *Researching Pedagogic Tasks*. Harlow: Longman.
- Cameron, L. & A. Deignan. (2006). The emergence of metaphor in discourse. *Applied Linguistics*, 27(4): 590–619.
- Clark, A. (1997). *Being There: Putting Brain, Body and World Together Again*. Cambridge: MIT Press.
- Cook, V. (2002). *Portraits of the L2 User*. Clevedon: Multilingual Matters.
- de Bot, K., W. Lowie & M. Verspoor. (2005). *Second Language Acquisition: An Advanced Resource Book*. Abingdon: Routledge.
- de Bot, K., W. Lowie & M. Verspoor. (2007). A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and Cognition*, 10(1): 7–21.
- Donato, R. (2000). Sociocultural contributions to understanding the foreign and second language classrooms. In J. Lantolf (Ed.), *Sociocultural Theory and Second Language Learning*. Oxford: Oxford University Press.
- Ellis, N. (2002). Frequency effects in language processing: A review with implications for theories of implicit and explicit language acquisition. *Studies in Second Language Acquisition*, 24: 143–188.
- Ellis, R. (1985). Sources of variability in interlanguage. *Applied Linguistics*, 6: 118–131.
- Ellis, R. (1987). Interlanguage variability in narrative discourse: Style shifting in the use of past tense. *Studies in Second Language Acquisition*, 9: 1–20.
- Ellis, R. & G. Barkhuizen. (2005). *Analysing Learner Language*. Oxford: Oxford University Press.
- Firth, A. & J. Wagner. (1997). On discourse, communication, and (some) fundamental concepts in SLA research. *The Modern Language Journal*, 81: 285–300.
- Fischer, K. & Z. Yan. (2002). Darwin's construction of the theory of evolution: Microdevelopment and explanations of variation and change in species. In N. Granott & J. Parziale (Eds.), *Microdevelopment: Transition Processes in Learning and Development*. Cambridge: Cambridge University Press.
- Fischer, K., Z. Yan & J. Stewart. (2003). Adult cognitive development: Dynamics in the developmental web. In J. Valsiner & K. J. Conolly (Eds.), *Handbook of Developmental Psychology*. London: Sage.
- Hatch, E. (1974). Second language learning — Universals? *Working Papers on Bilingualism*, 3: 1–17.

- Huebner, T. (1985). System and variability in interlanguage. *Language Learning*, 35: 141–163.
- Klein, W. (1998). The contribution of second language acquisition research. *Language Learning*, 48: 527–550.
- Lantolf, J. (Ed.). (1994). Sociocultural theory and second language learning. *The Modern Language Journal*, 78(4), (Special Issue).
- Lantolf, J. & M. Poehner. (2004). Dynamic assessment in the language classroom. CALPER Professional Development Document (CPDD) 0411.
- Larsen-Freeman, D. (1976). An explanation for the morpheme acquisition order of second language acquisition. *Language Learning*, 26: 125–134.
- Larsen-Freeman, D. (1985). State of the art on input in second language acquisition. In S. Gass & C. Madden (Eds.), *Input in Second Language Acquisition*. Rowley, MA: Newbury House.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18: 141–165.
- Larsen-Freeman, D. (2002). Language acquisition and language use from a chaos/complexity theory perspective. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization*. London: Continuum.
- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Grammaticing*. Boston: Heinle/Thomson.
- Larsen-Freeman, D. (2005). Second language acquisition and the issue of fossilization: There is no end, and there is no state. In Z.-H. Han & T. Odlin (Eds.), *Studies of Fossilization in Second Language Acquisition*. Clevedon: Multilingual Matters.
- Larsen-Freeman, D. & V. Strom. (1977). The construction of a second language acquisition index of development. *Language Learning*, 27: 123–134.
- Larsen-Freeman, D. & L. Cameron. (2008). *Complex Systems and Applied Linguistics*. Oxford: Oxford University Press.
- Leather, J. & J. van Dam. (2003). *Towards an Ecology of Language Acquisition*. Dordrecht: Kluwer Academic Publishers.
- Lemke, J. (2000). Across the scales of time: Artifacts, activities, and meanings in ecosocial systems. *Mind, Culture and Activity*, 7: 273–290.
- Lewontin, R. (2000). *The Triple Helix: Gene, Organism, and Environment*. Cambridge, MA: Harvard University Press.
- MacWhinney, B. (1999). The emergence of language from embodiment. In B. MacWhinney (Ed.), *The Emergence of Language*. Mahwah, NJ: Lawrence Erlbaum.
- Marchman, V. & E. Bates. (1994). Continuity in lexical and morphological development: A test of the critical mass hypothesis. *Journal of Child Language*, 21: 339–366.
- Marchman, V. & D. Thal. (2005). Words and grammar. In M. Tomasello & D. Slobin (Eds.), *Beyond Nature-Nurture: Essays in Honor of Elizabeth Bates*. Mahwah, NJ: Lawrence Erlbaum Associates.
- McLaughlin, B. (1990). Restructuring. *Applied Linguistics*, 11: 113–128.

- Percival, I. (1993). Chaos: A science for the real world. In N. Hall (Ed.), *Exploring Chaos: A Guide to the New Science of Disorder*. New York: Norton and Company.
- Pienemann, M. (1998). *Language Processing and Second Language Development*. Amsterdam/Philadelphia: John Benjamins Publishing Company.
- Robinson, B. & C. Mervis. (1998). Distinguishing early language development: Modeling lexical and grammatical acquisition using an extension of case-study methodology. *Developmental Psychology*, 34: 363–375.
- Robinson, P. (2001). Task complexity, task difficulty, and task production: Exploring interactions in a componential framework. *Applied Linguistics*, 22: 27–57.
- Seidlhofer, B. (2004). Research perspectives on teaching English as a Lingua Franca. *Annual Review of Applied Linguistics*, 24: 209–239.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10: 209–231.
- Sharwood Smith, M. & J. Truscott. (2005). Stages or continua in second language acquisition: A MOGUL solution. *Applied Linguistics*, 26: 219–240.
- Sidman, M. (1960). *Tactics of Scientific Research*. New York: Basic Books, Inc.
- Skehan, P. (1998). *A Cognitive Approach to Language Learning*. Oxford: Oxford University Press.
- Smith, L. & E. Thelen. (Eds.). (1993). *A Dynamic Systems Approach to Development*. Cambridge, MA: MIT Press.
- Stauble, A. & D. Larsen-Freeman. (1978). The use of variable rules in describing the interlanguage of second language learners. *Workpapers in TESL*. University of California, Los Angeles.
- Tarone, E. (1979). Interlanguage as chameleon. *Language Learning*, 29: 181–191.
- Tarone, E. (1988). *Variation in Interlanguage*. London: Edward Arnold.
- Thelen, E. (1995). Time-scale dynamics and the development of an embodied cognition. In R. Port & T. van Gelder (Eds.), *Mind as Motion*. Cambridge, MA: MIT Press.
- Thelen, E. & L. Smith. (1994). *A Dynamic Systems Approach to the Development of Cognition and Action*. Cambridge, MA: MIT Press.
- Thelen, E. & D. Corbetta. (2002). Microdevelopment and dynamic systems: Applications to infant motor development. In N. Granott & J. Parziale (Eds.), *Microdevelopment: Transition Processes in Development and Learning*. Cambridge: Cambridge University Press.
- Thelen, E. & E. Bates. (2003). Connectionism and dynamic systems: Are they really different? *Developmental Science*, 6: 378–391.
- Tomasello, M. (2000). First steps toward a usage-based theory of language acquisition. *Cognitive Linguistics*, 11: 61–82.
- Toolan, M. (2003). An integrational linguistic view. In J. Leather & J. van Dam (Eds.), *Ecology of Language Acquisition*. Dordrecht: Kluwer Academic Publishers.
- Tucker, M. & K. Hirsh-Pasek. (1993). Systems and language: Implications for acquisition. In L. Smith & E. Thelen (Eds.), *A Dynamic Systems Approach to Development: Applications*. Cambridge, MA: MIT Press.

- van Geert, P. (2003). Dynamic systems approaches and modeling of developmental processes. In J. Valsiner & K. J. Conolly (Eds.), *Handbook of Developmental Psychology*. London: Sage.
- van Geert, P. & M. van Dijk. (2002). Focus on variability: New tools to study intra-individual variability in developmental data. *Infant Behavior & Development*, 25: 340–374.
- van Geert, P. & H. Steenbeek. (2005a). A complexity and dynamic systems approach to development assessment, modeling and research. In K. W. Fischer, A. Battro & P. Lena (Eds.), *Mind, Brain, and Education*. Cambridge: Cambridge University Press.
- van Geert, P. & H. Steenbeek. (2005b). Explaining after by before: Basic aspects of a dynamic systems approach to the study of development. *Developmental Review*, 25(3–4): 408–442.
- van Gelder, T. & R. Port. (1995). It's about time: An overview of the dynamical approach to cognition. In R. Port & T. van Gelder (Eds.), *Mind as Motion: Exploration in the Dynamics of Cognition*. MIT Press.
- van Lier, L. (2004). *The Ecology and Semiotics of Language Learning*. Dordrecht: Kluwer Academic Publishers.
- Wolfe-Quintero K., S. Inagaki & H.-Y. Kim. (1998). *Second Language Development in Writing: Measures of Fluency, Accuracy & Complexity*. Honolulu: University of Hawaii Press.
- Young, R. (1991). *Variation in Interlanguage Morphology*. New York: Peter Lang.
- Yuan, F.-Y. & R. Ellis. (2003). The effects of pre-task planning and on-line planning on fluency, complexity and accuracy in L2 monologic and oral production. *Applied Linguistics*, 24(1): 1–27.

## Comment after Chapter 10

It should be clear by now that I had become increasingly intrigued by the new understandings that Chaos/Complexity Theory had afforded me. I also mentioned that I benefit from discussions with colleagues. One of these colleagues was Lynne Cameron, then of Leeds University, UK. Professor Cameron and I had met earlier, but we became reacquainted in Washington, D. C. when we were participating at the Georgetown University Round Table on Language and Linguistics in February 2003. As good fortune would have it (although we didn't think that it was good fortune at the time), a blizzard developed, and we conference participants were unable to leave our hotels due to the deep snow in the streets of Washington. Professor Cameron and I made good use of the extra two days

we were granted by Mother Nature to map out a book, which we later entitled *Complex Systems and Applied Linguistics* (2008).

The next chapter, published in 2007, was an invited preview of our book. As we explain in this chapter, Complexity Theory had its roots in the physical sciences, especially biology, with influence from general systems theory. Chaos Theory had a more mathematical origin. However, these science and math genes have not prevented it from being applied in the social sciences. In fact, what in this article we call a “supra-theory” (in later writings I refer to as a “metatheory”) is meant to convey the idea that the theoretical tenets of Chaos/Complexity Theory can describe behavior and change in a wide variety of systems.

In the book and in the next chapter, we applied the theoretical tenets to language and its evolution, language development, discourse, and the language classroom. In the book, in particular, we discuss what implications these theories hold for research.

## References

- Cameron, L. & D. Larsen-Freeman. (2007). Preview article: Complex systems and applied linguistics. *International Journal of Applied Linguistics*, 17(2): 226-240.
- Larsen-Freeman, D. & L. Cameron, L. (2008). *Complex Systems and Applied Linguistics*. Oxford: Oxford University Press.



## Chapter II

# Preview of *Complex Systems and Applied Linguistics*

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In our daily lives we seem to find it difficult to live with constant change and to need the comfort of routines. We deny the continual change that we experience by turning the living, dynamic world into named objects and thinking about them as fixed entities as river, tree, city or person. We turn our life experiences into stories, and our continually changing selves into sets of more or less fixed attributes, attitudes and identities.

The same preference for an artifice of synchronicity appears in our scholarly work. Change is inherent to most of our concerns as applied linguists, and yet in our theories we everywhere find processes converted into objects. The post-modern response to over-simplification of the world through a focus on entities is to fragment and disperse, to deny wholeness by making it multiple, hybrid and difficult to grasp. Complex systems theory, in contrast, embraces change, focuses on change and makes change central to theory and method.

As a scientific theory, complexity theory is fairly new (although it has roots in earlier general systems theory) and has seen its major development in the biological sciences, where it has supported a growing focus on the dynamics of whole systems. From its early days, complex systems theory (also then talked about as complexity or chaos theory, see Larsen-Freeman, 1997) offered a compelling approach to describing and explaining real-world phenomena, even though the techniques of partial differential equations underpinning theory development were inaccessible to non-mathematicians. The descriptions of systems with many different elements in continuous flux and how they change over time seem to resonate with the problem spaces of applied linguistics. A language learning community

can be thought of as a complex system, as can the brain/mind of an individual language user, and conventional ways of thinking of language as a system can be extended to seeing language as a complex system. Complex systems theory seems to make better sense of our experience as applied linguists and to offer fascinating new tools for thinking and for research.

## WHAT ARE COMPLEX SYSTEMS?

Complex systems are composed of elements or agents that interact in different ways. Their interactions lead to self-organization and the emergence of new patterns at different levels and timescales. Such systems are also adaptive and dynamic. The elements and agents change over time, but crucially so also do the ways in which they influence each other, the relations among them. Complex systems are open rather than closed; energy and matter can come into the system. The dynamic nature of element interactions and the openness of a system to the outside lead to non-linearity, which in complex systems theory signifies that the effect is disproportionate to the cause.

A city can be seen as a complex system, composed of people, places, routes and activities. These elements and agents of the system interact in multiple and changing ways. For example, people live, shop and work in certain places as a result of family history, transport systems, economic and many other factors. Over time, patterns of living change as these factors evolve. Seen as a system, the city self-organises and adapts in response to changes. The city system has non-linear dynamics and may display relatively sudden shifts in patterns of living. For example, global changes in economic activity may lead to empty warehouses and factories which, combined with rising house prices, may lead to regeneration of the city center as the empty warehouses are converted into apartments for young single people; this new city center population supports new entertainment and leisure facilities and requires changed public transport. The dynamics of the city as complex system produce the emergence of a new phenomenon which is called “city center living”.

Other examples of complex systems include economic and financial systems, transport systems, population systems, ecological systems such as a forest or an atoll, and neural systems. Similar processes of self-organisation, adaptation and emergence can be seen in each of the very different systems, leading to the suggestion that complex systems theory



can work as a “supra-theory” (Baake, 2002) with the same principles of system behavior and similar types of system change applicable to all systems, including those of concern to applied linguists. It remains for us as authors a live issue as to whether, in adopting complexity as a supra-theory, we claim that real-world systems are actually complex systems, with the mathematical constraints and requirements that entails, or whether we are invoking something more akin to metaphor or analogy; we do not claim that the systems under consideration can be categorised definitively as complex but rather than they can be “seen as” complex systems.

A complex dynamic system moves through a sequence of states, or modes of behavior; some of these may be quite stable states where the system maintains the same kind of behavior over some time; others may be highly unstable, with the system changing rapidly from one state to another. A stable state is called an “attractor”, since it seems as if the system is attracted into this state. A helpful example to illustrate the idea of a system moving through a succession of more or less stable states is that of a horse and its rider moving together in a field or arena (Thelen & Smith, 1994: 62–63). Because of its shape and structure, a horse has four different ways of moving, or “gaits”. The English language has specific verbs to describe these different types of movement, from the slowest to the fastest: *walk*, *trot*, *canter*, *gallop*. What is more, there is a conventional collocation used to describe a change to a faster type of movement: *the horse broke into a trot/canter/gallop*. The movements are not just faster versions of the same gait, but distinctly different, with a change in how the pairs of back and front legs move relative to each other. As a walking horse increases speed, there comes a point where it shifts into a new gait: *trotting*. There is usually some factor external to the horse that leads to the increase in speed, often a rider. The horse is one element in a larger system that includes the rider and aspects of the context, such as the surface and weather conditions. The horse-and-rider system displays both types of change that can occur in complex systems. On the one hand, the state of the system can change continuously within a gait, as when the horse trots faster or more slowly. On the other hand, the system changes discontinuously when the horse reaches particular speeds that prompt a shift to a new gait. Discontinuous changes like this in a complex system are called phase shifts or bifurcations. The states of the system before and after a phase shift are very different.

Phase shifts in applied linguistic systems might include shifts in pronunciation in the history of a language (Bybee, 2006), restructuring in

the learnt grammar of a language (McLaughlin, 1992), sudden increases in vocabulary size in early first language acquisition (Meara, 1997), or the appearance of a new genre in the language use of a speech community.

Before leaving the horse-and-rider example, we should note two other key features of complex systems highly relevant to our discipline. The environment or context is not external to the complex system but is part of the system, just as the moving horse is part of a complex dynamic system that includes aspects of context or environment. The stable attractors of a system, e.g. the horse in trotting mode, do not represent totally fixed behavior but rather stability with some degree of variability: a horse can trot faster or more slowly. The relation between stability and variability becomes an important aspect of system dynamics, reflecting potential for more dramatic change or for long-term stability.

Visualisation of a complex system invokes the powerful image of a landscape with hills and valleys over which the system roams, leaving behind its trajectory. The landscape (or phase space) represents the probabilities of various modes or phases of system behavior, and a path is carved out by a particular system as it moves from one mode to another. The size and shape of hills and valleys represent the probability that a system will enter a particular mode and, having once entered it, the probability that it will remain there. A valley with steep sides shows a stable mode of behavior that will be difficult to move out of. A hill shows an unstable mode of behavior that will require effort to maintain for any length of time. The valleys are attractors in the system, preferred modes of behavior that the system tends to return to. A system can move along calmly, avoiding deep valleys and steep hills, but may suddenly move into one of the attractors in a more dramatic phase shift. The system is changed by its move into the attractor — new patterns emerge. Around the edge of some attractors is an area of phase space that represents highly variable modes of behavior — Kauffman's "edge of chaos" (1995). Here, the system is highly unpredictable as it adapts rapidly, or self-organises, in response to a changing landscape.

In the book, two chapters explaining the nature of complex systems and their dynamics are followed by chapters applying these ideas to four areas of applied linguistics. We suggest the types of systems that can be found, their agents and elements, and their patterns of change over time. We re-interpret earlier work in the four areas through the complexity lens and outline what is opened up by this new perspective. A synopsis of each follows below.

## COMPLEX SYSTEMS IN LANGUAGE AND ITS EVOLUTION

A complexity view of language dissolves dichotomies that have been axiomatic in linguistics, such as the ones between synchronicity and diachronicity or *langue* and *parole*, and reveals insights into the nature of language and its learning that these dichotomies have obscured. Dichotomising has contributed to static conceptualisations of language. Instead, we take language as a dynamic system that is being continually transformed by use. A language at any point in time is the way it is because of the way it has been used, and any use of language changes it. Thus, if language is viewed as an open, continually evolving system rather than a closed one, then concepts such as “end-state” grammars become anomalous since open systems are constantly undergoing change, sometimes rather rapidly.

Forms in language are therefore to be seen as epiphenomena of interaction. They are emergent stabilities or attractor states in the dynamic system, where the state of a complex system refers to current patterns of behavior, not to stasis. As emergent forms are taken up as adaptations by members of a speech community, some become more privileged than others and endure or, at least, change at slower rates than others. Privilege might be bestowed because certain structures have greater semantic or pragmatic utility, or because they are associated with certain prestigious dialects, or because of their specialized register or function. Even though language is open to all sorts of influences and is continually changing, it still somehow maintains an identity as the “same” language. Within a given timescale, social forces and motivation around national or community identity play a role in “maintaining” a language in the same way that the cells of the human body are constantly being created and sloughed off while the person from all appearances perseveres.

At the level and scale of the individual user, language in use is “soft-assembled” (Thelen & Smith, 1994); it is a make-do extemporaneous response to the communicative pressures at hand. When two individuals’ systems interact and adapt to each other, the state space of the systems changes as a result of co-adaptation. On a longer timescale, at another level, across a speech community, these local interactions can transform the state space of the language system. The self-organizing property of complex systems, when applied to language, suggests that we do not need to view

the emergence of complex rules as the unfolding of some prearranged or innate plan (Tucker & Hirsh-Pasek, 1993: 364), because all that is required to account for complexification is a sensitive dependence on initial conditions and a context in which the system can adapt and change. Any structure arises in a bottom-up fashion from frequently occurring patterns of language use rather than as *a priori* components of fixed, autonomous, closed, and synchronic systems. In this way complexity theory provides an explanation for the emergence of macroscopic order (indeed even that which has sufficiently stabilized to be labelled French or English) and complexity from microscopic behavior of language speakers (Port & van Gelder, 1995: 29).

Such an explanation extends to the phylogenetic evolution of language. Linguistic structure emerges as a complex, adaptive system from the verbal interaction of hominids attempting to communicate with each other. Individuals organize lexical items into constructions, and if the constructions are learnable and frequent, then their use will spread throughout the community and become grammaticized (Bybee, 2006). The interaction modifies the grammatical structures to fit the brain rather than requiring the brain to evolve a genetically based mechanism designed to specify the form of the language (Lee & Schumann, 2005).

## COMPLEX SYSTEMS IN LANGUAGE DEVELOPMENT

In elaborating a complex systems perspective on first and second language development, we take issue with nativist views, suggesting that a complex systems supra-theory offers more convincing explanations. We deliberately differentiate the terms “acquisition” and “development”. While the former is commonly used in the research literature, from a complexity perspective, “development” is preferred. A complex systems view of language rejects the notion of language as something that is taken in — a static commodity that one acquires and therefore possesses (Larsen-Freeman, 2002). Instead, we see language as much a process as a product, something in which one participates (Sfard, 1998). Because language is a dynamic system, continuously changing, its potential too is always being developed, and it is never fully realised. Further, the use of the term “development” is meant to recognize the fact that language learners have the capacity to create their own forms with meanings and uses (morphogenesis) and to expand the meaning potential of a given language.

Finally, a language is not a single homogeneous construct to be acquired; rather, in the complex systems view that sees language as resulting from use, the centrality of variation and speakers' choice of lexicogrammatical constructions within a social context is foregrounded.

Complex systems approaches have much in common with emergentism (Ellis & Larsen-Freeman, 2006). Both call for some genetic prerequisite to first language development but differ hugely from nativist stances. The genetic contribution is not seen as a matter of transmitting the principles of universal grammar through an organ in the brain. Rather it is seen as consisting of more domain-general capacities (e.g. the ability to imitate, to detect patterns, to notice novelty) and perhaps even the social drive to interact with conspecific caregivers, which may exist in other social animals but be less powerful than that which drives humans (Lee & Schumann, 2005).

Nativists believe that the flow of language from adult to the child underdetermines the structure that is required for a child to produce it; they thus conclude that the only viable explanation for the shift from a child to an adult mental system is to assume that the complexity is genetically pre-specified. From the perspective of complexity theory, language development can be seen to stem from the emergence of new forms in a complex system.

What is striking from a complex systems view is that the language-learning child produces language that is richer or more complex than the language addressed to her or him (van Geert, 2003: 659). This is a commonly observed property of all complex systems, in which complexity emerges not from input to the system nor from an innate blueprint, but rather from the creation of order, as happens when a creole develops from a pidgin. Viewing language development as self-organisation or structure formation in a dynamical system means that different learners may develop different language resources even when the ambient language is similar (Mohan, 1992) because of their different experience and the choices they make in relation to it.

With complexity as a supra-theory not only do we get a more variegated portrayal of language, we also get a different, more emic, account of its development. Learning is not the taking in of linguistic forms by learners but the constant adaptation of their language resources in the service of meaning-making in response to the affordances that emerge in the communicative situation.

The assumption of monolinguals speaking the same language acquiring

an equally homogeneous target language is another convenient reduction that has to be discarded in a complex systems approach. From a complex systems perspective, language in use in the multilingual situation, which has been common in the past and likely will become almost universal in the future, is not a matter of translation between totally discrete and distinct language systems. For example, Meara's (2006) bilingual lexicon modelling, which allows for some interaction of two lexicons (at even a low level of "entanglement"), shows how general properties of lexical networks can emerge such that even relatively small amounts of input in one language can effectively suppress the other language without building in some special "language switch". It is a misconception to see a bilingual speaker as two monolinguals joined together, a point made clear in Herdina and Jessner's (2002) dynamic model of multilingualism.

Neither is it the case that the two systems converge. Although progress in SLA has traditionally been viewed as the degree to which a language learner's interlanguage aligns with the target language, it should be acknowledged from a complex systems view that there will never be complete convergence between the two systems. For one thing, there may be little reason for a learner to attempt to emulate native-speaker norms (Cook, 2002; Seidlhofer, 2004), and for another, there is no fixed, homogeneous target end state to language evolution or development (Larsen-Freeman, 2005). That does not mean, of course, that forms cannot become entrenched (MacWhinney, 2005), whereby with repeated use they become more fixed. This is particularly true when the L2 develops at first as parasitic or dependent on the L1.

In any event, what is psycholinguistically real language for learners is not identical to what is descriptively real for linguists. It may, instead of being governed by rules, be "pastiche of various kinds of item-based constructions" (Tomasello, 2000: 76). What we see in second language acquisition is the waxing and waning of such constructions or patterns. Language learning is not a linear, additive process, but an iterative one (de Bot, Lowie & Verspoor, 2007), which is context-dependent and variable. There is no single context; individual agents find their own environments and reconstruct them through their activities. Every organism is changing and determining what is important in its world — creating and remaking the world in which it lives (Lewontin, 2000). For this reason, what generalizations exist at the group level often fail at the individual level. Different learners are following different routes to SLA, although even these are patterned (Larsen-Freeman, 2006). This view of development might be

better served by conceiving of it as a web rather than a developmental ladder (Fischer, Yan & Stewart, 2003), development being seen as a complex process of dynamic construction within multiple ranges in multiple directions. While it is possible, of course, to separate context and person for the purpose of analysis, such separation requires the untenable assumption that the two are independent (van Geert & Steenbeek, 2005).

## COMPLEX SYSTEMS IN DISCOURSE

While the language system can be considered as a complex dynamic system, we can also conceptualise discourse more broadly as a complex system in which several individuals interact over time in language-using processes. Face-to-face conversation is taken as the primary type of language use from which all others spring (Clark, 1996; Schegloff, 2001). In developing a complex systems view of discourse, we work from Clark's premise that face-to-face conversation must be characterised first and that characterisation used to build descriptions of other discourse settings, which require specialised skills and some process of learning beyond face-to-face conversation, including literacy events that involve writing and reading, and learning settings such as the language classroom.

Each person engaged in face-to-face conversation can be seen as a complex system of interacting sub-systems of continuous ideational, emotional and physical activity, from the cellular and neural levels upwards to the physical being encountered in the conversation. This individual comes to the conversation from, and with, his or her ontogenetic history and will move on from the conversation changed in some way by participating in it. In conversation, speakers soft-assemble their contribution, through the adaptation of these sub-systems in the moment and "on the fly" (Thelen & Smith, 1994). What we see and hear happening in a conversation are the observable traces of interior physical, emotional and cognitive sub-systems continually adapting in soft-assembly to the discourse environment, which includes the topic, oneself and "the other". For example, the movement of tongue, mouth and jaw in a person's speech production system "can compensate adaptively for disturbances or perturbations encountered by one part of the system by spontaneously readjusting the activity of other parts of the system" (Saltzman, 1995: 157). At a cognitive level, there is two-way feedback and adaptation between the grammar of the language being used and the idea being talked about (Slobin,

1996), and between the ideational/conceptual or pragmatic and lexical choices that speakers exercise.

Speakers often subconsciously adjust their physical posture and position in response to what they observe about their interlocutor's posture and position; if one person in a group places his or her hands behind his or her head, the likelihood is that other members of the group will follow this action. This kinaesthetic mirroring reminds us that the systems at work in conversation include physical systems as well as systems of language.

Each person is also a social being and comes to a conversation as a member of various socio-cultural groups (collectives and aggregates) and having played a range of roles within groups: families, school classes, political groups, peer and friendship groups, speech communities, etc. A person's history of interactions in these various groups builds up collections of experiences through other conversations and through other events that contribute to the language, cognitive and affective resources available to be drawn on in future talk. Each of the collectives or groups that people belong to can be seen as complex systems (Sealey & Carter, 2004), in which individuals or smaller groups function as agents, and from which emerge "discourses" of various types (Gee, 1999), and which have trajectories or histories as groups.

Important and far-reaching implications follow from seeing speakers within a conversation not as autonomous systems but as part of a larger coupled system, i.e. a dialogic view of discourse. The first implication is that language used in dialogue is a property of the coupled system of the conversation and not a property of the individual speakers. While an individual has "a latent potential" to use language, it is only in a suitable discourse environment that this potential is actually expressed through the talk, in that environment (Beer, 1995). People have a latent potential to engage in discourse or what we also call their language (and other) "resources". The second implication, which follows from the first, is that language resources are virtual and do not exist independently from their manifestation in use. All we have — as researchers collecting data, as testers or as teachers — is language-using behavior in particular contexts or discourse environments. Each occasion of language-using behavior is dependent on the specific discourse environment, and conversely each discourse event is unique.

Taking a complexity perspective motivates a search for changing patterns of stability and variability in the systems under scrutiny. Several emergent discourse phenomena arise from face-to-face talk. The trajectory



of a face-to-face conversation across its phase space landscape will feature shallow attractors in the shape of routinised sequences and pre-sequences of the sort described in conversation analysis. Local routines help reduce the complexity of the system by narrowing down choices for participants. These kinds of joint action do not just happen “out of the blue” but take the form they do partly because people come to talk with expectations derived from previous experiences as members of socio-cultural groups. These socio-cultural forces have pre-shaped the landscape on which conversation takes place and so work “downwards” on to the microgenetic timescale. The IRF pattern characteristic of talk in classrooms, with its three parts of teacher Initiation — student Response — teacher Feedback (Sinclair & Coulthard, 1975; Mehan, 1979), can be seen as an attractor on the classroom discourse landscape that shows variability around a very stable form and that has arisen through adaptation in response to particular classroom contingencies. The discourse system will tend to return to the IRF attractor because it is a pattern that works; it is a preferred behavior of the system.

In addition to patterns of classroom talk that stabilise in particular classrooms and across classrooms, other stabilities in the dynamics of discourse include lexical-conceptual pacts (Brennan & Clark, 1996) and metaphors that stabilise over the timescale of a discourse event (Cameron & Deignan, 2006). Further discourse phenomena emerge upwards in level and in timescale from face-to-face talk and belong to discourse understood as “a broader range of social practice”(Schiffrin et al., 2001: 1) as speech genres (Bakhtin, 1981, 1986). Genres are themselves dynamic and continue changing through use. Their stability combines with variability, and it is this variability that provides the potential for growth and change. Genres that are changing and adapting fast and frequently may indicate that the discourse system is “at the edge of chaos” about to move into a new attractor or to dissolve and reform in some other shape altogether. Such is the case, for instance, with text messaging. First, people tried to text the way they wrote, then adapted, and for a short time people were abbreviating to things like “C U 2morro”. However, then the technology changed to include predictive spelling, and now texts come with full words, spelled even more accurately than the texters might have written them. Who knows where technology will drive the dynamics of the system next? Complex systems theory reminds us that understanding variability is crucial to understanding dynamics, and that understanding genres must include understanding their flexibility as well as their stability.

## COMPLEX SYSTEMS IN THE LANGUAGE CLASSROOM

A description of language that naturally flows from a complex systems perspective is one that sees a dynamic and evolving system with meaning and use as central. It emerges out of a socio-cultural-cognitive-historical context. It is discourse- or text-based; this is where its in-time dynamism is most apparent. Its descriptive units are constructions, form-meaning-use composites, emergent stabilities of varying sorts and sizes. What then of the learning and teaching of such a system in instructed contexts?

A complex dynamic systems perspective on the language classroom highlights interaction across interconnected levels of organisation — from individual minds up to the socio-political context of language learning — and interconnected timescales — from the minute-by-minute of classroom activity to teaching and learning lifetimes.

The dynamic systems that pervade and envelop the language classroom are continuously changing and adapting, sometimes shifting dramatically from one mode of behavior to another, sometimes hovering flexibly “on the edge of chaos”. We describe the language classroom as a complex system, not reducible to its component parts, but in which the parts contribute to the whole while also being formed by the whole. A systems perspective can help us understand language classroom problems and issues and suggest how to intervene to improve learning.

Having argued that language is a complex dynamic system, always changing, always adapting and evolving as it is used, second or foreign language learning presents us with an intriguing question. How is a dynamic, constantly changing language to be taught and learned? It seems inevitable that the complexity of the dynamic system that is a living language will need to be managed for the purposes of learning and teaching. The language that is the aim and content of instruction is a moving target for learners. Moving targets are difficult to hit, so students must be assisted in several ways so that they can cope with the dynamism and complexity of the target language. First, though, educators need to start with a suitable description of the target. This has always been the case, of course: an education system that wishes to teach a foreign language uses or constructs a description of the foreign language to serve as the target or goal of language learning in schools and colleges. However, the description (and samples drawn up according to it) needs to be of a particular kind from a complex systems perspective. Then, although thoughtful descriptions

are extremely useful as a starting point, they are not in and of themselves, sufficient. They need to, firstly, inform the selection or construction of language samples with which to engage learners. Secondly, students need to become aware of change and variation in the living language, in a manner that is commensurate with their level of development. Thirdly, all the awareness-raising in the world remains inadequate if students do not have the experience of soft-assembling their language resources, a process that Larsen-Freeman (2003) has referred to as “grammaring”.

A complex systems position holds that input cannot be enough for learners to produce the target language. Students need to experience the second language as a dynamic system, shaping their complex dynamic systems of the new language through working with it, soft-assembling what they can from their resources for different tasks and purposes. Each experience of soft-assembly leaves a trace or changes the latent potential of the learner. To see how a complex systems perspective describes language learning, we take the example of language-learning tasks. The process of completing the task is described by the complex dynamic system of language use moving across a task-based landscape, where the hills and valleys are constructed by the nature of the task. In a view of task as static frame, the unfolding task action is reflected in the trajectory of the system across a stationary landscape. However, while such a representation might work with a very rigid task, such as colouring in a picture through dictation or reciting a poem learnt by heart, language tasks designed to engage and involve learners by giving them some degree of choice are better described with an evolving landscape that represents coupled, co-adaptive systems. In these tasks, the group talk changes the task as they begin to do it, and the task is constructed through the doing of it. As the task proceeds, so the landscape of potential shifts and changes. For example, a pair of learners engaged in a “spot the difference” task may adapt to each other, and to the pictures they are using, and evolve efficient ways of establishing differences. The idea of the evolving task landscape allows us to describe how learners may reduce the demands of a task — flattening the landscape — as an alternative to pushing across the landscape by stretching their language resources to meet those demands (Cameron, 2003).

If we focus on what happens when language is used in the classroom, i.e. the systems in focus are classroom language-using systems, then once again all is dynamic: the learning, the discourse, the activity, the

language and the interlanguage. At this point, an essential dimension of teaching is the provision of feedback — implicitly or explicitly, through teacher-initiated, peer-initiated or self-initiated means, in a manner that is affectively and socially supportive while being judiciously targeted. Teaching does not cause learning but rather becomes the management of learning (Larsen-Freeman, 2000) — corralling the development of the learners' ongoing system, continually nudging it into a trajectory towards an acceptable attractor.

Describing classroom activity in terms of interacting complex systems helps us see how teachers and students can co-adapt to stable patterns of teaching behavior, motivation and participation that may not always be supportive to learning. Intervention to increase learning is a perturbation to a system stuck in an unhelpful attractor, attempting to move it into new paths on its landscape of potential.

Taking a complex systems perspective involves some major changes in how we see aspects of the language classroom: we find that there can be no replication, no static independent and measurable “things” to measure, test, evaluate or codify, no limits to what might be relevant in understanding classroom activity and behavior. This expansion is somewhat compensated for by the powerful apparatus for description and explanation of complex systems.

## RESEARCHING COMPLEX SYSTEMS IN APPLIED LINGUISTICS

Analysis or investigation of discourse from a complex systems perspective does not require us to throw away other approaches and their techniques. Indeed, multiple types of analysis are needed to work with information from systems at different scales, and new ways of blending methods are needed to explore simultaneous activity on several scales.

### References

- Baake, K. (2003). *Metaphor and Knowledge*. Albany, NY: State University of New York.
- Bakhtin, M. M. (1981). *The Dialogic Imagination*. Austin: University of Texas Press.
- Bakhtin, M. M. (1986). *Speech Genres and Other Late Essays*. Austin: University of Texas Press.

- Beer, R. (1995). Computational and dynamical languages for autonomous agents. In R. Port & T. van Gelder (Eds.), *Mind as Motion* (pp.121–148). Cambridge, MA: MIT Press.
- Brennan, S. & H. Clark (1996). Conceptual pacts and lexical choices in conversation. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 22(6): 1482–1493.
- Bybee, J. (2006). From usage to grammar: The mind's response to repetition. *Language*, 82(4): 711–733.
- Cameron, L. (2003). *Metaphor in Educational Discourse*. London: Continuum.
- Cameron, L. & A. Deignan (2006). The emergence of metaphor in discourse. *Applied Linguistics*, 27(4): 671–690.
- Clark, H. (1996). *Using Language*. New York: Cambridge University Press.
- Cook, V. (2002). *Portraits of the L2 User*. Clevedon: Multilingual Matters.
- de Bot, K., W. Lowie & M. Verspoor. (2007). A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and Cognition*, 10(1): 7–21.
- Ellis, N. & D. Larsen-Freeman. (2006). Language emergence: Implications for applied linguistics. *Applied Linguistics*, 27(4): 558–589.
- Fischer, K., Z. Yan & J. Stewart. (2003). Adult cognitive development: Dynamics in the developmental web. In J. Valsiner & K. J. Conolly. (Eds.), *Handbook of Developmental Psychology* (pp.491–516). London: Sage.
- Gee, J. P. (1999). *An Introduction to Discourse Analysis*. London: Routledge.
- Herdina, P. & U. Jessner. (2002). *A Dynamic Model of Multilingualism*. Clevedon: Multilingual Matters.
- Kauffman, S. (1995). *At Home in the Universe*. London: Penguin.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18(1): 141–165.
- Larsen-Freeman, D. (2000). *Techniques and Principles in Language Teaching* (2<sup>nd</sup> edn.). Oxford: Oxford University Press.
- Larsen-Freeman, D. (2002). Language acquisition and language use from a chaos/complexity theory perspective. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization* (pp.33–46). London: Continuum.
- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Grammaticing*. Boston: Thomson/Heinle.
- Larsen-Freeman, D. (2005). Second language acquisition and the issue of fossilization: There is no end, and there is no state. In Z.-H. Han & T. Odlin (Eds.), *Studies of Fossilization in Second Language Acquisition* (pp.189–200). Clevedon: Multilingual Matters.
- Larsen-Freeman, D. (2006). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, 27(4): 590–619.
- Leather, J. & J. van Dam (2003). *Towards an Ecology of Language Acquisition*. Dordrecht:

Kluwer Academic Publishers.

- Lee, N. & J. Schumann. (2005). The interactional instinct: The evolution and acquisition of language. Paper presented at AILA, Madison, Wisconsin.
- Lewontin, R. (2000). *The Triple Helix: Gene, Organism, and Environment*. Cambridge, MA: Harvard University Press.
- MacWhinney, B. (2005). Emergent fossilization. In Z.-H. Han & T. Odlin (Eds.), *Studies of Fossilization in Second Language Acquisition* (pp.134–156). Clevedon: Multilingual Matters.
- McLaughlin, B. (1992). Restructuring. *Applied Linguistics*, 11(2): 113–128.
- Meara, P. (1997). Towards a new approach to modelling vocabulary acquisition. In N. Schmitt & M. McCarthy (Eds.), *Vocabulary: Description, Acquisition and Pedagogy* (pp.109–121). Cambridge: Cambridge University Press.
- Meara, P. (2006). Emergent properties of multilingual lexicons. *Applied Linguistics*, 27(4): 620–644.
- Mehan, H. (1979). *Learning Lessons: Social Organization in the Classroom*. Cambridge, MA: Harvard University Press.
- Mohanan, K. P. (1992). Emergence of complexity in phonological development. In C. Ferguson, L. Menn & C. Stoel-Gammon (Eds.), *Phonological Development* (pp.635–662). Timonium, MD: York Press.
- Port, R. & T. van Gelder. (Eds.). (1995). *Mind as Motion: Explorations in the Dynamics of Cognition*. Cambridge, MA: MIT Press.
- Saltzman, E. (1995). Dynamics and coordinate systems in skilled sensorimotor activity. In R. Port & T. van Gelder (Eds.), *Mind as Motion* (pp.149–174). Cambridge, MA: MIT Press.
- Schegloff, E. (2001). Discourse as an interactional achievement III: The omnirelevance of action. In D. Schiffrin, D. Tannen & H. Hamilton (Eds.), *The Handbook of Discourse Analysis* (pp.229–249). Oxford: Blackwell.
- Schiffrin, D., D. Tannen & H. Hamilton (2001). Introduction. In D. Schiffrin, D. Tannen & H. Hamilton (Eds.), *The Handbook of Discourse Analysis* (pp.1–10). Oxford: Blackwell.
- Sealey, A. & B. Carter (2004). *Applied Linguistics as Social Science*. London: Continuum.
- Seidhofer, B. (2004). Research perspectives on teaching English as a Lingua Franca. *Annual Review of Applied Linguistics*, 24: 209–239.
- Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, March: 4–13.
- Sinclair, J. & M. Coulthard. (1975). *Towards an Analysis of Discourse*. Oxford: Oxford University Press.
- Slobin, D. (1996). From “thought and language” to “thinking for speaking”. In J. Gumperz & S. Levinson (Eds.), *Rethinking Linguistic Relativity* (pp.70–96). New York: Cambridge University Press.
- Thelen, E. & L. Smith. (1994). *A Dynamic Systems Approach to the Development of Cognition and Action*. Cambridge, MA: MIT Press.

- Tomasello, M. (2000). First steps toward a usage-based theory of language acquisition. *Cognitive Linguistics*, 11: 61–82.
- Tucker, M. & K. Hirsh-Pasek. (1993). Systems and language: Implications for acquisition. In L. Smith & E. Thelen (Eds.), *A Dynamic Systems Approach to Development: Applications*. Cambridge, MA: MIT Press.
- van Geert, P. (2003). Dynamic systems approaches and modelling of developmental processes. In J. Valsiner & K. J. Connolly (Eds.), *Handbook of Developmental Psychology* (pp. 640–672). London: Sage.
- van Geert, P. & H. Steenbeek (2005). A complexity and dynamic systems approach to development: Measurement, modeling, and research. In K. W. Fischer, A. Battro & P. Lena (Eds.), *Mind, Brain, and Education*. Cambridge: Cambridge University Press.

## Comment after Chapter 11

I do hope that readers of this book are somewhat clearer on the new way of thinking that Chaos/Complexity Theory (C/CT) inspired after reading the preview of Larsen-Freeman and Cameron (2008). In the article that follows, I once again nominated C/CT as a way of addressing the cognitive/social divide in the field because I saw cognitive and social perspectives as complementary. However, since the publication of Firth and Wagner's (1997) paper, the chasm between the two had widened.

The next article was my response to an invitation by the Editor of a special issue of the *Modern Language Journal* to provide a reflective commentary on the debate that was begun with the publication of Firth and Wagner's (1997) paper a decade earlier. I began by commenting on the original article and the published commentaries that followed it. As I reflected on the cognitive/social divide, I identified 12 points of contrast that could be used to characterize the two sides of the divide. Of course, by contrasting the positions, as I have done in the article, their differences may seem more stark than they really are. Nevertheless, this contrastive exercise was very useful to me in understanding the full extent of the divide, which still persists to this day.

As you will see when you read the article, the divide was not merely about the cognitive versus the social being primary in SLA. It went deeper than that. In fact, Firth and Wagner questioned accepted and well-established concepts such as the existence of an interlanguage. In this challenge and others they issued, they were in fact calling for a reconceptualization of SLA.

Thus the divide extended to differences in thinking about language, learning, and research.

## **References**

- Firth, A. & J. Wagner. (1997). On discourse, communication, and (some) fundamental concepts in SLA research. *Modern Language Journal*, 81: 285–300.
- Larsen-Freeman, D. & L. Cameron. (2008). *Complex Systems and Applied Linguistics*. Oxford: Oxford University Press.



# Chapter 12

## Reflecting on the Cognitive-social Debate in Second Language Acquisition

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Firth and Wagner's (1997) call for a more socially and contextually situated view of second language acquisition (SLA) research has generated a great deal of discussion and debate, a summary of which is offered in this reflective commentary. Given the individualistic, cognitive origin of the SLA field, such controversy is entirely understandable. With different ontologies and epistemologies, the two views, individual/cognitive and social/contextual, have had little impact on each other. These days, a theoretical pluralism prevails. Eventually, their differences may, though it is not clear that they will, be settled empirically. Another possibility is for there to be a reframing of our understanding, and I offer Chaos/Complexity Theory as one means for doing so. Indeed, the solution the SLA field has perennially adopted when there are conflicting views is to seek a larger frame, one that acknowledges the contributions of each perspective. More specifically, I expect that it will be the point where the two perspectives intersect that will prove to be the most productive for future understanding of SLA, and I believe that there is a new consensus around this point that is emerging.

I was in attendance at the 1996 International Association of Applied Linguistics (AILA) Congress in Jyväskylä, Finland, where Firth and Wagner gave the focal paper of the present issue, although I was participating in a concurrent session and did not hear them present their paper. Nevertheless, as I was leaving my session and making my way to another, the doors on the room where Firth and Wagner had just spoken flung open, and I was quickly

enveloped in the exiting crowd. Their excitement was palpable. For many, that day in August must have seemed a watershed moment. The perceived dominance of a cognitive, mentalistic orientation to second language acquisition (SLA) had been challenged. Scholars who had previously felt excluded found a rallying point in the Firth and Wagner paper; those who believed that their positions had been ignored felt empowered in a way that they had not before.

I have been asked to provide a reflective commentary on the debate in the Autumn 1997 and Spring 1998 issues of *The Modern Language Journal* (MLJ) that followed the publication of Firth and Wagner's 1996 AILA paper in the same journal. In order to situate the paper and the ensuing debate, I will first provide a brief genealogy of the field of SLA. Next, I will provide an even briefer summary of the main points of the Firth and Wagner (1997) article because that article has been reprinted in this issue. I will also point to the somewhat ambiguous position that the authors adopted: Were they calling for a more balanced approach to SLA or were they calling for a completely new one? Acknowledging this ambiguity is important because the reaction of the debate participants was shaped in part by how they interpreted Firth and Wagner's position. I will illustrate this point and fulfill my brief by discussing each commentary, which I will place into one of three categories: (a) broadly in agreement with Firth and Wagner (b) partially in agreement, and (c) mostly in disagreement. I will also summarize Firth and Wagner's (1998) response.

I will then indicate why the reconciliation between those who agree and those who disagree is not likely, although I will offer one way of thinking that may help. I will conclude by stating what I take the impact of the debate to be, leaving it to Firth and Wagner (2007) to offer their reflections on the current state of the field regarding these matters.

## **A BRIEF GENEALOGY OF THE STUDY OF SECOND LANGUAGE ACQUISITION**

The modern-day study of second language acquisition, or SLA, as it came to be called, had its antecedents in the foundational texts published during the middle of the previous century, especially, Fries (1945), Lado (1957), Skinner (1957), and Weinreich (1953). These texts brought together a coherent theory of language (structural linguistics) and a theory of learning (behaviorist psychology), and reflected a renewed interest in language

teaching and learning at the time. Two years after Skinner published his theory of operant conditioning, Chomsky (1959) countered with his scathing attack on behaviorism, and presented his own form of linguistics, which claimed that, at a deep level, all languages shared the same properties. In addition, Chomskyan linguistics introduced the notion that the developing language of the child was systematic from the start, due to the presence of an innate universal grammar and was not just a reflection of the linguistic input to which he or she had been exposed (Block, 2003; Selinker, 1972).

These claims were represented in the second language (L2) literature in a seminal article written by Corder (1967). Corder argued that language learners' errors were not a reflex of the native language (L1), but rather were reflective of the learners' underlying L2 competence. This perception was later extended in the claim that learners were actively involved in constructing a system out of the linguistic input to which they had been exposed, a linguistic system variously called an *idiosyncratic dialect* by Corder (1971), an *approximative system* by Nemser (1971), and an *inter-language* by Selinker (1972). All three researchers highlighted the position that learners' language was a linguistic system in its own right, replete with forms that indicated that learners were applying cognitive strategies to the language learning task. These strategies resulted in, for example, overgeneralization errors, which were taken to be evidence of an attempt by learners to construct the rules of the target language. Furthermore, all three researchers adopted a target-language centered perspective (Sridhar, 1980), suggesting that the learners went through successive stages of learning, with the most advanced being the closest to the target language, usually taken to be the standard dialect of educated native speakers (NSs). Seeing learner language from this perspective led to an appreciation of the cognitive powers of language learners, an appreciation that was not present when language acquisition was seen to be a product of habit formation, as the behaviorists had been claiming in the years preceding the publication of Corder's article.

Another formative influence on SLA at the time was Brown's (1973) research on L1 acquisition. Brown was breaking new ground by showing that children learning English as their L1 exhibited a common order in their acquisition of certain grammatical morphemes. The *Zeitgeist* for this view was the cognitive revolution that was taking place in psychology and linguistics. The latter field was particularly influential in SLA, of course, in the form of Chomsky's (1965) declaration that the proper focus for the study of linguistics was the underlying homogeneous competence of

the idealized speaker of the language. It was in competence, Chomsky proposed, that the systematicity and generativity of the underlying system could be observed. Subsequently, even though most SLA researchers did not choose to explain SLA in terms of Chomsky's universal grammar, they accepted the need to explain SLA in terms of the formation of a mental grammar. In keeping with Chomsky and U.S. structuralism, they also chose to conceive of progress in SLA as the accumulation of ever more complex linguistic structures and the increasing fluency in their use.

These developments in linguistics, psychology, and L1 acquisition research and the shift in awareness contributed by SLA pioneers led to the liberation of the field from the bondage of behaviorism. Language learners were seen as cognitive beings, much more actively involved in the construction of their L2 knowledge. Moreover, it was taken to be the researchers' mission to determine how learners accomplished the construction, which researchers did by pointing to the learners' use of formulaic utterances, hypothesis testing, rule formation, creative construction, learning strategies, and so on.

Owing to the pedigree of the SLA field, it was not surprising that a great deal of attention was given to the learners' developing morphosyntactic system. This attention was perhaps most obvious in early SLA research with the morpheme acquisition studies (Bailey, Madden, & Krashen, 1974; Dulay & Burt, 1973, 1974; Larsen-Freeman, 1975, 1976a) and the discovery of developmental sequences (Milon, 1974; Ravem, 1974; Wode, 1976). Just as Firth and Wagner's (1997) article would do several decades later, this research galvanized the research community and attracted new researchers to the quest to understand SLA. I distinctly remember the excitement of researchers coming together at the Teachers of English to Speakers of Other Languages (TESOL) Convention in Denver in March 1974, at the Linguistic Society of America meeting at the University of Massachusetts in Amherst in the summer of 1974, and at the Sixth Annual Conference on Applied Linguistics in Ann Arbor in January 1975. Even in those early days, we believed that we were witnessing the birth of a new field — one that did not see language as behavior, one that no longer ignored the mind, one that put cognitivism squarely at the forefront of its explanations. As it turns out, it was a powerful birthright. It is fair to say that a cognitivist view has dominated the field ever since, leading Doughty and Long (2003) to characterize SLA primarily as a product of a cognitive faculty and the SLA field of the future “as a branch of cognitive science”(p.4).

## FIRTH AND WAGNER'S CALL

It was then approximately 30 years after the birth of a cognitively oriented approach to SLA that Firth and Wagner presented their 1996 paper, a work that called for an enlargement of the parameters of the field to include a social and contextual orientation to language. It is interesting that these authors were not the first to issue such a call. Indeed, those researchers (e.g. Frawley & Lantolf, 1984, 1985; Lantolf & Frawley, 1988) persuaded by the work of Vygotsky (1962) and other socially oriented researchers (Beebe, 1980; Norton Peirce, 1995; Tarone, 1983; Young, 1988) had been exploring and promoting the social dimension of SLA for some time. Moreover, Block (1996), Breen (1985), Crookes (1997), Rampton (1995), and van Lier (1994) among others, pointed critically to the essentially asocial view of much SLA research. I cannot, therefore, explain with any confidence the reception that Firth and Wagner received in their bid to do a similar thing. Perhaps it was the case, as with the Denver, Amherst, and Ann Arbor meetings that I alluded to earlier, that it was in the forming of a group — their coming together and finding each other — that made a difference.

Of course, the publication of the Firth and Wagner (1997) article in the *MLJ* and the responses of a theoretically eclectic group of researchers no doubt did much to propagate both the controversy and the social views that Firth and Wagner espoused. Contrary to popular opinion, it is not usually the case that lone researchers make discoveries in isolation. Research is very much a collective enterprise (Larsen-Freeman, 2000b). We give papers, read each others' work, come together at professional conferences, sometimes collaborate, and most of us at least benefit from having conversational partners to stimulate our thinking further. Theoretical shifts of the magnitude that Firth and Wagner were calling for presumably take a critical mass of like-minded researchers.

In any event, it is time to ask just what it was that so inspired the crowd that day in August 1996 and later inspired and incited the readers of the *MLJ*. As I mentioned earlier, from my reading of Firth and Wagner (1997) and from my reading of several of the commentaries on their article, it seems to me that there was an ambiguity to their central position. Perhaps because of a political adroitness, these authors called for what at first blush appears to be a theoretically balanced approach to the study of SLA — one where both the social and the individual cognitive perspectives

to SLA would receive attention. Two of the commentators agreed with this position (Kasper, 1997; Poullisse, 1997), though each offered significant caveats. Indeed, some of the cognitively oriented researchers who took the greatest exception to the Firth and Wagner article also pointed out that they were themselves committed to looking at how (social) interaction was the source of modified input that could become intake in fueling the process of L2 acquisition (Gass, 1998; Long, 1997), allowing for social interaction to have at least an indirect influence on SLA. In addition, other SLA researchers had lent their voices to the same cause, that is, the need to look at both social and psychological influences on SLA (McKay & Wong, 1996; Preston, 1996; Selinker & Douglas, 1985; Tarone & Liu, 1995). Therefore, if what Firth and Wagner were calling for was a broadening of the field, perhaps such a broadening could have been accommodated without so much controversy.

However, in order to put forth their case for more representation for the social side, it appeared that Firth and Wagner (1997) were seeking to do more than redress a perceived imbalance. To this end, they urged SLA researchers to reconsider unquestioningly accepted and well-established concepts such as *nonnative speaker* (NNS), *learner*, and *interlanguage*. As Firth and Wagner stated in their 1998 response to the commentators, “we are unable to accept the premises of ‘interlanguage’ — namely, that language learning is a transitional process that has a distinct and visible end” (p.91). Furthermore, these authors contended that, since its founding by Corder, SLA had been concerned with individual acquisition and its relation to language-specific cognitive systems — the acquisition of L2 competence in the Chomskyan sense. “As such, it is flawed,” they wrote, “and obviates insight into the nature of language, most centrally the language use of second or foreign language (S/FL) speakers” (Firth & Wagner, 1997: 285). There was no ambivalence in these comments about the direction that they wished the SLA field to take. Challenging the foundational concepts of learner, nonnative speaker, and interlanguage, on which the field of SLA had been established some three decades earlier, seemed like a no-quarter assault. Hegemony can extend in either direction, of course, leaving little doubt in some researchers’ minds that Firth and Wagner were making a bid for the supremacy of an entirely different approach to SLA.

As can be seen in the Firth and Wagner (1997) article, reprinted in this issue, Firth and Wagner find further faults as well. However, the allegation that mainstream SLA was fundamentally flawed owing to its

individual cognitive focus clearly represents the most trenchant criticism. How then did the commentators respond? Those researchers/scholars who saw the call as one for achieving balance between psychological and social factors accepted it to some extent. Others strongly objected to the move to reposition the SLA field. Still others warmly embraced the call. I will begin by summarizing the commentaries of those that I place in this third group.

## COMMENTATORS IN SUPPORT OF FIRTH AND WAGNER'S CALL

Hall (1997), not a new voice in the psychological-social debate, pointed out that the *explananda* in the two positions were very different. Where *mainstream* SLA (her term, which I adopt here) took as its explanandum the learning of decontextualized linguistic components, the new, socially oriented way examined learning not in terms of systemic knowledge, but rather in terms of the knowledge of, and the ability to use, language. Therefore, rather than talking about the acquisition of grammatical morphemes, she considered it more appropriate to look at such phenomena as the patterned ways that turns are taken in a conversation. As she wrote, the new (Firth & Wagner, 1997) way of looking at SLA, a sociocultural way, "turns the process on its head" (p.303). Rather than looking at SLA as the accumulation of linguistic structures, what is important "is the discursive routinization of our communication practices and the means by which we realize them" (p.303). Adopting a Vygotskian stance, Hall embraced Firth and Wagner's call to offer an explanation of language behavior and development that "originates in our socially constituted communicative practices" (p.302). Furthermore, Hall argued that individual development cannot be considered apart from such practices, nor should the L2 learner be treated as "a deficient version of an idealized monolingual expert in linguistics" (p.303). Casting no doubt on which of the two positions in Firth and Wagner she believed, Hall asserted that the new view called for a radical reconceptualization of the SLA field and that "many of its presuppositions on language and learning are incommensurable with those of the more mainstream position" (p.305).

Also adopting the stronger of the two positions present in Firth and Wagner (1997), Liddicoat (1997) began his commentary by discussing the imbalance that existed between their social, contextualized view of SLA and the mainstream view of SLA as a relatively context-free cognitive phe-

nomenon. However, after pointing to the imbalance, he left little doubt that he subscribed to the more radical stance present in Firth and Wagner, that is, the need to reconceptualize the field. Liddicoat maintained that whereas traditional SLA research focused more on the learner's ability to produce morphosyntactic units, what should be in focus is the learner's ability to use language to create a message. A helpful elaboration on the difference between these foci is Liddicoat's observation that rather than focusing on what a learner cannot yet do, SLA researchers should attend to what a learner can do with the available resources.

For Liddicoat (1997), the other big shift that accompanied the newer perspective was the need to consider a different research methodology. Rather than investigating the macrolevel concepts of NS and NNS or learner, it would be better, according to Liddicoat, if microlevel investigations took place, investigations that would study "the actual social relationships that are being achieved through the talk in progress"(p.314). He offered his reasoning: "this preoccupation with macro-level categories — in particular with the participant as a learner — has led to actual *use* of language being relegated to a secondary place behind the identification of the processes involved in the activity of learning"(p.314).

Illustrating the problem that comes from ignoring language use, Liddicoat (1997) discussed the fact that in mainstream SLA investigations of NS-NNS interaction, it was always the former who asked the questions. Liddicoat hypothesized that this pattern may have come about as a result of such interactions typically taking the form of an interview, where one of the two interlocutors was quite naturally the questioner. The interviewer role was normally assumed by the NS because the purpose of the interactions in the research studies was to elicit data from NNSs. For this reason, the data were skewed, leading Liddicoat to conclude that it was important not only to look at interlocutors' respective roles, but also at the purpose of the talk/interaction.

Rampton (1997) also adopted Firth and Wagner's (1997) radical position in the debate, alleging that the mainstream SLA use of the notions of linguistic competence and speech community belonging are fundamentally flawed. Rampton wrote "certainly, sociolinguists show that individuals often belong in more than one speech community, that a single speech community often has more than one language, and that each language is itself variable"(p.329).

Rampton's (1997) displeasure with mainstream SLA research was



also grounded in the critical philosophical stance he adopted. Rampton challenged modernist notions inherent in mainstream SLA, such as the search for “universals, referential above indexical meaning, disembedded cognition, value-free inquiry, progress as a natural condition, and assimilation to the norms of an idealized monolingual U.K. or U.S. national”(p.330). Instead, he pointed to the postmodern preoccupation with hybridity — being neither on the inside nor on the outside of a particular social group and “the key imperative of our time” which is “to learn to live with difference”(p.330). With this postmodern sociological orientation, Rampton asserted that there are “now more scholars interested in how people negotiate and reconcile themselves both to *otherness* and *incompetence*”(p.330). In accord with Liddicoat (1997), Rampton observed that researchers need to be looking at how people get by with what they can do in language, rather than what they cannot do.

Rampton (1997) also pointed to SLA researchers' choice to align themselves with natural sciences in order to establish the seriousness of their enterprise. This alignment explains SLA's models of inquiry and methodological choices. However, he asserted that when confronted with fluidity in linguistic situations, such as the study of pidgins and creoles, researchers needed to rethink their methodology. It would be helpful in this regard, Rampton thought, for SLA researchers to study the heterogeneous linguistic situations that exist outside the classroom, such as lingua franca negotiations between NNSs and the diaspora of Black English vernaculars, because “these are varieties that one really cannot start to analyse with preconceived ideas about native speakers and well-formed languages”(p.332).

## COMMENTATORS IN PARTIAL AGREEMENT WITH FIRTH AND WAGNER'S CALL

The second category of respondents is made up of those who partially agreed with Firth and Wagner (1997). Into this group, I place the commentaries of Kasper (1997) and of Poulisse (1997) because both agreed on the desirability of broadening the perspective although still affirming a significant or primary role for cognition in SLA.

Kasper (1997) acknowledged that the constructs of learner and NNS are “highly reductionist in that they abstract from the complex multiple identities that constitute real people”(p.309). Nonetheless, as she observed,

everyone does it: “Of course, all social sciences ... construct their idealized agents by reducing away what seems trivial in terms of the adopted theory” (p.309). For this reason, Kasper added that “I am not too concerned that generic terms such as ‘learner’ and ‘nonnative speaker’ suggest to anybody that all learners or all nonnative speakers are the same. What they do suggest is a researcher’s focus on human agents” (p.309).

Kasper (1997) warned against the comparative fallacy, however, in which L2 learner performance is compared with that of NSs, and therefore seen to be deficient. In addition, she asked the important question, “who should learners be compared with? The solution to the comparative fallacy does not renounce on comparison but selects more appropriate baselines” (p.310). “For instance,” Kasper maintained, “when you study the phonological development and ultimate attainment of Anglocanadians learning French, do not choose as a baseline monolingual speakers of Canadian French; choose highly competent French-English bilinguals” (p.310) instead.

Kasper also concurred with conversation analysts (CA) Liddicoat (1997) and Firth and Wagner (1997) in believing it important “to demonstrate how social order is constructed at the microlevel of conversational interaction” (p.308); however, she added that “we should transcribe adequately to the research purpose at hand. CA conventions have no inherent superiority over other notation systems” (p.309).

A very important point that Kasper (1997) called “the most nagging problem” with the Firth and Wagner (1997) article is that it

purports to redirect the field of SLA, but has in fact very little to say about L2 *acquisition*. Any theory of language acquisition has to make explicit what the conditions and mechanisms of learning are. In other words, it has to address the question of how learners’ interlanguage knowledge progresses from stage A to stage B, and what events promote or hinder such progress. Firth and Wagner do not address these questions. What they seem to call for are socially situated studies of second language *use*. (p.310)

It is here where Kasper (1997) staked out her balanced position most clearly. Although she had long been interested in issues of pragmatics, sociolinguistics, and discourse analysis, she firmly believed that SLA was about establishing new knowledge structures and making them available subsequently, and for this reason, “A noncognitivist discipline that has learning as its central object is a contradiction in terms” (p.310).

Nevertheless, she indicated that because SLA takes place in a social context, the context must affect the SLA process.

Furthermore, because language learners are not passive recipients of input but actively participate in different kinds of interaction, they also construct their own identities and those of their respective others; these experiences are likely to be reflected in different parts of learners' developing L2 competence. (pp.310–311)

Also apparently interpreting Firth and Wagner's (1997) call as one of seeking balance, Poulisse (1997) agreed that developing linguistic competence involved both acquiring the system and its use. However, Poulisse added that

I would consider the psycholinguistic approach to be primary though, and the sociolinguistic approach to be secondary. You first need to describe the basic processes of learning and using language, and then to discuss the contextual factors that may influence these processes. (p.324)

Summarizing in this way, Poulisse wrote, "Irrespective of one's research paradigm," it seems useful to search for universal and underlying features of language processes (p.325).

## **COMMENTATORS OPPOSED TO FIRTH AND WAGNER'S CALL**

In this third category, I place commentators who seemed to take the greatest exception to Firth and Wagner's (1997) call. Even these commentators, though, acknowledged the merit of a social perspective. For instance, Long (1997) allowed that Firth and Wagner were probably "perfectly justified and probably right in arguing that a broader, context-sensitive, participant-sensitive, generally sociolinguistic orientation might prove beneficial for SLA research" (p.322). However, Long pointed out that it is incumbent upon the challengers not just to assert the benefits, but to demonstrate empirically that social contextual factors are relevant, and that while attempting to do so, Firth and Wagner needed to show "how they plan to deal with some obvious methodological problems" (p.322). Along similar lines, Long accepted the possibility that mainstream SLA research underestimated the impact of NNS social identities but left it to research to determine if this was so.

More important, Long (1997) and Kasper (1997) were united in their belief that, although L2 acquisition occurs through participation in conversation, SLA is centrally about acquisition, not use. Indeed, Long underscored this point by asserting that “most SLA researchers view the object of SLA inquiry as in large part an internal, mental process: *the acquisition of new (linguistic) knowledge*” (p.319). Furthermore,

the goal of research on SLA, qualitative or quantitative, inside or outside the classroom, in the laboratory or on the street, is to understand how changes in that internal mental state are achieved, why they cease (so-called “fossilization”) and which learner, linguistic and social factors (and, where relevant, which instructional practices) affect and effect the process. (p.319)

Besides clarifying the goal of mainstream SLA, Long (1997) made the very important point, also concurring with Kasper (1997), that some form of mental representation of the L2 must exist or how else could it be explained that

the result of a communicative experience or input does not evaporate when the learner leaves the room or when the learner goes to sleep at night; it remains, memory permitting, in the form of a modified, individual, partly idiosyncratic, internal mental representation of the L2. (p.319)

Two issues of the *MLJ* later (Spring, 1998), a further commentary and a response from Firth and Wagner (1998) were published. In the first, Gass (1998) voiced an equally strong reaction to their call. First of all, Gass objected to Firth and Wagner’s (1997) characterization of her work as being about interactional and sociolinguistic dimensions of language because, as she stated,

the goal of my work (and the work of others within the input/interaction framework ...) has never been to understand language use *per se*, but rather to understand what types of interaction might bring about what types of changes in linguistic knowledge. (p.84)

Thus, Gass reprised the important theme present in Kasper and Long’s commentaries that language use is not acquisition. She punctuated this point by noting that the crucial question is “how do people *learn* an L2 — The question is not: How do people *use* an L2, unless the latter question is a means of getting at the former” (p.85). Furthermore, “the emphasis on input and interaction studies is on the language used and not the act of communication” (p.84).

Gass (1998) also clarified the use of NS data as baseline data against which progress in the L2 was measured.

It is not so much that NS interaction is the “norm”, if by that is meant that NNSs are involved in something subnormal or abnormal. The point is that baseline data reflect data from those who are not involved in *learning*. The crucial variable is the presence or absence of learning. (p.86)

Finally, Gass (1998) concluded on a somewhat more conciliatory note:

Views of language that consider language as a social phenomenon and views of language that consider language to reside in the individual do not necessarily have to be incompatible. It may be the case that some parts of language are constructed socially, but that does not necessarily mean that we cannot investigate language as an abstract entity that resides in the individual. Further, as many have argued, there are parts of what we know about language (e.g. what is grammatical and what is ungrammatical) that cannot come from social interaction. The establishment of a rigid dichotomy ... is perhaps misguided. (p.88)

## FIRTH AND WAGNER'S 1998 RESPONSE

In response to these commentaries, Firth and Wagner (1998) restated their belief that the field of SLA was in need of conceptual and methodological broadening; however, they acknowledged that Long (1997) and Kasper (1997) were right to point out the centrality of acquisition. They maintained, though, that the notion of acquisition is not clearly defined and that it is very difficult to pinpoint where use ends and acquisition begins. Firth and Wagner felt it was important, therefore, for researchers to deconstruct the dichotomy of use versus acquisition. They concluded that the notion of competence is obsolete because one simply cannot unproblematically separate performance from competence. Moreover, they argued, by discounting language use, mainstream SLA researchers erected barriers between themselves and those who adopted a more sociolinguistic perspective.

Firth and Wagner (1998) also argued for a more emic view of communication. “Communication is not simply transfer of information in a ‘normal’, that is, native-speaker-equivalent, manner. What may appear ‘abnormal’ to observer-analysts may be regarded as appropriate and ‘normal’ by the interactants themselves”(p.93).

As for methodological implications, Firth and Wagner (1998) remained convinced of the need to collect data from naturally occurring everyday or workplace interactions between speakers of different languages rather than relying on experimental elicited data, which they said mainstream SLA researchers had used. Finally, they asserted that “a ‘functionalist’ model of language, firmly rooted in contingent, situated, and interactionist experiences of the individual as a social being, is better suited to understand language and language acquisition ... than a structural model” (p.92).

## COMPARING THE TWO POSITIONS

From the brief summary of the commentaries and of Firth and Wagner’s (1998) response that I have provided, it should be clear that one view cannot readily accommodate the other. I summarize the two positions in Table 1 in order to underscore this point. For ease of comparison, I have adopted the heuristic of a binary contrast. Of course, displaying the differences in a binary form obscures any overlap or agreement between them and represents the way that I perceive the contrast, one that may not be shared by all authors.<sup>1</sup>

At this point, several observations can be made from reviewing the two positions as summarized in Table 1. First, when reading down the columns, it can be seen that each view is internally consistent. For instance, if you take language to be a mental construct and learning to be a change in a mental state, then it makes sense to seek cognitive explanations. However, if you see language as a social construct and learning as involving a change in social participation, then focusing on language use factors is consistent.

**Table 1: Cognitivist and social views of SLA contrasted**

	<b>Cognitivist SLA (Mainstream)</b>	<b>Social SLA (Challenger)</b>
1. Role of Context	Social context is the site in which L2 acquisition takes place; however, if you change the context, the acquisition process remains the same. The goal is to search for universals that transcend individual contexts.	Social context influences performance. Social factors are related to systematic variation in learner language. Each context is unique although certain generalizations, such as turn-taking principles or observations about repair, can be made.

(continued)

	<b>Cognitivist SLA (Mainstream)</b>	<b>Social SLA (Challenger)</b>
2. Nature of Language	Language is a mental construct.	Language is a social construct.
3. Nature of Learning	Change in mental state.	Change in social participation.
4. Primary Research Focus	The primary focus is on language acquisition (how people learn a language, not how they use it). Given this focus, what is important are cognitive factors of knowledge representation, processing, and recall.	The primary focus is on language use. Language use and acquisition cannot be easily separated. Therefore, what is important are social/ interactional factors and their effect on the language used.
5. Objects of Inquiry in Language-focused Research	What is of interest is the aggregation and increasing complexity and control of linguistic structures by learners.	What is of interest are discursive routines of communication processes. There is also a need to look at the purpose of talk; a functional perspective to language is most helpful.
6. Identity of Research Participants	The salient identity of the participant in a research study is that of a learner.	The identity that the research participant adopts makes a huge difference, and it may not be that of learner. For example, in the moment, a learner may not "perform his or her competence" because he or she might want to align socially with another less competent peer.
7. Perspective on Evaluating Learners' Progress	Progress is measured by where along the route toward target proficiency the learner is as indicated by the learner's linguistic performance.	What is at issue is what the learner does with the resources that are available. Look at what the learner does to get his or her message across, not what the learner cannot do.
8. End State	The end state occurs when learner language and target language are congruent or where learner language is stabilized/fossilized.	There is no end state.

(continued)

	<b>Cognitivist SLA (Mainstream)</b>	<b>Social SLA (Challenger)</b>
9. Philosophical Orientation	Scientific, value-free inquiry Modernist	A critical view Postmodernist
10. Research Site	Varied, sometimes natural environments, sometimes experimental, where data are elicited	Varied contexts where language is used naturally and heterogeneously
11. Primary Level of Research Conceptualizations	<i>Macrolevel</i> idealizations, in other words, native speaker, learner	<i>Microlevel</i> social relationships that are being achieved through talk in progress
12. Attitudes toward Acceptance of SLA Theories	One theory will prevail; empiricism will determine which. Positivist	Multiple theories are welcome, even necessary. Relativist; pluralist

Second, it is clear that in some way both positions are correct. For example, if you accept a structural view of language, as mainstream SLA researchers do, then it could be true that learner performance remains unchanged as learners move from one context to the other (Tarone & Liu's, 1995, research notwithstanding). For instance, in pursuit of an explanation for the English morpheme acquisition orders that early SLA researchers were reporting, I compared the frequency with which teachers in English as a second language (ESL) classrooms were using common grammatical morphemes with that of English-speaking parents speaking to their children acquiring English as their L1. I found that the frequency ranks were significantly positively correlated (Larsen-Freeman, 1976b), presumably because of the ubiquity of these structural elements. However, if you are interested in interactional phenomena, performance may well differ due to social context. It is well known, for instance, that natural use conditions favor self-repair (Schlegloff, Jefferson, & Sacks, 1977), whereas classroom language use favors other repair, usually by the teacher (Schwartz, 1977).

Perhaps the most obvious observation of all to be made from an examination of Table 1 is that researchers do not focus on the same data or ask the same questions. Whereas the cognitivists look to see how linguistic structures are manifest in learners' performance and how learners' performance becomes increasingly accurate, complex, and fluent, socially oriented researchers wish to study instead how language resources are deployed in social situations and how participation changes. Fundamental



questions such as: Is the social context a site for a cognitive process or is it that the social context fundamentally shapes and alters the cognitive process? have not been resolved by either side. In this way, the two viewpoints really exist in parallel worlds (Zuengler & Miller, 2006), with minimal overlap between them. Having such fundamental ontological and epistemological differences has meant that they have not influenced each other very much.

Invoking Sfarid's (1998) distinction between acquisition and participation metaphors, I stated the following in 2002:

the acquisition/use division is ontological in nature, with the two positions reflecting fundamental differences in the way they frame their understanding of learning. Those that operate within an acquisition metaphor study the language acquisition of individuals and evidence of an individual's success is sought in the acquisition of target rules and structures. Those that operate within a participation metaphor study the language use of socially constituted individuals within groups, and seek evidence of success in the learners becoming participants in the discourse of the community. Distinguishing the mainstream and the challenger views in this way is more illuminating than construing the dispute solely as a psycholinguistic versus sociolinguistic split. It is, at the same time, more problematic, for it is far less obvious how such a fundamental difference can be resolved. (Larsen-Freeman, 2002: 37)

## RECONCILING THE DIFFERENCES

The fact that there are competing views in SLA is not remarkable. Indeed, some would find it a very healthy sign (Lantolf, 1996). Moreover, it may be the case that the two positions contrasted above are simply focusing on different aspects of a common problem. In support of this point, Wagner (2004) observed that the Firth and Wagner (1997) claim was not that there are no inner mental states involved in language acquisition; it is simply that, for socially oriented researchers, increasing participation in social life is the main object of description of a social theory of learning. One option, therefore, is for each side to pursue its own research agenda, each accounting for a different dimension and each providing the necessary checks and balances in preventing hegemony in either direction.

Indeed, this option has already been exercised to some extent. Whereas the two positions may have once competed for "air time", now it seems that there is a bifurcation in the field, with each side holding its own conferences,

or at least holding its own dedicated colloquia within conferences, publishing in journals that favor its point of view<sup>2</sup>, and so on. Thus, as Ortega (2005) put it, “views of SLA as a basic science that investigates an aspect of human cognition without regard for knowledge use ... co-exist with views of SLA as inquiry about human capacities that are socially and politically embedded”(pp.318–319). Co-existence does not necessarily mean ignoring the other’s position. Thus, one consequence of the Firth and Wagner (1997) article, it seems to me, is that the challenger’s view must now be reckoned with (see, e.g. Long, 2007).

A second option for dealing with the dispute is to have it adjudicated through empiricism. Long (1997) made this point plainly: “simply asserting that ... a greater ‘balance’ between cognitive and other ‘more holistic’ social views is needed, as Firth and Wagner do, will not make it so”(p.319). Earlier, Eckman (1994) suggested that the relationship between psycholinguistic and sociolinguistic factors in SLA is one that needed to be determined by empirical means, not by arguments alone. However, as Tarone (2000) noted,

neither strand of SLA research has consistently and systematically set out to gather the sort of data which might show whether social factors affect cognitive processes of acquisition in specific ways and thereby enable both strands to see how their work is related. (p.186)

To remedy this situation, Tarone (2000) suggested a research agenda that might help in seeing how the two sides are related, a point that Gass (1998) also suggested would be useful. Tarone posed two questions: (a) “If two L2 learners acquire English in two different social settings, will those learners internalize two different interlanguage (IL) grammars?”(p.187), and (b) What happens if you “change the social setting altogether? Will the way that the learner acquires the L2 change much?”(p.190). Tarone’s answer to the first question was affirmative, and her explanation was that the different grammars are due to the fact that learners receive different target language input in different contexts. Her answer to the second question was also affirmative, though limited to research findings pointing to changes in error correction, developmental sequences, and the negotiation of meaning. In answer to both questions, it should be noted, Tarone adhered, for the most part, to the mainstream definition of the explanandum, that is, linguistic structures.<sup>3</sup> An attempt that does not adhere to the mainstream definition, but that seeks to bring the different positions together, can

be found in calls to use CA longitudinally, accompanied by attempts to investigate how learners actively use the microstructure of interactional language as a resource for acquisition (Markee & Kasper, 2004).

These approaches appear to hold promise. At least they are an attempt to go beyond the polemical debate sparked by Firth and Wagner (1997). However, it is important to remember that, to some extent, answers to questions such as Tarone's (2000) depend on what you are looking for. If you are looking for the ways that context affects different repair strategies, which in turn affect learning, then it is likely that you will find them. However, as I indicated earlier, if you are looking at the frequency of use of common grammatical morphemes, then perhaps you will not. As Sford (1998) warned, "empirical evidence is unlikely to serve as an effective weapon in paradigm wars" (p.12) because the power of data to determine who is right may be confined to the paradigm within which they came into being.

Thus, although I am encouraged by the newer research agendas, it may make sense to pursue another response to Firth and Wagner's (1997) challenge, as well. In addition to co-existence and empiricism to resolve differences, there is a third option, one to which the field of SLA has historically resorted. As I have written earlier:

When faced with challenges to prevailing views in the past, the field of SLA has not replaced a view with its challenger, but rather has repeatedly broadened its domain of inquiry (Larsen-Freeman & Long, 1991). When fault was found with the *a priori* contrastive analysis hypothesis, a view of learning was posited that aimed to explain the SLA process through an analysis of learner errors, appealing to contrastive analysis to account for some of them. In turn, error analysis was encompassed by a view that held that only a complete analysis of the learners' performance, including their errors, would suffice. Performance analysis was subsumed by discourse analysis when it became evident that attention needed to be paid not only to learners' performance, but also to what sorts of interaction they engaged in. (Larsen-Freeman, 2002: 38)

Thus, with a nod to our history, I suggest that the way out of the acquisition versus use dilemma is to find a larger lens with which to examine issues in our field. Furthermore, I have recommended one such lens — Chaos/Complexity Theory (Larsen-Freeman, 1997, 2000a, 2002, 2003, 2006, 2007a; Larsen-Freeman & Cameron, 2008) — not as a new overarching theory, but as another way of reframing the search for understanding.

Chaos/Complexity Theory is an ecological theory (Kramsch, 2002) that concerns the study of complex, dynamic, nonlinear, self-organizing, and adaptive systems (Larsen-Freeman, 1997). Although not conceived to deal with issues of concern to SLA researchers, it has the power to inform them, especially in helping to unify the many dichotomies that SLA researchers have adopted, such as the one relevant to this issue of the *MLJ*, that is, the separation of the use of language from its mental structure. From an ecological perspective, the world is not composed of static forms, stable objectified entities. Instead, change and adaptation are continuous in the world and the phenomena that comprise it, and any perceived stability emerges from the dynamics of the system. The fact is that language forms are being continually transformed by use (Bybee, 2006). As such, any linguistic representation in the learner's mind is strongly tied to the experience that a speaker has had with language and may bear little resemblance to forms that NSs employ or that fit linguists' categories.

When we entertain a view of language in a less mechanistic and more organic way, as a complex adaptive system, we recognize that every use of language changes the language resources of the learner/user, and the changed resources are then potentially available for the next speech event. "The act of playing the game has a way of changing the rules", as Gleick (1987: 24) stated in describing naturally occurring complex adaptive systems. One of the insights gained from applying a more dynamic way of looking at language and its development, therefore, is to see that real-time language processing, developmental change in learner language, and evolutionary change in language are all reflections of the same dynamic process of language usage (see, e.g. Bybee, 2006; Larsen-Freeman, 2003; Smith & Thelen, 1993). These processes are not sequential, but rather they occur simultaneously, albeit at different timescales. It is not that you learn something and then you use it; neither is it that you use something and then you learn it. Instead, it is in the using that you learn — they are inseparable.

The natural state of the linguistic system can then be "defined as a dynamic adaptedness to a specific context" (Tucker & Hirsch-Pasek, 1993: 362), in which the context itself is being transformed by volitional language users/learners. The context does not mean only the physical space. It includes the intersubjective space between interlocutors, among other things. Humans "softly-assemble" (Smith & Thelen, 1993: 3) or adapt their language resources to meet their specific present goals — a make-do extemporaneous response to the communicative pressures at

hand. Adapting their resources sometimes means appropriating extant constructions (Goldberg, 1995; Tomasello, 2000); at other times, it means innovating by analogy or recombination. However, the constructions themselves are not limited to units from linguistic theories, nor are they a priori social constructs. Instead, the language resources themselves are a hugely variegated lot, likely best accounted for from an emic perspective.

The shape of language is surely affected by limitations of human perception and cognitive processing and all the attendant adaptations that processing has meant for language, such as its evolving a fractal or scale-free geometry (Larsen-Freeman, 1997; Larsen-Freeman & Cameron, 2008) to facilitate its learning. Evidence that language is social in nature stems from the fact that it is used for social action within a context of language use (Atkinson, 2002), where pressures and affordances, learners' identities, goals and affective states all have a profound effect on language performance (Cameron & Deignan, 2006; van Lier, 2004).

In short, viewing language as a complex adaptive system makes us regard linguistic signs not as "autonomous objects of any kind, either social or psychological", but as "contextualized products of the integration of various activities by [particular] individuals in particular communicative situations" (Harris, 1993: 311). It logically follows that they are "continually created to meet new needs and circumstances" (Toolan, 2003: 125). The patterns are "created and dissolved as tasks and environments change" (Thelen & Bates, 2003: 381). Some patterns are preferred; others are more ephemeral. The preferred ones become stabilized through frequency of use and the strengthening of connection weights in neural networks. Thus, developmental change seems "not so much the stage-like progression of new accomplishments as the waxing and waning of patterns, some stable and adaptive and others fleeting and seen only under special conditions" (Thelen & Bates, 2003: 380). In this way, it can be said that the learning of language is never complete (Larsen-Freeman, 2005). Furthermore, there is no homogeneity. We create linguistic forms (by combining and analogizing constructions) when we want to make new meanings — we go beyond the input (Larsen-Freeman, 1997).

Because changes in the system are engendered by agents' adaptation to their environment (van Lier, 2004), based on their previous language-using history, both social (learners' roles and relationships, with whom they identify, how they deploy their agency, the amount and type of mediation that occurs, etc.) and cognitive (the attentional resources brought to bear,

the perceptual salience of forms used, their probabilistic frequency, the limitations of short-term memory, etc.) factors are all potentially relevant. However, it is by no means sufficient to show how such factors affect the use of language at the moment. There are already many studies that show, for instance, how social factors affect interlanguage use at a single given time (e.g. Tarone, 2000). Any definition of learning must involve the transcendence of a particular time and space. It must show how the changed resources are henceforth available. As Long (1997) said, they do not just “evaporate”, (p.319). What it is that gets carried over in time and space, of course, is an open question.

From a Chaos/Complexity Theory point of view, what endures is not a rule-based competence, but a structured network of dynamic language-using patterns, stored in memory (Ellis & Larsen-Freeman, 2006; Larsen-Freeman, 2007b) with specific information about instances of use retained in the representation. Because these variegated language-using patterns emerge from language use, they are not only characterized by linguistic features, but they are also sometimes accompanied by gesture, unique prosodics, and by affective, cognitive, and episodic associations, experienced as they are embedded in a sociohistorical context. Thus, an individual’s perceptual, conceptual, and linguistic systems are continually being updated by that part of the context that the individual perceives in the same way that infants’ perceptual, conceptual, and enactive systems are not simply innate, but tuned through the sociocultural world in which they live (Gibson, as cited in Reed & Jones, 1982; Watson-Gegeo & Nielsen, 2003). Experience shapes our neural networks (Watson-Gegeo, 2004). Connectionist models, with their multiply connected networks, parallel distributed processing, and learning as the strengthening of connections through frequency, capture the essential relationship between cognitive development and social experience (Watson-Gegeo & Nielsen, 2003).

Indeed, new work in Chaos/Complexity Theory, dynamic systems theory, connectionism, emergentism, and language usage studies is making remarkable headway in transforming the way we think about language and its learning. A Chaos/Complexity Theory perspective does not reconcile all the differences that I listed in Table 1, but it suggests that the acquisition/use dichotomy can usefully be deconstructed, and it provides a larger container within which to study the complex, dynamic process of SLA.

When I was asked several years ago to comment in this journal on the usefulness of CA for L2 acquisition research, I answered “It all depends.”

Saying that something has been learned, saying what has been learned, when it has been learned, and the reason it has been learned are big challenges for all SLA researchers, cognitivists as well as those who practice CA ... There is no anointing in our discipline — it takes a demonstration of the usefulness of the perspective in producing new insights into learning so that sufficient numbers of others want to join in the work. (Larsen-Freeman, 2004: 606–607)

I myself am less drawn to an acceptance of parallel worlds and more to understanding where the two perspectives intersect. I say this not in an attempt to eliminate internecine feuding, but rather in recognition of the fact that our field is beset by dialectics: learning versus use, psychological versus social, acquisition versus participation, and yet, it is focusing on the dynamic coupling of each pair that is likely to be the most productive. Of course, once again, it should be said that asserting this to be the case is inadequate. Any new way of looking at language acquisition will not take root by pronouncement. What we should be seeking, it seems to me, is not to maintain old walls, or to construct new ones, but instead to open up new spaces (Watson-Gegeo, 2004). Happily, these days, more and more researchers are taking up the challenge of researching language acquisition and use from a *sociocognitive* perspective (see, e.g. Atkinson, 2002; Atkinson, Churchill, Nishino, & Okada, 2007; de Bot, Lowie, & Verspoor, 2007; Ellis & Larsen-Freeman, 2006; Larsen-Freeman & Cameron, 2008). I find evidence that a new critical mass is emerging, and in keeping with our history, I anticipate that the field of inquiry will once again broaden and move on.

## Notes

1. I should also point out that in Table 1 and the discussion of it, I use examples from morphosyntax to illustrate the cognitive focus on linguistic structures and examples from conversational structure to illustrate the social view. I do this because of the theoretical commitments of most of the authors in the articles I discuss. However, by favoring morphosyntax, I do not mean to exclude the studies of the acquisition of phonology and the lexicon that have cognitive underpinnings, nor do I mean to ignore all the work on the social dimensions of language, such as the study of the acquisition of speech events and speech acts and genres or the work of socioculturalists, language socialization researchers, and others who share with conversational analysts a social perspective on

- language use and acquisition.
2. For example, it is my impression that the Second Language Research Forum has attracted either cognitively oriented or socially oriented researchers over the past few years, depending on the theme of the conference set by the convener. Also, to cite another example, SLA researchers operating from a universal grammar perspective tend to publish the results of their research in the journal *Second Language Research*.
  3. Swain, another prominent SLA researcher, has also embraced a more social view of the learning process, while still attempting to account for the same explanandum, that is, linguistic structures (Swain, 2000).

## References

- Atkinson, D. (2002). Toward a sociocognitive approach to second language acquisition. *Modern Language Journal*, 86: 525–545.
- Atkinson, D., E. Churchill, T. Nishino & H. Okada. (2007). Alignment and interaction in a sociocognitive approach to second language acquisition. *Modern Language Journal*, 91: 169–188.
- Bailey, N., C. Madden & S. Krashen. (1974). Is there a “natural sequence” in adult second language learning? *Language Learning*, 21: 235–243.
- Beebe, L. (1980). Sociolinguistic variation and style shifting in second language acquisition. *Language Learning*, 30: 443–447.
- Block, D. (1996). Not so fast! Some thoughts on theory culling, relativism, accepted findings and the heart and soul of SLA. *Applied Linguistics*, 17: 65–83.
- Block, D. (2003). *The Social Turn in Second Language Acquisition*. Edinburgh, UK: Edinburgh University Press.
- Breen, M. (1985). The social context for language learning: A neglected situation? *Studies in Second Language Acquisition*, 7: 135–158.
- Brown, R. (1973). *A First Language*. Cambridge, MA: Harvard University Press.
- Bybee, J. (2006). From usage to grammar: The mind’s response to repetition. *Language*, 82, 711–733.
- Cameron, L. & A. Deignan. (2006). The emergence of metaphor in discourse. *Applied Linguistics*, 27: 671–690.
- Chomsky, N. (1959). A review of B. F. Skinner’s *Verbal Behavior*. *Language*, 35: 26–58.
- Chomsky, N. (1965). *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- Corder, S. P. (1967). The significance of learner’s errors. *International Review of Applied Linguistics*, 5: 161–170.
- Corder, S. P. (1971). Idiosyncratic dialects and error analysis. *International Review of Applied Linguistics*, 9: 147–159.



- Crookes, G. (1997). SLA and second language pedagogy: A socioeducational perspective. *Studies in Second Language Acquisition*, 19: 93–116.
- de Bot, K., W. Lowie & M. Verspoor. (2007). A dynamic systems approach to second language acquisition. *Bilingualism: Language and Cognition*, 10: 7–21.
- Doughty, C. J. & M. H. Long. (Eds.). (2003). *The Handbook of Second Language Acquisition*. Malden, MA: Blackwell.
- Dulay, H. & M. Burt. (1973). Should we teach children syntax? *Language Learning*, 23: 245–258.
- Dulay, H. & M. Burt. (1974). Natural sequences in child second language acquisition. *Language Learning*, 24: 37–53.
- Eckman, F. (1994). The competence-performance issue in second-language acquisition theory: A debate. In E. Tarone, S. Gass & A. Cohen (Eds.), *Research Methodology in Second-language Acquisition* (pp.3–15). Hillsdale, NJ: Erlbaum.
- Ellis, N. & D. Larsen-Freeman. (2006). Language emergence: Implications for applied linguistics — Introduction to the special issue. *Applied Linguistics*, 27: 558–589.
- Firth, A. & J. Wagner. (1997). On discourse, communication, and (some) fundamental concepts in SLA research. *Modern Language Journal*, 81: 285–300.
- Firth, A. & J. Wagner. (1998). SLA property: No trespassing! *Modern Language Journal*, 82: 91–94.
- Firth, A. & J. Wagner. (2007). Second/foreign language learning as a social accomplishment: Elaborations on a re-conceptualized SLA. *Modern Language Journal*, 91(s1): 800–819.
- Frawley, W. & J. Lantolf. (1984). Speaking as self-order: A critique of orthodox L2 research. *Studies in Second Language Acquisition*, 6: 143–159.
- Frawley, W. & J. Lantolf. (1985). Second language discourse: A Vygotskian perspective. *Applied Linguistics*, 6: 19–44.
- Fries, C. C. (1945). *Teaching and Learning English as a Foreign Language*. Ann Arbor: University of Michigan Press.
- Gass, S. (1998). Apples and oranges: Or, why apples are not orange and don't need to be. *Modern Language Journal*, 82: 83–90.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Penguin Books.
- Goldberg, A. (1995). *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: University of Chicago Press.
- Hall, J. K. (1997). A consideration of SLA as a theory of practice: A response to Firth and Wagner. *Modern Language Journal*, 81: 301–306.
- Harris, R. (1993). Integrational linguistics. In A. Crochetière, J.-C. Boulanger, C. Ouellon, (Eds.), *Actes du XVe Congrès International des Linguistes* (pp.321–323). Ste-Foy: Presses de l'Université Laval.
- Kasper, G. (1997). "A" stands for acquisition: A response to Firth and Wagner. *Modern Language Journal*, 81: 307–312.
- Kramsch, C. (Ed.). (2002). *Language Acquisition and Language Socialization: Ecological*

*Perspectives*. London: Continuum.

- Lado, R. (1957). *Linguistics across Cultures*. Ann Arbor: University of Michigan Press.
- Lantolf, J. (1996). SLA theory building: "Letting all the flowers bloom." *Language Learning*, 46: 713–749.
- Lantolf, J. & W. Frawley. (1988). Proficiency: Understanding the construct. *Studies in Second Language Acquisition*, 10: 181–195.
- Larsen-Freeman, D. (1975). The acquisition of grammatical morphemes by adult ESL students. *TESOL Quarterly*, 9: 409–430.
- Larsen-Freeman, D. (1976a). An explanation for the morpheme acquisition order of second language learners. *Language Learning*, 26: 125–134.
- Larsen-Freeman, D. (1976b). Teacher speech as input to the ESL learner. *UCLA Workpapers in TESL*, 10: 45–49.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18: 141–165.
- Larsen-Freeman, D. (2000a). Second language acquisition and applied linguistics. *Annual Review of Applied Linguistics*, 20: 165–181.
- Larsen-Freeman, D. (2000b). An attitude of inquiry: TESOL as science. *The Journal of the Imagination in Language Learning*, 5: 18–21.
- Larsen-Freeman, D. (2002). Language acquisition and language use from a chaos/complexity theory perspective. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization* (pp.33–46). London: Continuum.
- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Gramming*. Boston: Heinle/Thomson.
- Larsen-Freeman, D. (2004). CA for SLA? It all depends. *Modern Language Journal*, 88: 603–607.
- Larsen-Freeman, D. (2005). Second language acquisition and the issue of fossilization: There is no end, and there is no state. In Z.-H. Han & T. Odlin (Eds.), *Studies of Fossilization in Second Language Acquisition* (pp.189–200). Clevedon, UK: Multilingual Matters.
- Larsen-Freeman, D. (2006). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, 27: 590–619.
- Larsen-Freeman, D. (2007a). On the complementarity of chaos/complexity theory and dynamic systems theory in understanding the second language acquisition process. *Bilingualism: Language and Cognition*, 10: 35–37.
- Larsen-Freeman, D. (2007b, April). On the nature of competence. Paper presented at the American Association for Applied Linguistics, Costa Mesa, CA.
- Larsen-Freeman, D. & M. Long. (1991). *An Introduction to Second Language Acquisition Research*. London: Longman.
- Larsen-Freeman, D. & L. Cameron. (2008). *Complexity Systems and Applied Linguistics*. Oxford: Oxford University Press.

- Liddicoat, A. (1997). Interaction, social structure, and second language use. *Modern Language Journal*, 81: 313–317.
- Long, M. (1997). Construct validity in SLA research: A response to Firth and Wagner. *Modern Language Journal*, 81: 318–323.
- Long, M. (2007). *Problems in SLA*. Mahwah, NJ: Erlbaum.
- Markee, N. & G. Kasper. (2004). Classroom talks: An introduction. *Modern Language Journal*, 88: 491–500.
- McKay, S. & S.-L. Wong. (1996). Multiple discourses, multiple identities: Investment and agency in second-language learning among Chinese adolescent immigrant students. *Harvard Educational Review*, 66: 577–608.
- Milon, J. (1974). The development of negation in English by a second language learner. *TESOL Quarterly*, 8: 137–143.
- Nemser, W. (1971). Approximative systems of foreign language learners. *International Review of Applied Linguistics*, 9: 115–124.
- Norton Peirce, B. (1995). Social identity, investment, and language learning. *TESOL Quarterly*, 31: 409–429.
- Ortega, L. (2005). Methodology, epistemology, and ethics in instructed SLA research: An introduction. *Modern Language Journal*, 89: 317–327.
- Poullisse, N. (1997). Some words in defense of the psycholinguistic approach: A response to Firth and Wagner. *Modern Language Journal*, 81: 324–328.
- Preston, D. (1996). Variationist perspectives on second language acquisition. In R. Bayley & D. Preston (Eds.), *Second Language Acquisition and Linguistic Variation* (pp.1–45). Amsterdam: John Benjamins.
- Rampton, B. (1995). *Crossing: Language and Ethnicity among Adolescents*. London: Longman.
- Rampton, B. (1997). Second language research in late modernity: A response to Firth and Wagner. *Modern Language Journal*, 81: 329–333.
- Ravem, R. (1974). The development of Wh-questions in first and second language learners. In J. Richards (Ed.), *Error Analysis* (pp.134–144). London: Longman.
- Reed, E. & R. Jones. (Eds.). (1982). *Reasons for Realism: Selected Essays of James J. Gibson*. Hillsdale, NJ: Erlbaum.
- Schlegloff, E., G. Jefferson & H. Sacks. (1977). The preference for self-correction in the organization of repair in conversation. *Language*, 53: 361–382.
- Schwartz, J. (1977). Repair in conversations between adult second language learners of English. Unpublished master's thesis, University of California, Los Angeles.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10: 209–231.
- Selinker, L. & D. Douglas. (1985). Wrestling with "context" in interlanguage theory. *Applied Linguistics*, 6: 190–204.
- Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, 27: 4–13.
- Skinner, B. F. (1957). *Verbal Behavior*. New York: Appleton-Century-Crofts.

- Smith, L. & E. Thelen. (Eds.). (1993). *A Dynamic Systems Approach to Development*. Cambridge, MA: MIT Press.
- Sridhar, J. (1980). Contrastive analysis, error analysis, and interlanguage. In K. Croft (Ed.), *Readings on ESL for Teachers, and Teacher Trainees* (pp.91–119). Cambridge, MA: Winthrop Publishers.
- Swain, M. (2000). The output hypothesis and beyond: Mediating acquisition through collaborative dialogue. In J. Lantolf (Ed.), *Sociocultural Theory and Second Language Learning* (pp.97–114). Oxford: Oxford University Press.
- Tarone, E. (1983). On the variability of interlanguage systems. *Applied Linguistics*, 4: 142–163.
- Tarone, E. (2000). Still wrestling with “context” in interlanguage theory. *Annual Review of Applied Linguistics*, 20: 182–198.
- Tarone, E. & G.-Q., Liu. (1995). Situational context, variation, and second language acquisition theory. In G. Cook & B. Seidlhofer (Eds.), *Principle and Practice in Applied Linguistics: Studies in Honour of H. G. Widdowson* (pp.107–124). Oxford: Oxford University Press.
- Thelen, E. & E. Bates. (2003). Connectionism and dynamic systems: Are they really different? *Developmental Science*, 6: 378–391.
- Tomasello, M. (2000). First steps toward a usage-based theory of language acquisition. *Cognitive Linguistics*, 11: 61–82.
- Toolan, M. (2003). An integrational linguistic view. In J. Leather & J. van Dam (Eds.), *Ecology of Language Acquisition* (pp.123–140). Dordrecht, The Netherlands: Kluwer Academic.
- Tucker, M. & K. Hirsch-Pasek. (1993). Systems and language: Implications for acquisition. In L. Smith & E. Thelen (Eds.), *A Dynamic Systems Approach to Development: Applications* (pp.350–384). Cambridge, MA: MIT Press.
- van Lier, L. (1994). Forks and hope: Pursuing understanding in different ways. *Applied Linguistics*, 15: 328–347.
- van Lier, L. (2004). *The Ecology and Semiotics of Language Learning*. Dordrecht, The Netherlands: Kluwer Academic.
- Vygotsky, L. (1962). *Thought and Language*. Cambridge, MA: MIT Press.
- Wagner, J. (2004). The classroom and beyond. *Modern Language Journal*, 88: 612–616.
- Watson-Gegeo, K. (2004). Mind, language, and epistemology: Toward a language socialization paradigm for SLA. *Modern Language Journal*, 88: 331–350.
- Watson-Gegeo, K. & Nielsen, S. (2003). Language socialization in SLA. In C. Doughty & M. Long (Eds.), *The Handbook of Second Language Acquisition* (pp.155–177). Malden, MA: Blackwell.
- Weinreich, U. (1953). *Languages in Contact*. The Hague, The Netherlands: Mouton.
- Wode, H. (1976). Developmental sequences in naturalistic L2 acquisition. *Working Papers on Bilingualism*, 11: 1–31.
- Young, R. (1988). Variation and the interlanguage hypothesis. *Studies in Second Language*

*Acquisition*, 10: 281–302.

Zuengler, J. & E. Miller. (2006). Cognitive and socio-cultural perspectives: Two parallel worlds? *TESOL Quarterly*, 40: 35–58.

## Comment after Chapter 12

In the next article, I take up important differences that I identified in the previous one, i.e. the nature of language and its learning. You will recall that in the earlier article, I characterized the cognitive view of language and its learning as one of learners' aggregating linguistic structures of increasing complexity, which learners can subsequently use in performance (which is compared with the performance of native speakers). This is a fairly traditional view of language learning and one that still prevails in the thinking of many language researchers and educators. However, in the article that follows, I point out the theoretical (and perhaps pedagogical) costs to perceiving the learning of language in this way.

By conceiving of language as set of linguistic structures, we reify it to some extent, describing it in terms of linguistic categories. Moreover, we separate language from language learning, thus creating a dualism between language and its development. As I explain in the next article, C/CT takes a different approach. It is concerned with describing the mutual constitution of language and its development. It also counters the tendency to portray learner language as being an incomplete and deficient version of native speaker language. It sees learners not so much as engaged in learning to construct sentences as they are learning to dynamically adapt their language resources to changing situations, including interaction with their interlocutors.

I also introduce five theories that are helpful in supporting this different view of language and its learning. Finally, the article discusses the pedagogical cost of maintaining a static view of language: the "inert knowledge problem", which results when language is taught as a system of fixed structures. The problem is that learners know the linguistic rules governing the structures, but they cannot easily apply them for their own purposes when they need or want to. This is a costly problem, wasting time and discouraging learners.



# Chapter 13

## On the Need for a New Understanding of Language and Its Development

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### INTRODUCTION

For decades, following linguists' aspiration to understand language as a synchronic system, applied linguists have regarded language as a system of static paradigms and rules. Such a view has been the legacy of structural grammar, which originated in the twentieth century with the work of Ferdinand de Saussure (de Saussure, 1916/1959). Structuralists specify paradigms of linguistic units (e.g. lexemes or morphemes), which fit into certain positions in a linguistic unit, or syntagm, such as a sentence. They do not attempt to account for the use of language (*parole*, or speech), but rather its underlying system (*langue*).

Generative grammar, which Noam Chomsky first proposed in the middle of the previous century, also does not seek to explain the use of language (performance), but rather its underlying system (competence) (Chomsky, 1965). Competence, defined as a system of rules, generates all well-formed sentences. It typically functions as an algorithm by which grammaticality is judged in discrete terms (i.e. a sentence is grammatical or ungrammatical). Proponents of generative grammar have further argued that competence is not the result of communicative function and is not simply learned through interaction with others. Instead, generative grammarians believe that properties of a generative grammar arise from an innate universal grammar (UG), which is common to all languages. Importantly, UG researchers, both linguists and applied linguists, seek to determine what constraints there are on human languages and why they exist, e.g. is there a language organ with specific representations that are universal and that facilitate language acquisition?

Very productive research agendas and useful descriptions of language follow from these two types of grammars. They have resulted in a number of language acquisition studies on morphology and syntax, and the descriptions have made their way into language textbooks in the form of paradigms, lists, transformation exercises and rules (among other things). They have also led language teachers and language acquisition researchers to make observations, such as “the learner has or does not have the past tense”, or that a learner produces sentences that are or are not correct. As we will see, such categorical observations are not so useful.

UG also has its limitations in that it is more appropriate for language representation than development (White, 2003), and as such, it does not offer as much to those who wish to investigate indeterminate, variable, nonlinear phenomena such as language development, be it first language acquisition or second language learning. A static algorithm cannot account for the continual and never-ending growth and complexification of language as it develops.

Now it is unfair to criticize a theory for what it does not purport to do.<sup>1</sup> However, even as a theory of linguistic representation, UG rests on a number of assumptions, which have been increasingly challenged these days. It assumes that the system is innate, that syntax is autonomous, and that it operates at the sentence level,<sup>2</sup> and that its units and its subsystems are discrete and invariant. Further, its only reply to a fundamental question in second language acquisition (SLA) — the differential success question — is to suggest that what distinguishes global L2 acquisition from L1 acquisition is that second language learners are only partially able, or even fail entirely, to “access” the innate linguistic system.<sup>3</sup> When appropriated to explain language acquisition phenomena, learners’ performance is described with linguists’ etic categories, and learners’ performance is assessed by its degree of conformity to these. Learners themselves are not assumed to influence the process.

These assumptions are incompatible with an alternative view of language and learning, one inspired by Chaos/Complexity Theory (Larsen-Freeman, 1997), which sees the language system as dynamic, emerging from use, its subsystems interactive, multi-leveled, and heterochronic, grammaticality as gradient (Mohan, 1992), and learning as gradual, situated in a particular context and accomplished by unique goal-oriented agents.

In this chapter, therefore, I will argue that applied linguistics would be well-served by adopting a new conceptualization of language, one that draws on Chaos/Complexity Theory (C/CT) for its inspiration. In an



earlier article (Larsen-Freeman, 1997), I have discussed how the 12 features that characterize complex systems (i.e. that they are not only complex, but dynamic, nonlinear, chaotic at times, emergent, unpredictable, sensitive to initial conditions, open, self-organizing, feedback-sensitive, adaptive and fractal in shape) are also true of language. In the 1997 article and others (Larsen-Freeman, 1998, 2000, 2002a, 2002b, 2003a, 2003b 2006a, 2006b, 2007; Ellis & Larsen-Freeman, 2006; Larsen-Freeman & Cameron, 2008a), I have drawn attention to C/CT for the theoretical perspective it affords, so I will be very brief here. C/CT attempts to account for the behavior of complex dynamic systems, sometimes called complex adaptive systems or CAS, where each of these descriptors and the others listed above have special meanings. For example, “complex” does not mean complicated, but rather that the behavior of the system emerges from the interaction of the components that define it. Although it has originated in the physical sciences and mathematics, it is a theory that can usefully inform views of language in my opinion.

In a complex dynamic system, agents (or elements)<sup>4</sup> interact, and as they do, their relationship changes and some new order emerges. Changes in a system are brought about by the agents’ adaptation to their environment as they learn from their experiences. These changes are often the result of feedback that the agents receive as they engage in activities. Thus, the natural state of the system can be “defined as a dynamic adaptedness to a specific context” (Tucker & Hirsh-Pasek, 1993: 362). Furthermore, when the language system changes from one relatively stable attractor state<sup>5</sup> to another, the point of transition is marked with increased behavioral variability, sometimes referred to as chaos.<sup>6</sup> Having passed through a phase transition, the systems self-organize or restructure, where the new organization may be novel, qualitatively different from earlier organizations. The self-organizing property, when applied to language, suggests that we do not view language complexity as the unfolding of some prearranged plan (Tucker & Hirsh-Pasek, 1993: 364) because all that is required to account for complexity is a sensitive dependence on initial conditions and a language-using context within which the system can adapt and change.

It is important to reconcile the apparent contradiction between the agency of human language users/learners with the notion that their language resources are self-organizing. It is not, in fact, a contradiction. Humans do make intentional choices about what they will learn and what language resources they will deploy in a given situation to express their

meaning and to present themselves in a way that they intend; however, the choices they make are rarely conscious choices to change the system itself. Instead, as historical linguist, Rudy Keller observes, language change is “a consequence of human actions, albeit actions which are only unintentionally transformative”(Keller, 1985: 211).

Because the change is ongoing, the systems are in a non-equilibrium, but ordered state, which is why I referred to their attractor states as only “relatively stable”. It is the dynamism of the systems, in fact, that I wish to highlight in this chapter. Indeed, I will primarily be concerned with the virtue of seeing the language system as a dynamic system (one that has dynamic patterns, such as eddies in a stream, which are stable, but not static). For after all, that language is systematic is not in dispute. Indeed, it is its systematicity that many of us find fascinating. However, what is meant by “system” in “access to the linguistic system” is not especially conducive to describing the dynamics of language use from the perspective of language users, and especially ill-fitted for illuminating the evolutionary dynamics involved in language change and in language development (learning and acquisition), e.g. its variability and instability, its gradual growth, and its periods of turbulence. As Elman (2003: 430) so simply puts it—development is about change over time — not about a succession of snap-shots — frozen in time and fixed.

## THE THEORETICAL COSTS OF THE REIFICATION OF THE LINGUISTIC SYSTEM

One of the costs of the reification of the linguistic system is the need to maintain dualistic thinking. We find ourselves talking about “system and access” or “knowledge and behavior” or “competence and performance” or “langue and parole” or “knowledge and control” or “a property theory and a transition theory” or “acquisition and use”. Such distinctions can have useful heuristic value, of course,<sup>7</sup> but they come at a cost. This dualism obscures the fact that each pair represents two perspectives on the same underlying process. Language structure is shaped by the way that language is used, and its use in turn spurs further development. Bohm calls it “Structure-process”(cited in Nichol, 2003). The fact is that language is being constantly transformed by use. As such, dualistic thinking is unparsimonious and perhaps unnecessary.

A second cost stems from problems we have in representing L2 learner language, which, if anything,<sup>8</sup> is even more variable and dynamic

and which is often portrayed as being an incomplete version of the reified account, so-called “target language”, thus encouraging a deficit view of what has been learned. Even if we successfully avoid “the comparative fallacy” (Bley-Vroman, 1983), we must resort to such unsatisfactory display devices as distribution tables and variable rules and seemingly arbitrary criteria for when something is acquired, rather than seeing language learning as continuous and never-ending. We say that learners have or have not yet reset a particular parameter or, in terms of traditional grammar, “gotten” the past tense or passive voice. We treat a linguistic form as something to be taken in, a commodity to be possessed (Sfard, 1998; Larsen-Freeman, 2002b).

A third cost comes in pedagogical implications. Teaching language as a system of static rules leaves us to contend with “the inert knowledge problem” (Whitehead, 1929), whereby what is learned as knowledge within the classroom does not transfer readily from within the classroom to outside it, or even from one part of a lesson to another. Categorical decisions concerning grammaticality lead to a means of assessment that cannot discriminate among different performances when both are non-target-like. For example, “I eated it yesterday” and “I eat it yesterday” would both be considered ungrammatical, even though the former shows the learner’s awareness of the need to mark past tense. It also overlooks the fact that learners may well be appropriating the system for their own purposes, desiring and demonstrating a different sort of capacity than that of “conformity to uniformity” (Larsen-Freeman, 2003a). As Widdowson (2003) argues it is not a question of “giving” students authentic language, which they are supposed to appropriate, but rather presenting language to students that learners can authenticate for themselves.

These costs are incurred because applied linguists have held a static, computational view of language, a view of language that is still widespread in linguistics.

There is a near-consensus within contemporary linguistics that language should be seen as a system of knowledge — a sort of “mental grammar” consisting of a lexicon that provides information about the linguistically relevant properties of words and a computational system that is responsible for the formation and interpretation of sentences. (O’Grady, 2003: 43)

As a result, many applied linguistics researchers have tackled the issue of L2 development by distinguishing the WHAT from the HOW, i.e.

distinguishing the representation of linguistic knowledge in terms of a property theory from the processing, acquisition, and development of linguistic knowledge in terms of a transition theory (Hulstijn, 2002).

However, these days a static knowledge/computational view of language and its development is giving way to a more dynamic, situated view, encouraging us to problematize what has long been taken for granted. We are pressed to ask “what if” questions: What if “knowing of language” is not knowledge at all? What if, learners do not construct mental models of the target language that are increasingly isomorphic with the etic constructs of linguists? What if we have been unduly influenced by a computational, information-processing perspective from which language is seen to be information that is perceived, encoded, stored, and retrieved (Larsen-Freeman & Cameron, 2008a)?

We are aided in entertaining such questions by the emergence of new theories, theories that do not take as a given the necessity of distinguishing between representation and processing, between acquisition and use.

## A NEW UNDERSTANDING OF LANGUAGE

In straddling the performance/competence distinction (Broeder & Plunkett, 1994), these newer theories reflect a more dynamic view of language. Such views are compatible with C/CT, “in which the act of playing the game has a way of changing the rules” (Gleick, 1987: 24). The rules referred to by Gleick are not linguistic rules, and, in fact, a C/CT perspective supports a view of language as patterned, not rule-governed. Nevertheless, the analogy is useful for representing the truth that we change a language by using it. Of course, this is not a new insight; after all, how else could language change occur? However, by focusing on the “in-between-ness”, the nexus between use and change, rather than imposing artificial bifurcations borne out of methodological convenience (i.e. distinguishing diachronic from synchronic or language acquisition from language use or language learning/acquisition from language change), we come to understand that these are all manifestations of a common dynamic process, operating in different time frames and at different levels of scale (see also Dickerson’s (1976) case for the psycholinguistic unity of language learning and language change).

A new understanding of language then sees language as a self-organizing dynamic system and the language resources of an individual speaker/learner as an interconnected network of dynamic language-using

patterns (Larsen-Freeman & Cameron, 2008a). The development of the system is not an act of conformity, but rather of emergence. From a chaos/complexity perspective, one might argue that the language system is not only restructured or connection weights in a neural network reweighted (depending on which level of abstraction the locus of explanation focuses) as a result of use; it is *created* (Larsen-Freeman, 2003a). As Harris pointed out: “We do not communicate through reference to prior fixed abstract forms, but rather ‘... we create language as we go, both as individuals and as communities’”(cited in Bybee & Hopper, 2001: 19).

Of course, Chomsky was also aware of and interested in constructing a system that accounted for creativity, defined by him as the competence of language users to produce and understand language forms that they had not yet encountered. However, Chomsky’s view of creativity is not the same as the creativity to which I have just referred.

Chomsky’s notion of creativity ... is not a statement about the capacity of the individual to produce strikingly innovative language or to co-create meanings in everyday conversational exchanges involving more than one speaker, but rather a statement about a genetically endowed capacity to exploit an underlying system. It is an essentially biological view, in which language is separate from external and social or cultural influences. Its main parameters are the universal properties of language and the underlying competence of language users, not particularly creative instances of its uses, whether spoken or written. (Carter, 2004: 78)

In a dynamic system, on the other hand, it is not a static competence that accounts for creativity. The state of a system changes over time and so do the relations among the elements that constitute it, such as happens with a developing embryo.<sup>9</sup> For after all, language is not a closed, entropic system. It does not settle down to a point of equilibrium. Instead, as with other naturally-occurring systems, language is dynamic, constantly evolving, self-organizing. Thus, creative patterns can form and re-form dynamically and organically over stretches of discourse, and emerge co-creatively between speakers even in ordinary conversation (Carter, 2004).

In contrast, much psycholinguistic research proceeds as if a static and complete set of grammar rules was available and that its acquisition was the goal of language acquisition. UG theorists talk about end-state grammars, but from a C/CT perspective, there is no end and there is no state (Larsen-Freeman, 2006a). Projections from traditional grammar such as the learner’s

acquisition of verb tenses, and so on, continue as if the learner were filling out details of an already existent paradigm. But this is not likely to be the case from the learner's perspective. With a different understanding of language — one that is more dynamic — not only do we get a more variegated portrayal of language, we also get a different (emic) perspective on its development. Learning is not the taking in of linguistic forms, but the constant adaptation of one's language resources in response to the communicative situation. As Hopper (1998) puts it, forms are constantly being adapted to the needs of the hearer or audience — speech is performed in a context of adjustment to others. Thus, learners are not engaged in learning sentences, but rather in learning to soft-assemble (Thelen & Smith, 1994) their language resources in an intentional way to meet the present contingencies and to reflect who they are and how they wish to be seen, and to adapt them to the situation at hand to the degree that they wish.

Of course, to some extent language-using patterns involve conventional structures, for without them, mutual intelligibility would be impossible. However, the dividing line between conventional language structures and novel structures can be seen to be constantly changing under the influence of everyday language use, leading Thompson and Hopper (2001: 48) to conclude that “Grammar is a name for the adaptive complex, highly interrelated, and multiply categorized sets of recurrent regularities that arise from doing the communicative work that people do”.

There is no consistent level at which these regularities are stable — their boundaries may or may not coincide with the constituent boundaries of linguists' grammatical descriptions. Instead, they may be words, phrases — constructions — patterns of various lengths, specificity and complexity. Still, every use of language changes its resources, and the changed resources are then used in the next learning event. One of the promises of applying a more dynamic way of looking at language, therefore, is that it connects real-time processing to change over development time (see, for example, Smith & Thelen, 1993). Finally, this new understanding of language obviates concerns about the variability and indeterminacy of interlanguage performance. If language is a dynamic system, then variability of performance and indeterminacy of speakers' intuitions would naturally follow. As Klein (1998: 540–541) puts it: “there is no structurally well-defined ‘external language’, nor is the perfect internal representation of such a structurally well-defined and stable entity the normal case ... A real language is a normative fiction”.

## RESEARCH WITHIN THE NEW UNDERSTANDING OF LANGUAGE

This new understanding of language in linguistics/applied linguistics will likely require new study designs, new analytic techniques, and perhaps new definitions of the rules of evidence (Larsen-Freeman & Cameron, 2008b; see the articles in Ellis & Larsen-Freeman, 2006). Van Gelder and Port (1995) have distinguished among three means of investigating dynamic systems: quantitative modeling, qualitative modeling and dynamical description. The first is not likely to be of much use to applied linguists because it requires a direct mathematical description of a system, in which all variables affecting a system can be quantified and then used to predict the subsequent behavior of a system. However, several applied linguists have productively used qualitative modeling, in which a simpler system is abstracted from the system under investigation, one which seems to behave in similar ways to it. To show how C/CT can be used to model both inorganic elements and organic agents, let me cite the work of two researchers.

Meara (1999) uses qualitative modeling to investigate self organization in bilingual lexicons. Meara employed a Random Autonomous Boolean Network model, a form of cellular automata, which are complex systems made up of parts or cells which interact with each other. In Meara's research, the parts are words or lemmas. In his model, some of the cells represented words/lemmas in the L1 and some in the L2. Meara assumed that there were likely some interactions possible between L1 and L2 lexicons (i.e. that they are not two entirely separate systems, in which an impact on one would have no impact on the other), but that there must also be some constraints on the interactions or otherwise a single, undifferentiated system would result. By selectively activating L1 or L2 units, Meara was able to simulate a pattern of lexical activity that potentially explains how bilinguals keep their two languages separate, yet which also shows how even a small amount of L2 input can effectively disable the L1 and tune the L2. By so doing, he explains the "Boulogne ferry effect", in which just hearing a few L2 words can re-activate the knowledge of L2 words that had once been learned, but presumably forgotten. Models such as Meara's can then be tested against actual data from bilinguals.

In Satterfield's computer simulations, the units are human beings. Satterfield (2001) uses the simulations to explore creole genesis. Satterfield models the origin of Sranan within a Surinamese plantation setting by

examining how emergent linguistic representations arise from external conditions found in this specific language contact situation. Computer simulations induce dynamic interactions between speakers, tracking each agent's (extra-linguistic) activity base and linguistic development.

Dynamical description, the third of van Gelder and Port's three categories, is also beginning to be used in applied linguistics. Employing such an approach, Cameron (2000) was able to describe classroom data from an EFL lesson in a rural north Norwegian primary school. Engaging in a dynamical description of classroom data requires collecting data over several interacting timescales (particularly the microgenetic and the ontogenetic), in which it is assumed that dynamical principles apply to each, with changes in one level giving rise to changes in the other (Cameron, 2000: 11). For the purposes of her exploratory study, Cameron was only able to research the microgenetic level. To do so, Cameron used tools from discourse analysis and conversational analysis to reveal collaborative patterns of interaction in the way that the teacher and children used their language resources. Distinguishing task-as-plan from task-as-action (see Coughlin & Duff, 1994, for a similar distinction), Cameron was able to trace how the task-as-action metamorphosed from a general teacher prompt (a question about Arctic foxes) to a series of teacher elicitations with minimal student response. However, with one of the children in particular, who "subverted" the task-as-action by not replying to the teacher's questions, but rather by producing an alternative piece of information (telling his class about his pet budgie, rather than contributing to the discussion of polar animals), a phase shift in interactional control occurred, with the student's language taking over the organization of the conversation. In other words, the student's subversion caused a shift in the trajectory of language use. Student-initiated shifts in the dynamics of tasks, e.g. through subversions, and their impact on language use, may be an important focal point for empirical investigation of how classroom interaction contributes to learning from a C/CT perspective.

Cameron's research findings are reminiscent of Gleitman *et al.*'s (1984) work that showed that the quality of child-directed speech changes as the child grows, coming to approximate more closely adult-directed speech. Here is evidence that the input and the developing system are mutually-constitutive, with each changing to accommodate the other — "a reciprocal dynamism", — it might be called (Cameron & Larsen-Freeman, 2007; see also Dale & Spivey's (2006) notion of "syntactic coordination" and Atkinson



*et al.*'s (2007) "alignment"). This characterization of input is different from static depictions of input in theories that tend to regard the environment as a triggering mechanism, fostering the maturation of innate structure. It also differs from theories that regard the context as primary and suggest that the communicative context and highly structured input propel the system forward (Tucker & Hirsh-Pasek, 1993). Instead, this view respects learner agency, captures the dynamism of the process, and shows how different developmental trajectories for each individual can arise. Indeed, applying a dynamical description to an analysis of the developing language of five Chinese learners of English (Larsen-Freeman, 2006b) reveals that individuals clearly chart their own unique paths and that variation is central to the enterprise of learning, as our more sociolinguistically-oriented applied linguistic colleagues have been saying for some time.

Of course, C/CT's contributions to language development can also be studied using more traditional research methods, such as experiments. For instance, if it is the case that children attend to fundamental frequency and syllable lengthening as cues to linguistic segmentation (Hirsch-Pasek *et al.*, 1999), then it would be productive to conduct an experiment in which certain acoustic cues in speech are experimentally manipulated to see whether a phase shift, such as those found in other C/CT systems can be elicited (Tucker & Hirsh-Pasek, 1993).

Others within our field have already found that they could appropriate a dynamic view of language, such as has been described here, for theoretical purposes. For instance, Herdina and Jessner (2002) have done so to construct a dynamic model of multilingualism, Leather (2002) and Lemke (2002) to discuss a model of development, and Lee and Schumann (2003) to posit a theory of language evolution. Still others have made use of some of the principles of C/CT<sup>10</sup> in advancing an ecology of language acquisition (Kramsch, 2002; van Lier, 2002, 2004; Leather & van Dam, 2003) and a sociocognitive approach (Atkinson, 2002).

## **ALTERNATIVE THEORIES TO SUPPORT A NEW CONCEPTUALIZATION OF LANGUAGE**

Chaos/Complexity Theory is not the only approach that suggests that language be viewed in a more dynamic fashion. In fact, because of its breadth and level of abstraction, it might be good to think of it as offering an overarching theoretical perspective or supra-theory (Cameron &

Larsen-Freeman, 2007), with other theories, where they are compatible, providing the necessary conceptual and operational tools (see Larsen-Freeman & Cameron, 2008a and the September 2003 special issue of *Developmental Science*). Here, only a few examples can be provided.<sup>11</sup>

One supporting theory lies with connectionism (Gasser, 1990).<sup>12</sup> Connectionists use computers to model neural networks in the brain. Certain nodes in connectionist networks are strengthened as language data are taken in; others are weakened. In this way, language is seen to be a “statistical ensemble” of interacting elements (Cooper, 1999: ix), constantly changing. Because of their dynamic nature, connectionist models combine language representation with language development, obviating the need for two different theories (Mellow & Stanley, 2001; Hulstijn, 2002). The most relevant example of a model that was “paleo-connectionist”, but which “has now merged into the river of connectionism” (Thelen & Bates, 2003), is the Competition Model (MacWhinney & Bates, 1989).<sup>13</sup> Core Competition Model beliefs about language and its development include that language is function-driven, rather than rule-driven, that language is learned from input in a statistical or probabilistic way, and that language learning is nonlinear, whereby gradual changes can lead to emergent properties (Thelen & Bates, 2003: 385).

Other connectionist models also rely on emergentist theories of language (e.g. Ellis, 1998; Elman *et al.*, 1998; Elman, 2003; Tomasello, 1998, 2003; MacWhinney, 1999), which hypothesize that structural regularities in language arise from learners’ analysis of the distribution of forms in the language input to which they are exposed and use over the course of their lifetimes.<sup>14</sup> Thus, as Ellis (2003) has put it, emergentists believe that a rule-based linguistic description is the explanandum, not the explanans. This is a view very different from the traditional conception of rules as (a priori) mental representations that comprise competence.

Closely related, but not necessarily connectionist, are usage-based theories or cognitive linguistic theories (Barlow & Kemmer, 2000; Langacker, 2000; Tomasello, 2000; Bybee & Hopper, 2001; Bybee, 2006, 2008; Robinson & Ellis, 2008), which hold that we learn the system from usage. Constructionist theories of child language acquisition account for the emergence of creative patterns from children’s analyses of the utterances in their usage history and from their abstraction of regularities within them (Tomasello, 1998, 2003; Ellis & Larsen-Freeman, 2006; Goldberg, 2006). These regularities are much more variegated than

what traditional theories seek to explain. For instance, Tomasello (2003) includes individual words and phrases, idioms, metaphors, non-canonical collocations, and constructions, a much more complex and diverse set of representations than the “core grammar” of formal approaches.

A second alternative, Dynamic Systems Theory (DST) (Smith & Thelen, 1993; Thelen & Smith, 1994; Kelso, 1995; Port & van Gelder, 1995; van Geert, 2003), is closely aligned with connectionism. Although it has had the greatest impact in accounting for early sensorimotor development in infants, the two theories have much in common (Thelen & Bates, 2003). For one thing, dynamic systems theory, like connectionism, does away with the distinction between competence and performance. Dynamic system researchers feel no need to invoke an underlying mental competence to explain human behavior in context. Instead, an organism’s ongoing activity continuously changes its neural states, just as growth changes the physical dimensions of the body. Further, patterns are thought to emerge from the complexity of the system and its energetic status. Just as real-time states must lose stability to shift to new forms of actions, so also must preferred patterns of behavior lose stability to engender developmental change. DST has been applied more recently to matters of central concern to applied linguists, that of language acquisition and learning (van Geert & van Dijk, 2002; van Geert & Steenbeek, 2005; de Bot *et al.*, 2007; de Bot, 2008).

A third alternative, which also assumes that linguistic regularity is an endpoint, not a means, is offered by probabilistic linguistics. Probabilistic linguists treat linguistic phenomena non-categorically, i.e. they seek to account for the gradiency of linguistic behavior manifest, for example, by judgments of well-formedness that are not absolute, but rather display properties of continua. Probabilistic linguists assume not only that language changes over time, but also that it is inherently variable. Importantly, for the purposes of this chapter, probabilistic linguists also call into question the need for an innate language faculty in order to contend with the “poverty of the stimulus”, showing that unlike categorical grammars, probabilistic grammars are learnable from positive evidence alone. In fact, “if the language faculty is probabilistic, the learning task is considerably more achievable” since “variability and continuity both enhance learning” (Bod *et al.*, 2003: 7; see also computational linguistics, e.g. Jurafsky & Martin, 2000).

A fourth alternative is emergent grammar. In objecting to Chomsky’s

portrayal of grammar as a static object, which is fully present at all times in the mind of the speaker, Hopper (1988) proposes instead that grammar is a phenomenon “whose status is constantly being renegotiated in speech and which cannot be distinguished *in principle* from strategies for building discourses”(Hopper, 1988: 118). As Hopper puts it: “Its forms are not fixed templates, but arise out of face-to-face interaction in ways that reflect the individual speakers’ past experience of these forms, and their assessment of the present context, including especially their interlocutors, whose experience and assessments may be quite different.”(1998: 156) Thus, according to Hopper, “language is a real-time activity, whose regularities are always provisional and are continually subject to negotiation, renovation, and abandonment”(Hopper, 1988: 120), a dynamic view of language if there ever was one.

A fifth alternative is sociocultural theory, which according to Lantolf and Pavlenko (1995: 116) “erases the boundary between language learning and language using”. Then, too, echoing a theme of this article, Newman and Holzman (1993: 39) in discussing Vygotsky’s notion of linguistic tool(s) state, “their function is inseparable from the activity of their development”. Such views clearly overcome the dualism, which I pointed to earlier as a problem inherent in the “accessing the linguistic system” concept. In its place, are posited ontogenetic and microgenetic domains, which are inextricably linked.

Of course, these five approaches rest upon different ontological and epistemological foundations, and therefore, generalizing from them is a risky business. For instance, although probabilistic linguistics rejects the idea that linguistic competence is categorical and discrete, it retains the construct of linguistic competence, assuming that knowledge of variation forms part of it. Then, too, sociocultural theory and emergent grammar are the only ones that have taken social interaction seriously as the source of structure in cognitive development. As a final example of their diversity, the embodiment in dynamic systems theory, sociocultural theory, a sociocognitive approach and cognitive linguistics, although not incompatible with the other perspectives, is not dealt with in the others. In addition, some of these theoretical perspectives have been more developed than others, and they do not all possess the characteristics of what I have called the overarching theory. However, I have drawn attention to them to underscore the point that entertaining an alternative, more parsimonious, view to that of “accessing an innate system” is possible.

## REVISITING THE COSTS IN MAINTAINING THE “ACCESSING AN INNATE LINGUISTIC SYSTEM” METAPHOR PERSPECTIVE

Earlier, I suggested that there were three costs incurred in maintaining an exclusively structuralist or generativist perspective. I have used this chapter to address the first of the three costs: the need to maintain dualistic thinking, specifically a system and its access. C/CT is centrally concerned with describing the mutual constitution of system and change, which is why I feel it can contribute to how we conceive of what we study in a way that is more reflective of its dynamic nature and, at the same time, overcome the dualistic thinking that is fostered by segregating a system from its development (Larsen-Freeman, 2002b) or acquisition from use (Larsen-Freeman, 2007).

Admittedly, the second cost — how to represent (learner) language — still presents a vexing problem, one with which I have not dealt in this chapter. Symbolic accounts, such as that which underlies the “accessing the linguistic system” perspective are the norm in our field, and it is difficult to know how to characterize an alternative.<sup>15</sup> For example, should the current level of activation of distributed connection weights in subsymbolic connectionist systems be considered “competence”, or as Gasser (1990: 181) puts it, “memory” ?

Clark (1997) finds that representation in the brain should not lead, as do more traditional computational models, to the separation of the brain from the body and from the environment in which it functions — including other people. Clark argues that cognitive activity should not be seen as autonomous and separate when it quite obviously is affected by a range of physical and contextual factors. Dynamic systems theory, with its emphasis on perceptual-motor development, certainly shares Clark’s view in espousing the fully embodied mind. So, too, do biologists Maturana and Varela (1987) who see cognition no longer “as problem solving on the basis of representations; instead, cognition in its most encompassing sense consists in the enactment or bringing forth of a world by a viable history of structural coupling” (Varela *et al.*, 1991: 205), “structural coupling being our history of recurrent interactions” (Maturana & Varela, 1987: 138).

More recently, Spivey (2007) has developed a complex dynamic view of mind that he calls “continuity psychology”. He points out the inadequacies of a computer metaphor of mind and of the viability of an alternative perspective that sees the mind in continual flux and mental processes as

continuously dynamic. According to Spivey, this entails dropping “the assumption of stable symbolic internal representations ... continuing on to a fully ecological dynamical account of perception, cognition, and action”(2007: 332) that connects brain, body, and world.

Of course, some in our field would not be bothered by our inchoate efforts to represent learner language as a dynamic system. This is because they subscribe to the “participation metaphor”(Sfard, 1998), wherein what changes as learners progress is not any sort of mental competence, but rather learners’ movement from peripheral to fuller participation in communities of practice. They would agree with researchers such as Thelen (Thelen & Bates, 2003) who does not think representation in the brain is an issue at all, claiming that there is no need to infer unobservable mental structures apart from behavior in context. “Dynamic systems theory [at least pre-1994, see the September 2003 special issue of *Developmental Science*] says that it is not useful to ask what a child ‘really knows’ because there is only behavior assembled to do tasks”(Thelen & Bates, 2003: 382). This is consonant with J. J. Gibson’s (1979) perceptual learning theory in which the various aspects of information processing are seen to be superfluous since “much of the structure attributed to sundry buffers and operators inside the mind was really coming from the active process of behaving in a structured world, a world which could be accessed directly”(Thelen & Bates, 2003: 388).

Those who do feel that purely mental representations are important, probabilistic linguists, for example, still find mental competence a useful notion, the difference from other linguistic accounts being that their rules of competence allow for probabilities. Then, too, corpus linguists and those who favor exemplar-based approaches (Truscott, 1998; Ellis, 2003) find that linguistic units are likely encoded in memory as chunks, not as rules.

Of course, all of these ways of thinking about and representing the system reflect the diversity in the theorists’ locus of explanation. Perhaps the most that can be said about the representation issue is to remember that, following Marr’s (1982) theory of vision, the same object may be represented at various levels of detail. At one extreme level, the thing of interest is treated in a very general way, e.g. the participation metaphor; at the other extreme, the object of inquiry is treated with great detail, e.g. specific exemplars stored in memory. What is important to remember is that both extremes are already abstracted from the focus of inquiry, necessitating some form of representation, which already filters out many of these details. A

consequence of this is that we cannot simply talk about something having some property; rather, we must talk about whether, given a certain level of detail and a certain locus of explanation, it is seen to have this property.

As for the third cost — the inert knowledge problem, which results when grammar is taught as a static system — in response, I have offered “grammaring” (Larsen-Freeman, 2003a). In coining the term *grammaring*, I have sought to emphasize teaching grammar as a procedural skill so that students learn to use grammatical structures, not only to assimilate knowledge of the rules. Moreover, I have argued, consonant with cognitive linguistics, that the ability to use grammar structures will be promoted by students’ understanding of the underlying semantic and pragmatic reasons for why things are structured as they are. In other words, teachers should teach reasons, not only rules. Further, I have suggested that students’ *grammaring* ability will also be enhanced when they engage in meaningful or intentional practice, using grammatical structures for their own purpose(s). Such a view takes into account the natural second language acquisition process, in which the developing language does not change through aggregation, but rather through morphogenesis (Larsen-Freeman, 2003a) or the creation of new forms, which is what language users do — including second language learners. In addition, it respects the non-discrete, nonlinear nature of language learning. From this perspective, learning does not add knowledge to an unchanging system — it changes the system (Feldman, 2006).

## CONCLUSION

I conclude this chapter as I began it. Structural descriptions of language and the notion of “accessing the linguistic system” have a place in applied linguistics research. We certainly need to know more about our genetic inheritance, the initial conditions/constraints on human language and their influence on language/language development. Surely the human capacity for language must derive in part from the genome, even though the capacities are likely to be general cognitive, and not language-specific, ones. However, even our understanding of the contribution of the genome will be better served when we choose less static depictions than referring to the underlying neural machinery as being “built-in”. Indeed, recent research in molecular biology suggests that thinking of our genetic inheritance as a blueprint is misguided. A better way of thinking about genomes is that they describe processes for building things rather than

pictures of finished products (Marcus, 2004).

I am prepared to accept the criticism that the view I am proposing in this chapter puts too much emphasis on a process view of language. However, as language develops, changes, and is used continuously in real time, I do believe that we must find a better conceptualization than relying on theories that merely replace one symbol or representation with another to model these processes. As Smith and Thelen (1993: 10) state “dynamic systems provides the metaphor to account for the context-dependent, ‘fuzzy’, idiosyncratic, and flexible aspects of performance as well as for its global similarities”. As they put it (with my substitutions/elaborations in brackets):

[W]hen we reject the [dualistic] assumption that behavior is motivated by forming internal representations [which are subsequently accessed], we free ourselves to ask questions that are truly *process*-oriented. Thus, we seek to know less what [learners] *have* inside, but how they marshal their available resources to solve a functional problem. When we substitute concepts [from Chaos/Complexity Theory] for innate structures and stages, we open up new operational strategies for truly understanding the motors of change, rather than providing descriptions of the products of change. When we welcome variability and individual differences as part of the data rather than as noise, we can begin to find principles that unite individual differences and species similarities.

Ultimately, of course, the test of this new understanding of language is whether it helps us to explain more or otherwise deepens our understanding. I believe that seeing language/language development more dynamically has the potential to do this, and that indeed a major shift of perspective is already underway in our understanding of language.

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## **Notes**

1. However, UG does have a specific learnability component connected with it. According to Chomsky (1965), explanatory adequacy for any theory of lan-



guage must account for how children are able to acquire language, i.e. how they are able to choose the correct grammar from all possible grammars on the basis of the input provided.

2. The fact that the sentence is chosen, as opposed to the utterance, reveals its written-language bias. This is relevant because many of the syntactic complexities it seeks to explain do not arise in oral discourse.
3. Although this is not assumed by all those who adopt this theoretical orientation; some, for example, Epstein *et al.* (1996) assume full access to UG for all second language learners.
4. The theory applies both to organic agents, for instance, agentic consumers in an economy, and inorganic elements, for example, atoms of rubidium gas in a Bose-Einstein condensate. Clearly, there are significant differences in the way that agents and elements behave. Human agents, for instance, not only adapt, but more importantly intentionally change the world in ways that elements cannot; however, the complex, dynamic, and adaptive behavior of both types of components can be modeled and explained by this theory.
5. Attractors are behavioral states that the system prefers.
6. A classic example of this in language learning occurs at the trough of the U, in a U-shaped learning curve. In terms of language change, an example on a longer time scale might be the fluctuation in vowel length articulation that accompanied the Great Vowel Shift before it regularized.
7. Some of these were adopted deliberately to facilitate a description of language as an idealized system, i.e. apart from the messiness engendered by its use.
8. Although much work in L1 acquisition (Hopper, Bybee, Tomasello) demonstrates that L1s are far more variable and dynamic than mainstream linguistic theories suggest.
9. Although in embryo development, there is a point at which the embryo ceases being an embryo. This is not the case with language evolution.
10. Although they do not always draw directly from C/CT for them.
11. For example, I could have easily included systemic functional linguistics, conversation analysis, interactional sociolinguistics, corpus-based linguistics, construction grammar and language socialization approaches here, and I do in my other writings. For this chapter, however, I have chosen to focus on newer approaches.
12. It is not my intent to wholly endorse any of these approaches by including them. Each has strengths and limitations. For example, connectionist models sometimes employ the algorithm of back propagation, which is said to be neurologically implausible and not suitable for language acquisition, due to catastrophic forgetting (Nelson, 2007). Then, too, even those committed connectionists have pointed to the disembodied and asocial nature of computer models of learning.

13. See MacWhinney (2008) for an updated version of the Competition Model, which attempts to unify an explanation for both L1 and L2 acquisition.
14. And, of course, a long time ago, Larsen-Freeman (1975) showed this taking place in second language acquisition with the frequency of occurrence of forms in the input correlating with the accuracy order in learners' language production, and the learners' suppliance of morphemes appearing to be item-based rather than rule-based.
15. Of course, it is possible to have a symbolic account of language without computation, as John Searle has done.

## References

- Atkinson, D. (2002). Toward a sociocognitive approach to second language acquisition. *Modern Language Journal*, 86(4): 525–554.
- Atkinson, D., E. Churchill, T. Nishino & H. Okada. (2007). Alignment and interaction in sociocognitive approach to second language acquisition. *Modern Language Journal*, 91(2): 169–188.
- Barlow, M. & S. Kemmer. (Eds.). (2000). *Usage Based Models of Language*. Stanford, CA: CSLI Publications.
- Bley-Vroman, R. (1983). The comparative fallacy in interlanguage studies: The case of systematicity. *Language Learning*, 33(1): 1–17.
- Bod, R., J. Hay & S. Jannedy. (Eds.). (2003). *Probabilistic Linguistics*. Cambridge, MA: MIT Press.
- Broeder, P. & K. Plunkett. (1994). Connectionism and second language acquisition. In N. Ellis (Ed.), *Implicit and Explicit Learning of Languages* (pp.421–453). London: Academic Press.
- Bybee, J. (2006). From usage to grammar: The mind's response to repetition. *Language*, 82(4): 711–733.
- Bybee, J. (2008). Usage-based grammar and second language acquisition. In P. Robinson & N. Ellis (Eds.), *Handbook of Cognitive Linguistics and Second Language Acquisition* (pp.216–236). New York & London: Routledge.
- Bybee, J. & P. Hopper. (Eds.). (2001). *Frequency and the Emergence of Linguistic Structure*. Amsterdam/Philadelphia, PA: John Benjamins Publishing Company.
- Cameron, L. (2000). The complex dynamics of language use on tasks. Working paper. School of Education, University of Leeds.
- Cameron, L. & D. Larsen-Freeman. (2007). Complex systems and applied linguistics. Review Article. *International Journal of Applied Linguistics*, 17(2): 226–240.
- Carter, R. (2004). *Language and Creativity*. London & New York: Routledge.
- Chomsky, N. (1965). *Aspects of a Theory of Syntax*. Cambridge, MA: MIT Press.
- Clark, A. (1997). *Being There: Putting Brain, Body and World Together Again*. Cambridge,

MA: MIT Press.

- Cooper, D. (1999). *Linguistic Attractors: The Cognitive Dynamics of Language Acquisition and Change*. Amsterdam/Philadelphia, PA: John Benjamins Publishing Company.
- Coughlin, P. & P. Duff. (1994). Same task, different activities: Analysis of an SLA task from an activity theory perspective. In J. Lantolf & G. Appels (Eds.), *Vygotskyan Approaches to Second Language Research* (pp.173–193). Norwood, NJ: Ablex.
- Dale, R. & M. Spivey. (2006). Unraveling the dyad: Using recurrence analysis to explore patterns of syntactic coordination between children and caregivers in conversation. *Language Learning*, 56(3): 391–430.
- de Bot, K. (2008). Introduction: Second language development as a dynamic process. *Modern Language Journal*, 92(2): 166–178.
- de Bot, K., W. Lowie & M. Verspoor. (2007). A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and Cognition*, 10(1): 7–21, 51–55.
- de Saussure, F. (1916/1959) *Cours de Linguistique Générale*. C. Bally & A. Sechehaye (Eds.). (translated in 1959 as *Course in General Linguistics*, W. Baskin, trans.) New York: Philosophical Library.
- Dickerson, W. (1976). The psycholinguistic unity of language learning and language change. *Language Learning*, 26(2): 215–231.
- Doughty, C. & M. Long. (Eds.). (2003). *The Handbook of Second Language Acquisition*. Malden, MA: Blackwell Publishing.
- Ellis, N. (1998). Emergentism, connectionism and language learning. *Language Learning*, 48(4): 631–664.
- Ellis, N. (2003). Constructions, chunking, and connectionism: The emergence of second language structure. In C. Doughty & M. Long (Eds.), *The Handbook of Second Language Acquisition* (pp.63–103). Malden, MA: Blackwell Publishing.
- Ellis, N. & Larsen-Freeman, D. (Eds.). (2006). Language emergence: Implications for applied linguistics. Introduction to the special issue. *Applied Linguistics*, 27(4): 558–589.
- Elman, J. (2003). Development: It's about time. *Developmental Science*, 6(3): 430–433.
- Elman, J., E. Bates, M. Johnson, A. Karmiloff-Smith, D. Parisi & K. Plunkett. (1998/1996). *Rethinking Innateness: A Connectionist Perspective on Development*. Cambridge, MA: MIT Press.
- Epstein, S., S. Flynn & G. Martohardjono. (1996). Second language acquisition: Theoretical and experimental issues in contemporary research. *Behavioral and Brain Sciences*, 19: 677–758.
- Feldman, J. (2006). *From Molecule to Metaphor: A Neural Theory of Language*. Cambridge, MA: MIT Press.
- Gasser, M. (1990). Connectionism and universals in second language acquisition. *Studies in Second Language Acquisition*, 12(2): 179–199.
- Gibson, J. J. (1979). *The Ecological Approach to Visual Perception*. Boston, MA: Houghton Mifflin.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York: Penguin Books.

- Gleitman, L., E. Newport & H. Gleitman. (1984). The current status of motherese hypothesis. *Journal of Child Language*, 11(1): 43–79.
- Goldberg, A. (2006). *Constructions at Work: The Nature of Generalization in Language*. Oxford: Oxford University Press.
- Herdina, P. & U. Jessner. (2002). *A Dynamic Model of Multilingualism*. Clevedon: Multilingual Matters.
- Hirsch-Pasek, K., R. Golinkoff & G. Hollich. (1999). Trends and transitions in language development: Looking for the missing piece. *Developmental Neuropsychology*, 16(2): 139–162.
- Hopper, P. (1988). Emergent grammar and the a priori grammar postulate. In D. Tannen (Ed.), *Linguistics in Context: Connecting Observation and Understanding* (pp.117–134). Norwood, NJ: Ablex Publishing Corporation.
- Hopper, P. (1998). Emergent grammar. In M. Tomasello (Ed.), *The New Psychology of Language* (pp.155–176). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Hulstijn, J. (2002). Towards a unified account of the representation, processing, and acquisition of second-language knowledge. *Second Language Research*, 18(2): 191–221.
- Jurafsky, D. & J. H. Martin. (2000). *Speech and Language Processing: An Introduction to Natural Language Processing, Speech Recognition, and Computational Linguistics*. Englewood Cliffs, NJ: Prentice-Hall.
- Keller, R. (1985). Towards a theory of linguistic change. In T. Ballmer (Ed.), *Linguistic Dynamics: Discourses, Procedures and Evolution* (pp.212–237). Berlin: Mouton de Gruyter.
- Kelso, S. (1995). *Dynamic Patterns: The Self-organization of Brain and Behavior*. Cambridge, MA: MIT Press.
- Klein, W. (1998). The contribution of SLA research. *Language Learning*, 48: 527–549.
- Kramsch, C. (Ed.). (2002). *Language Acquisition and Language Socialization: Ecological Perspectives*. London: Continuum.
- Langacker, R. (2000). A dynamic usage-based model. In M. Barlow & S. Kemmer (Eds.), *Usage Based Models of Language* (pp.1–64). Stanford, CA: CSLI Publications.
- Lantolf, J. & A. Pavlenko. (1995). Sociocultural theory and second language acquisition. *Annual Review of Applied Linguistics*, 15: 108–124. Cambridge: Cambridge University Press.
- Larsen-Freeman, D. (1975). *The acquisition of English grammatical morphemes by adult learners of English as a second language*. Ph. D. dissertation, University of Michigan.
- Larsen-Freeman, D. (1997). Chaos/Complexity science and second language acquisition. *Applied Linguistics*, 18(2): 141–165.
- Larsen-Freeman, D. (1998). On the scope of second language acquisition research. *Language Learning*, 48(4): 551–556.
- Larsen-Freeman, D. (2000). Second language acquisition and applied linguistics. *Annual Review of Applied Linguistics*, 20: 165–181.
- Larsen-Freeman, D. (2002a). Making sense of frequency. *Studies in Second Language Acquisition*, 24(2): 275–285.
- Larsen-Freeman, D. (2003a). *Teaching Language: From Grammar to Grammaticing*. Boston,

- MA: Thomson/Heinle.
- Larsen-Freeman, D. (2003b). The changing conception of language and its implications for language education and research. In B. Bartlett, F. Bryer & D. Roebuck (Eds.), *Reimagining Practice: Researching Change*, Vol. 1 (pp.61–71). Brisbane: Griffith University.
- Larsen-Freeman, D. (2006a). Second language acquisition and the issue of fossilization: There is no end, and there is no state. In Z.-H. Han & T. Odlin (Eds.), *Studies of Fossilization in Second Language Acquisition* (pp.189–200). Clevedon: Multilingual Matters.
- Larsen-Freeman, D. (2006b). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, 27(4): 590–619.
- Larsen-Freeman, D. (2007). Reflecting on the cognitive-social debate in second language acquisition. *Modern Language Journal*, 91(5), Focus Issue: 773–787.
- Larsen-Freeman, D. & L. Cameron. (2008a). *Complex Systems and Applied Linguistics*. Oxford: Oxford University Press.
- Larsen-Freeman, D. & L. Cameron. (2008b). Research methodology on language development from a complex systems perspective. *Modern Language Journal*, 92(2): 200–213.
- Leather, J. (2002). Modeling the acquisition of speech in a multilingual society: An ecological approach. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization. Ecological Perspectives*, 47–67. London: Continuum.
- Leather, J. & J. van Dam. (Eds.). (2003). *Ecology of Language Acquisition*. Dordrecht: Kluwer Academic Publishers.
- Lee, N. & J. Schumann. (2003). The evolution of language and of the symbolosphere as complex adaptive systems. Paper presented at the American Association of Applied Linguistics Conference, Arlington, VA, 22–25 March.
- Lemke, J. (2002). Language development and identity: Multiple timescales in the social ecology of learning. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization. Ecological Perspectives*, 68–87. London: Continuum.
- MacWhinney, B. (2008). A unified model. In P. Robinson & N. Ellis (Eds.), *Handbook of Cognitive Linguistics and Second Language Acquisition* (pp. 341–371). New York & London: Routledge.
- MacWhinney, B. (Ed.). (1999). *The Emergence of Language*. Mahwah, NJ: Lawrence Erlbaum Associates.
- MacWhinney, B. & E. Bates. (Eds.). (1989). *The Crosslinguistic Study of Sentence Processing*. New York: Cambridge University Press.
- Marcus, G. (2004). *The Birth of the Mind: How a Tiny Number of Genes Creates the Complexity of Human Thought*. New York: Basic Books.
- Marr, D. (1982). *Vision. A Computational Investigation into the Human Representation and Processing of Visual Information*. New York: W. H. Freeman & Co.

- Maturana, H. & F. Varela. (1987). *The Tree of Knowledge: The Biological Roots of Human Understanding*. Boston, MA: Shambala.
- Meara, P. (1999). Self-organization in bilingual lexicons. In P. Broeder & J. Murre (Eds.), *Language and Thought in Development* (pp.127–144). Tubingen: Gunter Narr Verlag.
- Mellow, D. & K. Stanley. (2001). Alternative accounts of developmental patterns: Toward a functional-cognitive model of second language acquisition. In K. Smith & D. Nordquist (Eds.), *Proceedings of the Third Annual High Desert Linguistics Society Conference* (pp.51–65). Albuquerque, NM: High Desert Linguistics Society.
- Mohanan, K. P. (1992). Emergence of complexity in phonological development. In C. Ferguson, L. Menn & C. Stoel-Gammon (Eds.), *Phonological Development* (pp.635–662). Timonium, MD: York Press, Inc.
- Nelson, R. (2007). The stability-plasticity dilemma and SLA. Paper presented at American Association for Applied Linguistics Conference, Costa Mesa, California, April.
- Newman, F. & L. Holzman. (1993). *Lev Vygotsky: Revolutionary Scientist*. London & New York: Routledge.
- Nichol, L. (Ed.). (2003). *The Essential David Bohm*. London & New York: Routledge.
- O'Grady, W. (2003). The radical middle: Nativism without universal grammar. In C. Doughty & M. Long (Eds.), *The Handbook of Second Language Acquisition* (pp.43–62). Malden, MA: Blackwell Publishing.
- Port, R. & van Gelder, T. (Eds.). (1995). *Mind as Motion: Exploration in the Dynamics of Cognition*. Cambridge, MA: MIT Press.
- Robinson, P. & N. Ellis. (Eds.). (2008). *Handbook of Cognitive Linguistics and Second Language Acquisition*. New York & London: Routledge.
- Satterfield, T. (2001). Toward a sociogenetic solution: Examining language formation processes through SWARM modeling. *Social Science Computer Review*, 19(3): 281–295.
- Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, 27(1): 4–13.
- Smith, L. & E. Thelen. (Eds.). (1993). *A Dynamic Systems Approach to Development: Applications*. Cambridge, MA: MIT Press.
- Spivey, M. (2007). *The Continuity of Mind*. Oxford: Oxford University Press.
- Thelen, E. & L. Smith. (1994). *A Dynamic Systems Approach to the Development of Cognition and Action*. Cambridge, MA: Bradford Books/MIT Press.
- Thelen, E. & E. Bates. (2003). Connectionism and dynamic systems: Are they really different? *Developmental Science*, 6(3): 378–391.
- Thompson, S. A. & P. J. Hopper. (2001). Transitivity, clause structure, and argument structure: Evidence from conversation. In J. Bybee & P. J. Hopper (Eds.), *Frequency and the Emergence of Linguistic Structure* (pp.27–60). Amsterdam: John Benjamins.
- Tomasello, M. (2000). First steps toward a usage-based theory of language acquisition. *Cognitive Linguistics*, 11(1–2): 61–82.
- Tomasello, M. (2003). *Constructing a Language*. Cambridge, MA: Harvard University Press.
- Tomasello, M. (Ed.). (1998). *The New Psychology of Language. Cognitive and Functional*

- Approaches to Language Structure*. Mahwah, NJ: Erlbaum.
- Truscott, J. (1998). Instance theory and universal grammar in second language research. *Second Language Research*, 14(3): 257–291.
- Tucker, M. & K. Hirsh-Pasek. (1993). Systems and language: Implications for Acquisition. In L. Smith & E. Thelen (Eds.), *A Dynamic Systems Approach to Development: Applications* (pp.359–384). Cambridge, MA: MIT Press.
- van Geert, P. (2003). Dynamic systems approaches and modeling of developmental processes. In J. Valsiner & K. Connolly (Eds.), *Handbook of Developmental Psychology* (pp.640–672). London: Sage.
- van Geert, P. & M. van Dijk. (2002). Focus on variability: New tools to study intraindividual variability in developmental data. *Infant Behavior & Development*, 25: 340–374.
- van Geert, P. & H. Steenbeek. (2005). Explaining “after” by “before”: Basic aspects of a dynamic systems approach to the study of development. *Developmental Review*, 25(3–4): 408–442.
- van Gelder, T. & R. Port. (1995). It’s about time: An overview of the dynamical approach to cognition. In R. Port & T. van Gelder (Eds.), *Mind as Motion: Exploration in the Dynamics of Cognition* (pp.1–33). Cambridge, MA: MIT Press.
- van Lier, L. (2002). An ecological-semiotic perspective on language and linguistics. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization. Ecological Perspectives* (pp.140–164). London: Continuum.
- van Lier, L. (2004). *The Ecology and Semiotics of Language Learning*. Dordrecht: Kluwer Academic Publishers.
- Varela, F., E. Thompson & E. Rosch. (1991). *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, MA: The MIT Press.
- White, L. (2003). On the nature of interlanguage representation. In C. Doughty & M. Long (Eds.), *The Handbook of Second Language Acquisition* (pp.19–42). Malden, MA: Blackwell Publishing.
- Whitehead, A. N. (1929). *The Aims of Education*. New York: Macmillan.
- Widdowson, H. (2003). *Defining Issues in English Language Teaching*. Oxford: Oxford University Press.

## Comment after Chapter 13

In the next chapter, I expand upon the theme I wrote about in the last one (the idea that language is a dynamic system) in order to suggest that applied linguists would benefit from a broader perspective — a transdisciplinary one. The article was delivered as a plenary address at the

American Association for Applied Linguistics conference in 2010. In it, I first define “discipline”, and then, I show that each of the expansions on the definition, such as crossdisciplinary and interdisciplinary, can be helpful, but also have their limitations. I favor one combination in particular, i.e. “transdisciplinary”, not only because of its broad scope in overcoming the fragmentation that can come from disciplinary thinking, but also because transdisciplinarity is where new intellectual themes arise, according to the linguist Michael Halliday. Halliday himself suggested that Complexity Theory (CT) was one of these themes.

In this chapter, I enumerate 12 principles underlying CT, in an attempt to show how they give us a new way of thinking about language and its development. I stress the importance of context, not as a backdrop to the main action of human activity, but rather as part of the complex systems itself. You may also notice that I include Dynamic Systems Theory (DST) in this discussion. Although DST and CT have different genealogies, they overlap considerably in their principles, and many researchers these days combine them and talk and write about Complex Dynamic System Theory (CDST).

Because the article was delivered as a plenary address, I tried to end on a more philosophical note. To do so, I referred to French philosopher Edgar Morin’s (2007) observation that we humans have been better prepared by our education to separate than to connect. According to Morin, we need to think in a way that enables us to connect as well as to distinguish. In so doing, I believe that CT/DST gives us the means to humanize science.

## References

- Morin, E. (2007). Restricted complexity, general complexity. In C. Gershenson, D. Aerts & B. Edmonds (Eds.), *Worldviews, Science and Us: Philosophy and Complexity* (pp.5–29). Singapore: World Scientific.



# Chapter 14

## Complex, Dynamic Systems: A New Transdisciplinary Theme for Applied Linguistics?

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### INTRODUCTION

The moving figure you see on the screen is a fractal. Mesmerizing, isn't it? This particular figure is named for the mathematician Benoît Mandelbrot, who coined the term “fractal” to refer to structures that are self-similar on every level of scale. As it is projected here, it is iterating, taking us deeper and deeper into the structure where we see the same pattern repeated. Fractals occur commonly in nature, the product of dynamic systems. I would like you to hold this image in mind today, as I speak about a theory with which fractals are associated, namely Complexity Theory.

For some time, I have been intrigued by the perspective Complexity Theory affords us to think anew about our objects of concern as applied linguists (Larsen-Freeman, 1997). Although originating in the physical sciences and mathematics, Complexity Theory (CT) inspires us to think differently about language and language development — especially with regard to their complexity and dynamism, qualities which have received short shrift, at least from mainstream linguists and applied linguists. Its way of thinking challenges the dominant “preformationist” paradigms of the field, and the very notion that knowledge structures or schemas of competence guide performances and account for their invariant features.

Although some of you might be put off by its origin in the natural sciences, you may be reassured by the fact that CT has been embraced by a range of disciplines from biology to organizational development to epidemiology. Indeed, the French philosopher and sociologist, Edgar Morin, finds in complex thought an approach to many of the vexing issues

that we humans struggle with at this time. And South African philosopher, Paul Cilliers, finds in it philosophical grounds on which to challenge injustice in the world.

What I want to focus on today, though, is the case for complexity as a transdisciplinary theme. I will begin by discussing what a discipline is. I will then move to considering its derivatives: multidisciplinary, crossdisciplinary, interdisciplinary, and finally, transdisciplinary. Following a discussion of this taxonomy, I will list some principles of Complexity Theory, elaborating upon three of them. I will then briefly point to their value in thinking about and researching second language (L2) development.

## DISCIPLINARY KNOWLEDGE AND ITS VARIATIONS

In the words of the social scientist Raymond Miller (1982: 6)<sup>1</sup>, a discipline is a “conceptual framework”. Members of a discipline, by virtue of their training and initiation into that discipline, have acquired “a sense of order, of what is real and how knowledge is obtained”. Halliday (1991: 42) has observed that the twentieth century has been the age of disciplines, with each having its own theories and methods. In keeping with this observation, Morin (2007) cites “the principle of disjunction”, whereby disciplines have become hermetic from one another. These days, however, disciplinary boundaries are being torn down (Halliday, 1991). Although disciplines have made valuable contributions to our understanding, at the same time, they constrain what is legitimate to look at and which theories can be brought to bear to interpret findings. Applied linguists, by virtue of not having a disciplinary home, have happily not been subject to the same constraints. I say “happily” because disciplinary knowledge is always partial and provisional, and unless one gets outside of a discipline, such limitations are not always apparent (Widdowson, 2005).

Given the present state of affairs, with new hybrids being created all the time (“neuroeconomics” is one that I have heard recently), it is perhaps time to heed Morin’s call for replacing the principle of disjunction with a principle that maintains the distinctive nature of the disciplines, but that seeks to establish a relationship among them. One way to accomplish this might be to adopt a multidisciplinary approach. The problem with multidisciplinary approaches is, however, that they are additive (Moran, 1994: 49), with each discipline contributing its perspective on an issue, but with no interaction among the disciplines. This results in little or no

subsequent modification of views among the contributing disciplines.

More promising then, perhaps, are crossdisciplinary approaches that involve an effort at moving across disciplinary boundaries. For example, last year, Elinor Ostrom of Indiana University became the first woman to win the Nobel Prize for Economics. Also noteworthy is that her background is in political science, not economics. “It is part of the merging of the social sciences’, Robert J. Shiller, an economist at Yale, said of the award. ‘Economics has been too isolated ...’” (*New York Times*, New York edition, 13 October 2009, page B1).

However, the drawback to a crossdisciplinary approach is that “it is not simply a matter of coupling two disciplines together, with each retaining its own identity and integrity, but of one discipline assuming a dominant role and drawing upon the other whatever can be accommodated within its scheme of things ... As a consequence, of course, the adaptation will always be open to the charge of distortion” (Widdowson, 2005: 18). For example, Widdowson notes that Joshua Fishman has discussed the field of sociolinguistics, and has argued that it has failed to deal adequately with ideas from sociology.<sup>2</sup>

Interdisciplinary approaches are another variation to be considered. These days our universities are fond of promoting interdisciplinarity. However, an issue with interdisciplinarity is that “it is simply not possible to see things from two different perspectives at the same time. You can, of course, shift from one perspective to another at different times, and this can often prove enlightening, if only to show how incomplete and partial different representations of reality can be” (Widdowson, 2005: 19).

The interdisciplinarity of applied linguistics is widely acknowledged, but, aside from linguistics, there has been little discussion of the nature of the relationship among the disciplines that inform it, other than to acknowledge their contribution to theoretical aspects. So we are left with our dilemma. A solution might be to break with discipline-bound concepts. Such is the case with transdisciplinarity or with a transdisciplinary approach, as suggested by Miller (1982: 21).

Transdisciplinary approaches are articulated conceptual frameworks which claim to transcend the narrow scope of disciplinary world views and metaphorically encompass the several parts of the material field which are handled separately by the individual specialized disciplines.

In his interview (2006) with Anne Burns in the *Journal of Applied Linguistics*, Halliday also speaks of transdisciplinarity and adds that it not only avoids

the fragmentation of disciplinary knowledge, it also redefines the structure of knowledge. In an earlier publication, Halliday put it this way:

I say “transdisciplinary” rather than “inter-” or “multi-disciplinary” because the latter terms seem to me to imply that one still retains the disciplines as the locus of intellectual activity, while building bridges between them, or assembling them into a collection; whereas the real alternative is to supersede them, creating new forms of activity which are thematic rather than disciplinary in their orientation. (2001/1990: 176)

Halliday (1991) elaborates by noting that in the nineteenth century, evolution became a theme of this kind: it embodied the concept of history, the “arrow of time” which had been missing from the physical sciences and which they were then ready to bring back. An evolutionary perspective was widely adopted by the physical sciences. “But the human sciences were not ready for it. They still lacked the sense of a system, a model of how any form of organization persists; so in the following period they developed their own theme, that of structuralism. Change had to be taken off the agenda so that we could study how human systems were organized.” (Halliday, 1991: 42)

## **COMPLEXITY THEORY/DYNAMIC SYSTEMS THEORY<sup>3</sup>**

I believe we have reached a point where change can be put back on the agenda. And that is what I think Complexity Theory/Dynamic Systems Theory (CT/DST) encourages us to do. Before going on, however, I should note that the word “theory” in CT/DST is not singular, but rather, represents a range of theoretical insights that call into question some of the assumptions that have been used to inform and to structure research for many years. As developmental psychologists Smith and Thelen (1993: xii) write:

[Dynamic Systems Theory] is being used by researchers and theorists for many different levels of analysis, for behavior ranging from the physiologic to the social, and for describing change over time scales from seconds to years. We see this diversity, however, not as a failing of the approach, but indeed as its real strength ... [Nevertheless, w]e are alert to the pitfalls of explaining too much by a single, overarching organization. It seems to us that the future of [Dynamic Systems Theory] will lie with very general principles of process and change, applicable in many domains, over many levels and time scales, but also allowing the multiple local details to emerge from the necessary empirical work.

So what are the general principles of process and change that Smith and Thelen allude to? Here are twelve that I have compiled (see also Cilliers, 2005 and de Bot & Larsen-Freeman, 2011). I realize that if you know nothing about CT/DST, these may be difficult to understand. I will try to make three of them, at least, more comprehensible by elaborating on them in a moment (for the discussion of other principles, see Larsen-Freeman, 1997; Larsen-Freeman & Cameron, 2008).

1. Complex systems are open and dynamic.
2. They operate under conditions that are not in equilibrium.
3. Complex systems are systems because they comprise many elements or agents, which interact.
4. Change/dynamism is central. The systems adapt both through interaction with the environment and through internal reorganization/self-organization.
5. The strength of the interactions changes over time. Therefore, multiple routes are often possible between components, mediated in different ways.
6. The complexity of complex systems is emergent. It is not built into any one element or agent, but rather arises from their interaction.
7. Because the systems are open, what arises may be in nonlinear relation to its cause. In other words, an unexpected occurrence may take place at any time.
8. The structure of a complex system is maintained even though its components may change.
9. The environment in which they operate is part of a complex system.
10. Complex systems display behavior over a range of timescales and at different levels of complexity — the latter are nested, one within another.
11. Complex systems sometimes display chaotic variation.
12. Complex systems iterate — they revisit the same territory again and again, which means that the present level of development is critically dependent on what preceded it.

Let me now elaborate a bit on three of these.

#### **Principle #4: Change/Dynamism Is Central to Our Objects of Concern.**

Dynamic change in the form of language evolution, language processing, language change, language use, language acquisition, language development, etc. is central to our concerns as applied linguists; nevertheless, the process by which things unfold dynamically has gotten rather short-shrift in applied linguistics. As Jeff Elman (2003: 430) has said of language development:

Development: It's about time. Well, other things too. But what is surprising is that, with a few notable exceptions, very little work in developmental research seems to focus on what is most striking about development, namely, that it involves change over time. This tendency to study development as if it were a succession of snap-shots — frozen in time and fixed — is more than odd. It biases the theoretical perspective, favoring theories in which the origins of behavior are of minimal interest.

Halliday also anticipated the need to introduce or to reintroduce a dynamic perspective into applied linguistics. “It is useful, he suggests, both to capture a phenomenon *qua* object at a particular moment in time (synoptic) as well as to tease out the processes through which a phenomenon unfolds (dynamic)” (Halliday, 2007/1990: 362, cited in Hult, 2010). Sounding a similar note, Ellis and Larsen-Freeman (2006) proposed that theories of language representation (property theories) and theories of language acquisition and use (transition theories) are complementary; yet the two have been kept distinct. In CT/DST a property theory and a transition theory can be integrated because development (which must be viewed dynamically) is seen to result in a certain stability (which can be viewed synoptically), which is then the starting point for further unfolding.

In short, Plato and Heraclitus were both right — but Plato has had his way with us recently. In our daily lives complexity and constant change can be difficult to live with. We cope by reducing the complexity — by adopting routines and telling stories about our life experiences, and by reifying constant change, for instance, nominalizing dynamic processes, which then connotes stasis (Larsen-Freeman & Cameron, 2008). We give a language a name as if its borders were defined and it existed as a separate entity. The same preference for an artifice of simplicity and fixity appears in our scholarly work. Change is inherent in most of our concerns as applied linguists, and yet in our theories we everywhere find processes converted into objects. CT/DST restores the dynamism to our objects of concern. CT/DST aims to account for how the interacting parts of a complex system give rise to the system's collective behavior and how such a system simultaneously interacts with its environment. This brings me to a second principle.

**Principle #6: The Complexity of Complex Systems Is Emergent. It Is Not Built into Any One Element or Agent, but Rather Arises from Their Interaction.**

Alice Munro, the Canadian writer, once said “The complexity of

things — the things within things — just seems to be endless. I mean nothing is easy, nothing is simple” (Franzen, 2004). Nothing of interest to applied linguistics, I would add. Recall the image of the fractal that I showed you at the beginning of my talk. Complex things within complex things might be a good way to describe a fractal.

However, in CT/DST, “complex” does not merely mean “complicated”. Although the components of a complex system are usually numerous, diverse, and dynamic, a defining characteristic of a complex system is that its behavior emerges from the interactions of its components, as in flocking birds or schooling fish.

... and the thousands of fishes moved as a huge beast, piercing the water. They appear united, inexorably bound by common fate. How comes this unity? (Anonymous)

CT/DST’s answer to this question about unity is that the school of fish emerges out of the interaction of the individual fish. There is no lead fish exhorting the others to form a school. There is no pre-set pattern (preformativism). Instead, a school of fish emerges and then adapts itself to a changing environment — forming and reforming in response. This process of forming through interaction of the parts of a system is called self-organization. In other words, self-organization is the spontaneous creation of more complex order. It refers to “any set of processes in which order emerges from the interaction of the components of system without direction from external factors and without a plan of the order embedded in any individual component” (Mitchell, 2003: 6). Self-organization is responsible for the patterns and orderly arrangement both in the natural world and in the realms of mind, society and culture (Heylighen, 2008). However, it is not just that things are ordered.

Order is not sufficient. What is required is something much more complex. It is order entering upon novelty; so that the massiveness of order does not degenerate into mere repetition; and so that the novelty is always reflected upon a background of system. (Whitehead, 1978: 339)

Thus, complexity is creative — it helps a system to go beyond, to grow. We see an example of this in our everyday society.

[As] we interact with ever more people, organisations, systems and objects [a]nd as the network of interactions grows and spreads around the globe, the different economic, social, technological and ecological systems that we

are part of become ever more interdependent. The result is an ever more complex “system of systems” where a change in any component may affect virtually any other component, and that in a mostly unpredictable manner. (Heylighen, Cilliers, & Gershenson, 2007: 117)

The traditional scientific method, which is based on analysis, isolation, and the gathering of COMPLETE information about a phenomenon, is incapable of dealing with such complex interdependencies. One of the reasons that we can never have complete information about a system is that “a system is never optimally adapted to an environment since the process of evolution of the system will itself change the environment so that a new adaptation is needed, and so on ...” (Heylighen, 1989). Heylighen’s observation brings up the third principle I will comment upon, one having to do with the importance of the context.

### **Principle #9: The Environment in Which Complex Systems Operate Is Part of a Complex System. Context Is All Important.**

It is not uncommon for researchers to discuss the context as if it were a backdrop to what is of focal interest. However, CT/DST challenges the idea that context is background to the main action. It sees the context as part of the complex system. The philosopher Paul Cilliers put it this way: because everything is always interacting and interfacing with others and the environment organically, the notions of “inside” a system and “outside” a system are never simple or uncontested (Cilliers, 2001: 142). The geneticist and Nobel laureate in Physiology, Barbara McClintock, gives us a glimpse of what this means in practice (Briggs & Peat, 1989: 201–202):

Basically, everything is one. There is no way in which you draw a line between things. What we [normally] do is to make these subdivisions, but they’re not real.

Though McClintock arrived at this sense of oneness by focusing on parts (in particular on the chromosome) with an almost reductionist fervor, her approach is not reductionist or “objective” in the traditional sense.

I found that the more I worked with them the bigger and bigger [the chromosomes] got, and when I was really working with them I wasn’t outside, I was down there. I was part of the system.

Cancer researcher Mina Bissell (*New York Times*, 29 December 2009) provides us with another example of the importance of challenging the inside/outside



dichotomy. For years, researchers have been pursuing the hypothesis that cancer is caused by rogue cells that come from genetic mutations. Bissell proposed a radical idea: Gene mutations are part of the process of cancer, but they alone are insufficient to explain how cancer occurs. Cancer involves an interaction between rogue cells AND surrounding tissue. This new focus on a cancer's surroundings or context represents a paradigm shift in how to think about cancer and why it occurs ... and perhaps how to stop it.

Life is defined by where we draw the lines. The fact that defining these boundaries is so difficult is part of what makes life interesting. All boundaries are no more than temporary patterns resulting from a filtering process ... As such, they are to some degree arbitrary ... and require ongoing review to understand how they shape our context of interest — and how our context of interest shapes them. (*General Systems Bulletin XXXIX*: 38 — Call for the First International Workshop on Complexity and Real World Applications, 21–23 July 2010, International Society for the Systems Sciences, 2010)

Of course, it is humanly impossible to study everything at once. “Boundaries are still required if we want to talk about complex systems in a meaningful way — they are in fact necessary ...” (Cilliers, 2005: 612); however, there are strategic considerations at stake when drawing them. Therefore, we need at least to recognize the challenge in defining a focal point for our investigations. As Atkinson et al. (2007) write, we need to view mind, body, and world relationally and integratively — as constituting a single ecological circuit.

Identifying the functional whole, then, is key. And this leads to the challenge to find new functional ways of conceptualizing and perceiving, changing our “objects of concern” into processes, change, and continuities ... and doing so in a way that does not decontextualize them. Thelen and Smith (1994: 217) put it this way: “... since the global order is made by and made manifest in the details of the here and now, it is most fundamentally always context dependent.” Byrne concludes: “Complexity theory challenges the nomothetic programme of universally applicable knowledge at its very heart — it asserts that knowledge must be contextual.” (Byrne, 2005: 97)

Not much of what I have said thus far has dealt with language or its development. I now briefly take these up in a way that has been illuminated by CT/DST. Linguist Dwight Bolinger (1996: 5), although not explicitly invoking CT/DST, rendered a definition of language that is certainly in keeping with Complexity Theory:

English is a godawful mixture of irregularities growing out of competing regularities — a perpetual cliffhanger where one crisis resolves itself by creating another and the permanent solution always waits for tomorrow.

The fact of the matter is that the stability of language only becomes possible through constant change. Language is a complex, adaptive system.<sup>4</sup> Larsen-Freeman and Cameron (2008: 111–112) articulated the concept this way:

Viewing language as a complex system makes us regard linguistic signs not as “autonomous objects of any kind, either social or psychological”, but as “contextualised products of the integration of various activities by [particular] individuals in particular communicative situations” (Harris, 1993: 311), what we have called their language resources. “It logically follows that they are continually created to meet new needs and circumstances ...” (Toolan, 2003: 125) Complexity theory encourages us to link real-time processing and all its variability to change over time. The value of this perspective is that language is no longer perceived as an idealised, objectified, atemporal, mechanistic “thing”. (Rutherford, 1987)

The earlier quote from Smith and Thelen (1993) makes it clear that general CT/DST principles have to be accompanied by the necessary local empirical work. So what are some examples of the necessary empirical work being done in the name of CT/DST? In particular, how has CT/DST informed L2 development?<sup>5</sup>

## EMPIRICAL WORK IN L2 DEVELOPMENT

For much of the second half of the last century, the dominant metaphor for L2 development was the digital computer. One manifestation of this is the ubiquity of terms like “input” and “output”. Accompanying those terms was a characterization of the process of language use as a rule-based manipulation of symbols. Consequently, researchers put their efforts into searching for universal stage-like progression in the acquisition of rules towards full competence. Influenced by CT/DST, some researchers have shifted their efforts to not only looking for stabilities, but also to examining the flexible, transient, dynamic patterns of learner language which emerge from use (Ellis & Larsen-Freeman, 2006). “Language development is no longer seen as a process of acquiring abstract rules, but as the EMERGENCE of language abilities in REAL TIME, where changes over days, months, and years and moment-to-moment changes in language

‘processing’ are the same phenomena, differing only in their timescales.” (Evans, 2007: 131) To this end, Kramsch and Whiteside (2008) report on empirical work in L2 use in an immigrant community that supports this last point: Language phenomena emerge at a particular level or scale as a result of activity at a lower level or from an earlier period.

Ellis with Larsen-Freeman (2009), following work by L1 acquisition researchers Tomasello (2003) and Goldberg (2006), have reported on the acquisition of English verb-argument constructions (VACs) by EFL learners from a usage-based perspective. They suggest that learners appear to induce categories from exemplars centered on verbs prototypical of a particular VAC, prototypical verbs being overwhelmingly prevalent in the language spoken to learners. Perhaps not surprisingly, when the learners begin to produce VACs, the first verb to emerge for a VAC is the one with the highest frequency. Thus, the use by speakers of such highly frequent exemplars when addressing learners presumably facilitates comprehension in the micro-discursive moment, and perhaps facilitates their subsequent emergence in learner production.

Ellis with Larsen-Freeman went on to use computer simulations to see if they would pattern VAC data in a similar manner to the learners. Although decontextualized, computer simulations allow for the investigation of dynamic interactions of these factors in language learning, processing, and use. In fact, the simulations showed how simple iterated general learning mechanisms, exposed to the co-adapted language usage typical of speech to learners, produced the same order of emergence as that which characterized learner production, and used the same cues. Learning takes place through continually revisiting the same space over and over again.

The suggestion that a developing system functions as a resource for its own further development calls into question whether it is possible to separate the learner from learning. Indeed, as Kramsch (2002) observes, it “is no longer sufficient to talk about individual differences in SLA [second language acquisition] against a backdrop of a universal learner ... variation becomes the primary given; categorization becomes an artificial construct of institutionalization and scientific inquiry” (Kramsch, 2002: 4); paraphrasing Yeats, she adds: it may not be possible “to tell the dancer from the dance”. Kramsch’s notion of symbolic competence also fits well within a CT/DST perspective because it is an “ability not only to approximate or appropriate for oneself someone else’s language, but to shape the very context in which one learns and uses the language” (Kramsch, 2008: 400).

Dörnyei (2009) has suggested that the seemingly comprehensive and straightforward picture of individual differences as stable and monolithic learner traits that concern distinct learner characteristics is part of an idealized narrative. He notes that if we take a situated and process-oriented perspective on SLA, we cannot fail to realize that the various learner attributes display a considerable amount of variation from time to time and from situation to situation. As he notes, seeking an explanation for individual differences in cause-effect patterns and generalizable findings does not fit a Complexity Theory perspective.

I suggested in my own study of five Chinese learners of English (Larsen-Freeman, 2006; see also de Bot, Lowie, & Verspoor, 2005, 2007) that the difference between the performance of learners is not “noise”, but rather a natural part of dynamically emergent behavior assembled by individuals with different orientations, grounded in social relationships with other people, and in keeping with historical contingency. From a CT/DST perspective, flux is an integral part of any system. It is not as though there was some norm from which individuals deviate. Variability stems from the ongoing self-organization of systems of activity.

Macqueen (2009) also adopted a CT/DST perspective in her investigation of the development of four ESL learners' writing. A qualitative methodology (Lexical Trail Analysis) was used to capture a dynamic and historical view of the lexicogrammatical patterning in the learners' writing. Recurring patterns were traced, and the adaptations that learners made were noted. Macqueen's results demonstrate learners' ability to imitate and to adapt, and thus transform their language resources. “Adaptive imitation is the means of gaining the power to conform and the power to create. This power is what enables reciprocal causality in language patterning where ... the communication patterns of individual people contribute to the prevailing norms of their discourse communities ...” (p.266)

Larsen-Freeman and Cameron (2008: 158) have written in this way about the process of L2 development. “Embodied learners soft assemble their language resources interacting with a changing environment. As they do so, their language resources change. Learning is not the taking in of linguistic forms by learners, but the constant adaptation and enactment of language-using patterns in the service of meaning-making in response to the affordances that emerge in a dynamic communicative situation.” Thus, this view assumes that language development is not about learning and manipulating abstract symbols, but is enacted in real-life experiences, such

as when two or more interlocutors co-adapt during an interaction. During co-adaptation, the language resources of both are transformed through reciprocal causality.

There have been others, too, who have used a CT/DST perspective to advance their research agendas. For instance, Meara (2006) used dynamic modeling to describe vocabulary development or loss, and Herdina and Jessner (2002) used it to discuss changes in multilingual proficiency on an individual level and to provide a more dynamic description of multilingualism. More empirical work has been done, and is being done, all the time. These few examples will have to suffice to support my belief that CT/DST offers a valuable transdisciplinary theme, having general principles that promote the necessary local empirical work and “creating new forms of activity which are thematic rather than disciplinary in their orientation” (Halliday, 2001/1990: 176).

## CONCLUSION

As I conclude, I would like to draw your attention once more to the image on the screen. In a moment, I will play for you a brief episode from the program *Nature* that appeared recently on the Public Broadcasting System. It depicts a flock of starlings looking to roost for the night. As they circle, they form a flock. The flock flows from one amorphous figure to another forming and reforming over and over, before alighting in a grove of trees. The commentator observes that they seem to function as a super-organism — at a level of complexity beyond that of individual birds. This super-organism is a fitting symbol of Complexity Theory, an emergent figure that has self-organized from the interaction of its individual components.

Morin (2007) makes the point that we humans have been better prepared by our education to separate than to connect. Because of this, our ability to connect has languished. A transdisciplinary theme helps us to reverse this trend. As Morin (2008: vii) states:

We need a new kind of thinking that reconnects that which is disjointed and compartmentalized, that respects diversity as it recognizes unity, and that tries to discern interdependencies.

Not only is it a problem in our modern world that we fail to recognize and respect our interdependence, it is also a problem that we do not appreciate the complexity of the world we live in. As Nowotny, Scott, and Gibbons (2001: 21)

put it “Contemporary society is characterized — irreversibly — by pluralism and diversity and also, we argue, volatility and transgressivity. It can no longer be understood either in terms of the norms or practices of scientific rationality ...”

The price we pay for clinging to a modernist rationality can be seen on many levels in our interdependent, complex, globalized world. Perhaps the most important one is the distortion it brings to our understanding of what it is to be human. As Horn (2008: 140) writes, “In attempting to make the human sciences objective, the human became turned into an object”. Thus, the ultimate promise of CT/DST is to “help us to humanize science, not the other way round” (Cilliers, 2008: 50).

## Notes

1. As cited in Moran (1994).
2. I must acknowledge that I take the same risk in appropriating a theory from the physical sciences, as I have done with Complexity Theory.
3. Although they have different origins, Dynamic Systems Theory (de Bot, Lowie, & Verspoor, 2005, 2007; de Bot, 2008) has much in common with Complexity Theory, so for my purposes here I will not distinguish them.
4. See the Special Issue of *Language Learning*, December 2009, edited by Ellis and Larsen-Freeman, featuring this theme.
5. In the plenary address I discussed many more areas of applied linguistics that had been influenced by CT/DST, even if not directly and not necessarily by a single intact theory. Here I will limit the discussion to L2 development.

## References

- Atkinson, D., E. Churchill, T. Nishino & H. Okada. (2007). Alignment and interaction in a sociocognitive approach to second language acquisition. *The Modern Language Journal*, 91 (2): 169–188.
- Bolinger, D. (1996). Oddments of English. *Journal of English Linguistics*, 24 (4): 4–24.
- Briggs, J. & F. D. Peat. (1989). *The Turbulent Mirror*. New York: Harper & Row.
- Burns, A. (2006). Applied Linguistics: Thematic pursuits or disciplinary moorings? A conversation between Michael Halliday and Anne Burns. *Journal of Applied Linguistics*, 3 (1): 113–128.
- Byrne, D. (2005). Complexity, configurations and cases. *Theory, Culture & Society*, 22 (5): 95–111.

- Cilliers, P. (2001). Boundaries, hierarchies and networks in complex systems. *International Journal of Innovation Management*, 5 (2): 135–147.
- Cilliers, P. (2005). Complexity, deconstruction and relativism. *Theory, Culture & Society*, 22 (5): 255–267.
- Cilliers, P. (2008). Knowing complex systems: The limits of understanding. In F. Darbellay, M. Cockell, J. Billotte & F. Waldvogel (Eds.), *A Vision of Transdisciplinarity: Laying Foundations for a World Knowledge Dialogue*. EPFL Press & CRC Press, 43–50.
- de Bot, K. (2008). Second language acquisition as a dynamic process. *The Modern Language Journal*, 92 (2): 166–178.
- de Bot, K., W. Lowie & M. Verspoor. (2005). *Second Language Acquisition: An Advanced Resource Book*. London: Routledge.
- de Bot, K., W. Lowie & M. Verspoor. (2007). A dynamic systems approach to second language acquisition. *Bilingualism: Language and Cognition*, 10: 7–21, 51–55.
- de Bot, K. & D. Larsen-Freeman. (2011). Researching second language development from a dynamic systems perspective. In M. Verspoor, K. de Bot & W. Lowie (Eds.), *A Dynamic Approach to Second Language Development: Methods and Techniques* (pp.5–23). Amsterdam: John Benjamins.
- Dörnyei, Z. (2009). *The Psychology of Second Language Acquisition*. Oxford: Oxford University Press.
- Ellis, N. C. & D. Larsen-Freeman. (2006). Language emergence: Implications for applied linguistics. Introduction to the special issue. *Applied Linguistics*, 27 (4): 558–589.
- Ellis, N. C. with D. Larsen-Freeman. (2009). Constructing a second language: Analyses and computational simulations of the emergence of linguistic constructions from usage. *Language Learning*, 59, Supplement 1: 93–128.
- Elman, J. (2003). Development: It's about time. *Developmental Science*, 6: 430–433.
- Evans, J. (2007). The emergence of language: A dynamical systems account. In E. Hoff & M. Shatz (Eds.), *Handbook of Language Development*. Malden, MA: Blackwell, 128–147.
- Franzen, J. (2004). Runaway: Alice's Wonderland. *Sunday New York Times Book Review*, 14 November.
- Goldberg, A. (2006). *Constructions at Work: The Nature of Generalization in Language*. Oxford: Oxford University Press.
- Halliday, M. A. K. (1991). Towards probabilistic interpretations. In E. Ventola (Ed.), *Trends in Linguistic Studies and Monographs 55. Systemic Linguistics Approaches and Uses*. Berlin: De Gruyter Mouton, 39–62.
- Halliday, M. A. K. (2001). New ways of meaning: The challenges to applied linguistics. In A. Fill & P. Mühlhäusler (Eds.), *The Ecolinguistics Reader: Language Ecology and Environment* (pp.175–202). New York: Continuum. First published in *Journal of Applied Linguistics*, 6 (1990): 7–36.
- Halliday, M. A. K. (2007). On the concept of “educational linguistics”. In J. Webster (Ed.), *The Collected Works of M. A. K. Halliday, Volume 9: Language and Education* (pp.354–367). London: Continuum. Originally published in R. Giblett & J. O'Carroll (Eds.). (1990).

- Discipline, Dialogue, Difference*. Proceedings of the Language in Education Conference, Murdoch University, December 1989. Murdoch, Australia: Duration, 23–42.
- Halliday, M. A. K. & A. Burns. (2006). Applied Linguistics: Thematic pursuits or disciplinary moorings? A conversation between Michael Halliday and Anne Burns. *Journal of Applied Linguistics*, 3 (1): 113–128.
- Harris, R. (1993). Integrational linguistics. In A. Crochetière, J.-C. Boulanger & C. Ouelon (Eds.), *Actes du XVe congrès international des linguistes* (pp.321–323). Sainte-Foy: Presses de l'Université Laval.
- Herdina, P. & U. Jessner. (2002). *A Dynamic Model of Multilingualism*. Clevedon: Multilingual Matters.
- Heylighen, F. (1989). Self-organization, emergence and the architecture of complexity. In *Proceedings of the 1st European Conference on System Science*. Paris: AFCET, 23–32.
- Heylighen, F. (2008). Complexity and self-organization. In M. Bates & M. N. Maack (Eds.), *Encyclopedia of Library and Information Sciences* (pp.1215–1224). Oxford: Taylor & Francis.
- Heylighen, F., P. Cilliers & C. Gershenson. (2007). Worldviews, science and us: Complexity and philosophy. In J. Bogg & R. Geyer (Eds.), *Complexity, Science and Society* (pp.41–49). Oxford: Radcliffe Publishing.
- Horn, J. (2008). Human research and complexity theory. *Educational Philosophy and Theory*, 4 (1): 130–143.
- Hult, F. (2010). Theme-based research in the transdisciplinary field of educational linguistics. In F. Hult (Ed.), *Directions and Prospects for Educational Linguistics* (pp.28–50). Dordrecht: Springer.
- Kramsch, C. (2008). Ecological perspectives on foreign language education. *Language Teaching*, 41 (3): 389–408.
- Kramsch, C. (Ed.). (2002). *Language Acquisition and Language Socialization*. London: Continuum.
- Kramsch, C. & A. Whiteside. (2008). Language ecology in multilingual settings: Towards a theory of symbolic competence. *Applied Linguistics*, 29 (4): 645–671.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18 (2): 141–165.
- Larsen-Freeman, D. (2006). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, 27 (4): 590–619.
- Larsen-Freeman, D. & L. Cameron. (2008). *Complex Systems and Applied Linguistics*. Oxford: Oxford University Press.
- Macqueen, S. M. (2009). Patterns in second language writing. Ph.D. dissertation, Department of Linguistics and Applied Linguistics, University of Melbourne, Australia.
- Meara, P. (2006). Emergent properties of multilingual lexicons. *Applied Linguistics*, 27 (4): 620–644.
- Miller, R. C. (1982). Varieties of interdisciplinary approaches in the social sciences: A 1981



Overview. *Issues in Integrative Studies*, 1–37.

- Mitchell, S. (2003). *Biological Complexity and Integrative Pluralism*. Cambridge: Cambridge University Press.
- Moran, P. (1994). Towards coherence in language teaching: The case for a transdisciplinary approach. Ph.D. Qualifying Paper, Lesley College, Cambridge MA.
- Morin, E. (2007). Restricted complexity, general complexity. In C. Gershenson, D. Aerts & B. Edmonds (Eds.), *Worldviews, Science and Us: Philosophy and Complexity* (pp.5–29). Singapore: World Scientific.
- Morin, E. (2008). *On Complexity*. Cresskill, NJ: Hampton Press, Inc.
- Nowotny, H., P. Scott & M. Gibbons. (2001). *Re-thinking Science: Knowledge and the Public in an Age of Uncertainty*. Cambridge: Polity Press.
- Rutherford, W. (1987). *Second Language Grammar: Learning and Teaching*. London: Longman.
- Smith, L. & E. Thelen. (Eds.). (1993). *A Dynamic Systems Approach to Development: Applications*. Cambridge, MA: The MIT Press.
- Thelen, E. & L. Smith. (1994). *A Dynamic Systems Approach to the Development of Cognition and Action*. Cambridge, MA: MIT Press.
- Tomasello, M. (2003). *Constructing a Language*. Cambridge, MA: Harvard University Press.
- Toolan, M. (2003). An Integrational Linguistic View. In J. Leather & J. van Dam (Eds.), *Ecology of Language Acquisition* (pp.123–140). Dordrecht, The Netherlands: Kluwer Academic.
- Whitehead, A. N. (1978). *Process and Reality: An Essay in Cosmology* (First published 1929, corrected edn. edited by D. R. Griffin & D. W. Sherburne). New York: The Free Press.
- Widdowson, H. G. (2005). Applied linguistics, interdisciplinarity, and disparate realities. In P. Bruthiaux, D. Atkinson, W. Eggington, W. Grabe & V. Ramanathan (Eds.), *Directions in Applied Linguistics* (pp.12–25). Clevedon: Multilingual Matters.

## Comment after Chapter 14

After laying out the principles of Complexity Theory/Dynamic Systems Theory (CT/DST) in the previous article, my thinking in the next chapter reflected a different focus. I had always wanted to better understand the transfer of learning, especially given my motivation to better understand “the inert knowledge problem”. Of course, “transfer” is prominent in language learning, but the term is usually used to refer to the transfer that occurs between two languages, i.e. the cross-linguistic influence of one language on another.

In this chapter, I examine a different dimension of transfer — that which hopefully takes place when what is learned in one context is available to be used at a different time and a different place. After all, this kind of transfer is why we have formal education. It presumably exists because so that students are able to use what they have learned in the classroom later in the environment outside the classroom for their own purposes. However, transfer of this kind does not always occur. Thus, I use this opportunity to explore why it does not take place. I consider different taxonomies of transfer in educational research.

In the article, I propose that if we focus on what students are doing rather than what we expect them to be doing, we see that actually more transfer takes place than we think. Even so, I suggest that “transfer” may not be the right way to think about what learners are doing because it is not the case that learners transport their knowledge intact from one place and time to another. And, it is also certainly not the case that learners’ performance on tasks (or the learners themselves for that matter) in one situation remain unchanged in another. Instead, I suggest that learners “transform” what they have learned according to their purposes and to how they interpret the new context. In other words, it is important to study the perception of the individual engaged in the “transfer” and what the learner does to activate and apply prior learning. This is similar to what I earlier referred to as a second order affordance. I conclude by suggesting several practices that teachers can employ to help learners transform what they have learned and thereby to mitigate the inert knowledge problem.

## Transfer of Learning Transformed\*

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### INTRODUCTION

A crucial assumption motivating instruction is that what students learn at one time and one place is available for them to use at another time and another place. In other words, students should be able to *transfer* what they have learned. Because this assumption undergirds all education, learning transfer, also called transfer of training and transfer of practice, has been the focus of much research for well over a century,<sup>1</sup> and it continues to inspire a great deal more.<sup>2</sup> The research has sought to answer the question why students often fail to transfer their learning, a failure termed the inert knowledge problem (Whitehead, 1929); students appear to have learned something at one time, but cannot activate it at another.

More than an academic inconvenience, the inert knowledge problem presents serious individual and social consequences. Language learners abandon their study of languages when they discover that they cannot utilize outside of the classroom that which they have worked so hard to attain within it. Employers complain that their new hires cannot perform tasks on the job that they should have learned in schools; schools counter that students have been taught how to do them. Especially distressing is the fact that the lack of transfer affects students discriminately, with lower income students being more affected by it than middle income students (Alexander, Entwisle, & Olson, 2001). Despite its serious consequences, there is little agreement among scholars about the nature of transfer, the extent to which it occurs, and its underlying mechanisms (Barnett & Ceci, 2002).

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The present chapter argues that in order to understand transfer of learning with respect to language learning, researchers need to reframe the field's understanding of the problem: Language researchers need to see that transfer is not a matter of "exporting" an intact bit of knowledge from within the classroom to without or even of students' "reusing" what they have been taught, but rather of students' *transforming* what they have learned. While this shift in perspective does not solve the inert knowledge problem, it redirects attention to what students do rather than to what they don't do. When researchers and educators attend to what students are doing, they see not only that more transfer has taken place than they may have imagined, but also that what has been transferred has been transformed.

To contextualize the transformation of transfer, this *Language Learning* "current", I first describe types of transfer. I next trace the evolution of research that has attempted to understand and to measure transfer. I begin with cognitive factors. I then highlight three major themes in recent years: the importance of the learning context, the agency of learners, and the co-determination of learners and context. I continue with a transformative, ecological, dynamic account of transfer. I conclude by offering suggestions for how to mitigate the problem.

## **TYPES OF LEARNING TRANSFER: SOME BACKGROUND**<sup>3</sup>

Different taxonomies of transfer have been proposed (e.g. Barnett & Ceci, 2002; Royer, Mestre, & Dufresne, 2005). One common distinction made is between near and far transfer. Near transfer takes place between two similar contexts. An example would be a student's using a public computer at a library to do homework where the computer is of the same model and uses the same software as the computer the student uses at school. Far transfer occurs over two widely separate contexts. An example is when someone skilled at chess uses the same strategies that were successful in chess to run a business (Perkins & Salomon, 1992). Far transfer is thought to be accomplished through analogical reasoning, and is considered the prototypical type of transfer; however, a problem with it is that students don't always see the connections between the two contexts (Helfenstein, 2005).

Teachers, under pressure to improve their students' performance on standardized examinations, sometimes teach to the test — an example of applying the strategy of teaching for near transfer, when, in fact, far transfer

may be more important for students' future success (Barnett & Ceci, 2002). Of course, near transfer in language teaching can be important as well. For example, it is assumed that students are able to apply what they are learning in the second language classroom to their study of other school subjects when they are taught in the second language. The scope of far transfer has been extended beyond the ability to apply something learned in one setting to another to include the ability to solve novel problems that are isomorphs of one another, that is, those that share the same logical structure with the knowledge initially acquired, but which are presented or described in different terms. Even here, though, it has been found that only after receiving hints pointing out that two situations are isomorphic are students able to transfer relevant knowledge (Gick & Holyoak, 1983).

Salomon and Perkins (1989) dichotomized transfer somewhat differently. Rather than metaphorical distance, their low-road/high-road dichotomy relates to the amount of effort required. Low-road transfer involves the triggering of well-practiced routines by stimulus conditions similar to those in the learning context. Mindful or high-road transfer involves deliberate effortful abstraction and a search for connections. Accomplishing a transfer task can sometimes involve both.

In a theme familiar to those in second language (L2) learning, Butterfield and Nelson (1989: 5) added that teaching should not only promote positive transfer, but should also minimize negative transfer, the "learning" that adversely affects subsequent performance. Into the latter category would fall instances of pedagogically induced overgeneralization. Of course, researchers interested in second language learning are familiar with both the concepts of positive/negative transfer and of induced transfer of training errors (Selinker, 1972). In the L2 context, transfer is most often used to refer to cross-linguistic influence. This phenomenon is related to the matter under investigation in this chapter (and some who discuss general learning transfer include it); however, I will set it aside for my present purpose.<sup>4</sup>

Then, too, in first language (L1) acquisition, transfer has been invoked as an explanation for how it is that children are able to generalize from one syntactic structure to another. For example, Ninio (2011) argued that the learning curves of three types of basic verbal valence patterns show consistent acceleration, demonstrating the Power Law of Practice, the quantitative manifestation of transfer from previous learning. However, in this chapter, I will confine my exploration of transfer, or its lack, to what

takes place from inside to outside the classroom and from one lesson to the next. This view of transfer, too, is well-known in second language circles. For instance, in one L2 study, students spent weeks practicing sentences with verbs in the progressive form, only to have that form disappear from classroom language when the next lesson introduced the simple present tense (Lightbown, 1983).

## COGNITIVE VIEWS OF TRANSFER

### **The Inadequacy of Initial Learning**

It would be easy to dismiss the lack of transfer to inadequate proper learning in the first place. Although establishing whether something has been learned or not is a vexing problem in L2 learning, “[w]ithout an adequate level of initial learning, transfer cannot be expected. The point seems obvious, but it is often overlooked” (Bransford, Brown, & Cocking, 1999: 41). Research in L2 skill learning supports this observation. For example, learners literate in their native language may not immediately transfer their reading comprehension strategies to the second language; they have to achieve a certain “threshold” of L2 knowledge: Clarke’s (1979) threshold hypothesis.

Some transfer researchers maintain that there is an equivalence between learning and transfer. However, Lobato (2003) noted that learning and transfer to a different time/place are conceptually distinguishable. She observed that learners can generalize what they have learned in a classroom to novel situations without any new learning taking place. This would be successful transfer. Of course, what draws most attention is where transfer is not successful. An example of unsuccessful transfer would be where a student shows certain grammar skills on a standardized multiple-choice language test given at school but does not apply them when communicating. Indeed, this phenomenon is precisely what I have referred to as Whitehead’s inert knowledge problem. In other words, talk of transfer is always at least implicitly contrastive: It assumes learning within a certain context and asks about its impact beyond that context (Perkins & Salomon, 1992).

### **Type of Processing**

Anderson (1995) criticized earlier research on analogical transfer for its dominant focus on traits of the source and target in terms of declarative, instead of performance-oriented, processing. He pointed out

that for skill acquisition declarative knowledge plays only a significant role initially and in the course of practice is replaced by procedural knowledge. However, with regard to language learning, DeKeyser (2007) observed that procedural knowledge may be too specific to be transferred from one skill to another, for example, from language production to language comprehension skills. Anderson's position would also be vulnerable to challenge from instance theorists (Truscott, 1998), who hold that learning and subsequent transfer is mainly a function of memory retrieval of representations of specific instances of language use (Logan, 1988), a view that is in clear contrast to the view of transfer as resulting from the efficiency of proceduralization (Helfenstein, 2005).

Craik and Lockhart (1972) also discussed types of processing. They offered what is known as the levels of processing framework explanation for why transfer might not occur. They hypothesized that retention will be affected by the type and depth of processing. Semantic processing of words will result in better transfer than if the words are processed more superficially, such as by their phonetic composition.

A number of studies appear to support the levels of processing framework, but Morris, Bransford, and Franks (1977) challenged this explanation. They manipulated levels of processing in word learning tasks and transfer tests in three experiments. Sentences were constructed containing target words that were either meaningful or not, or rhymed or did not. Essentially, the experiments showed that semantic processing was superior to rhyme processing, given a semantic recognition test, whereas rhyme processing was superior to semantic processing, given a rhyming recognition test. In other words, it is not that one form of processing is superior to another. Rather, it is that more effective transfer takes place when the type of processing correlates between the learning task and the transfer test. Their findings led them to call for replacing the concept of levels of processing with one emphasizing transfer-appropriate processing. Transfer appropriate processing rests on the idea that we can better remember what we have learned if the cognitive processes that are active during learning are similar to those that are active during retrieval (Blaxton, 1989; Lightbown, 2008). Thus, the most successful transfer is achieved when the retrieval conditions match, or have fidelity with, the conditions of learning (Franks, Bilbrey, Lien, & McNamara, 2000).

Mismatch, of course, was a big criticism of the audiolingual language teaching method. Drilling students in language patterns might get students

to produce the patterns accurately and fluently in the classroom, but when it came to students using the patterns in authentic communicative situations, the gap between the learning condition and the retrieval condition was too wide for successful transfer to take place. Students' knowledge remained inert.

### **Level of Abstraction**

Rather than students' following a fixed set of procedures, such as an audiolingual drill, or their memorizing a set of facts, Bransford and Stein (1993) emphasized the importance of students learning with understanding. They contended that students who only follow fixed procedures or memorize facts have little basis for approaching a problem-solving task that differs in the slightest way from the original context. The National Research Council has adopted a similar position in its strong support for the benefits of helping students represent their experiences at levels of abstraction that transcend the specificity of particular contexts and examples, a teaching practice they call deeper learning (Pellegrino & Hilton, 2012).

Applying this logic to learning grammar, Larsen-Freeman (2000) has called for teaching reasons rather than, or in addition to, rules. Larsen-Freeman claimed that reasons are broader-based than rules, and that when students understand reasons why grammar structures are the way they are, their understanding, along with meaningful practice, helps students transcend the boundaries of a particular context. Then, too, De Palma and Ringer (2011) called attention to work by Smit (2004), who made a similar argument with regard to learning to write. Smit "distinguishes between broadly based and localized aspects of writing knowledge and ability: while broadly based aspects of writing do transfer from one writing context to another, localized aspects, because they are specific to particular contexts, do not" (De Palma & Ringer, 2011: 136). I will return to the issue of context-specific learning later.

When it comes to item learning, it appears that encountering frequent instances of a construction (i.e. tokens) is inadequate for abstraction. Frequency of tokens leads to stability and even entrenchment of the particular construction. Such is the case with the learning of the irregular past tense verbs in English, for example, where each irregular verb is acquired "locally", as a lexical item. However, with token variety within a type, that is, where different verbs are marked with the *-ed* for past tense, generalized abstract knowledge results and learners are able to use the past



tense pattern productively, beyond the specific regular verbs that they have already encountered (Bybee, 2008; Ellis, 2002; Eskildsen, 2012).

### **Active Construction, Schema, and Metacognition**

With the introduction of constructivist learning theory, knowledge was not believed to transfer only due to commonalities across situations or tasks, but rather to result from learners' active construction of knowledge structures (Bruner, 1986). Learners were thought to construct schemata that organize large amounts of information into meaningful systems (Anderson, 1990). Cognitive schemata were then later used (transferred) during subsequent interactions.

In keeping with the discussion of higher order cognitive skills, a new theme was introduced into research in transfer: meta-cognition (Flavell, 1976; Brown, 1978). Different types of meta-cognitive skills, such as self-monitoring and self-regulation, were thought to facilitate learning and transfer. For instance, Soini (1999) counted among the preconditions for active transfer an individual's self-reflected management of knowledge.

### **It Is Not Just Cognition**

Much of the research has been conducted with reference to cognitive knowledge and skills, such as analogical reasoning. However, cognitive transfer is inseparable from issues of emotion and motivation. Thagard and Shelley (2001) criticized the simplicity of analogical inference based on mere comparison of objects and properties and proposed a more complex model, their emotional coherence theory. Students do not only transfer what they know, but they also transfer the emotional valences of source elements to new targets (Helfenstein, 2005).

With regard to motivation, Pugh and Bergin (2006) discussed how motivational factors affect transfer by influencing the quality of initial learning, by promoting the cognitive engagement of learners, by influencing the initiation of transfer attempts, and by contributing to learner persistence. Then, too, learners of all ages are said to be more motivated to transfer when they can see the potential usefulness of what they are learning (Anderson, Simon, & Reder, 1996) and when they can use that information to do something that has an impact on others — especially their local community (Pintrich & Schunk, 2002). Despite these developments, Belenky and Nokes-Malach (2012) have recently asserted that the study of knowledge transfer still rarely draws upon motivational constructs in empirical work,

and Perkins and Salomon (2012) have called for the reconciliation of the cognitive bases for transfer with motivational considerations.

Relating the issues of transfer and motivation to L2 acquisition, James (2012) studied L2 transfer motivation: a combination of effort, desire, and favorable attitudes determining students' intentions to transfer. James interviewed students enrolled in an English for academic purposes (EAP) writing course. He found that students' true motivation to transfer what they had learned in the writing course to other courses was rare, reinforcing the belief that transfer is hard to promote.

One of the issues that James's classroom-centered research raises is that so much of the transfer research has been conducted in laboratories, apart from natural learning environments (Lightbown, 2008). Bransford and Schwartz (1999) pointed out that transfer is often measured in sequestered problem solving (SPS) contexts, in which people complete tasks isolated from additional knowledge resources that are typically available in nonlaboratory settings. The researchers have questioned whether these decontextualized SPS assessments have ecological validity. This returns us to the matter of context.

## CONTEXT

A cognitive understanding of transfer assumes that transfer is facilitated when what is learned in one situation is sufficiently abstract and decontextualized to apply to other situations. The basis for this assumption is that knowledge is separable from the context in which it is developed, rather than a function of activity, social interactions, culture, and history (Lobato, 2006).

Arguably, knowledge is not simply the individualized learning that students bring to and take from the classroom. Prior and subsequent knowledge also includes the kind of knowledge that learners acquire because of their social roles. Lave and Wenger (1991) argued that learning is situated; it occurs in a context and culture. Social interaction is a critical component of situated learning — learners learn what they do by participating in a community of practice (Lave & Wenger, 1991).

In keeping with this position, more recent views consider sociocultural influences on transfer (Beach, 1999). Transfer is not simply something an individual does in isolation, but rather depends on social and cultural factors. This dependence can be seen clearly in work done by Nasir (2000). She found that students who were very knowledgeable about basketball “street statistics” did not use their knowledge to make sense of statistics lessons in

their classrooms. The statistics were analogous, but the students failed to see that. The cultural context of the two settings was so different that they supported different identities, roles, and interpretations of social demands.

But context dependence can be a problem for transfer, because transfer, by definition, has to occur when the original context of learning is not reinstated — when one is no longer in school, for example. Thus, if knowledge is too tightly bound to the context in which it was learned, transfer to superficially different contexts will be reduced significantly (Bjork & Richardson-Klavehn, 1989). In an attempt at reconciling the two views, Perkins and Salomon (1992) observed that general knowledge that works together with local knowledge is important for transfer.

Besides taking the context of learning into account, an important newer awareness in the study of transfer is the recognition that the learners' perspective needs to be considered.

## THE AGENCY OF THE INDIVIDUAL

It has been the case in much of the research that transfer success has been determined by how much what a student does corresponds with what the researcher expects the student to do. This normative definition of success obviates the need to look at what the student is actually doing when it departs from the researcher's expectations or from looking at the student's purposes and interpretation of the task. Indeed, a shortcoming of transfer research is that explanations rest on the judgment of the researcher or the characteristics of the learning material and situation instead of the perception of the individual engaged in transfer (Helfenstein, 2005), a practice which overlooks the mediating factors by which individuals activate and apply prior learning (Mestre, 2005).

The approaches I have been characterizing so far focus upon the knowledge and conditions of acquisition that optimize the chances of transfer from an etic or researcher's point of view, not an emic or learner's point of view. To remedy this oversight, Lobato (2003) advocated an "actor-oriented" transfer approach, which focuses on the processes by which learners form personal relations of similarities across situations, whether or not those connections are correct or normative, and on the specific ways in which the instructional environment affords and constrains learners' generalizations. By reanalyzing her data to look at how students see situations as similar, Lobato (2003) found significant evidence of transfer

that had been overlooked in the initial etic analysis.

Thus, rather than asking whether transfer occurs, actor-oriented researchers ask what connections students are making. This question guides actor-oriented researchers to investigate how features of instructional environments, including the social nature of the setting, influence what students attend to and how in turn what they attend to affects how students generalize their learning experiences (Lobato, Ellis, & Muñoz, 2003). However, Lobato, Rhodehamel and Hohensee (2012) cautioned against an unfettered view of student agency. They advised that features in instructional contexts constrain the number of interpretations that are available for students to make.

James (2008) reported that ESL students' writing transfer was affected by the students' perception of the similarity between two tasks, not the researcher's task design, which used similar subject matter. Hansen (2000) also reported on an EAP student's skepticism regarding what she was learning in an EAP writing course, and Hansen suggested that this student's perception may well affect the transferability of what she was being taught. Experience tells us that a language teacher cannot take for granted that students will make connections between cognates. Many a second language instructor will assume that cognates are immediately recognizable by language learners, and that transfer is automatic in such cases, but experience suggests that this is not so (e.g. Zehr, 2011).

## INDIVIDUAL INTERACTING WITH CONTEXT

The concept of transfer being the result of learning that is exported from one context to another is deficient in another way. This view ascribes to context the limited role of differentially supporting or interfering with transfer, so that context is not seen to be an actual part of the process (Beach, 2003). Earlier, Beach (1999) put it this way:

Historically, studies of transfer have located agency and explanation for the process along a Cartesian plane that cleaves individuals and social contexts. Individual agency is assumed to have little to do with the creation of social contexts supporting transfer, just as changes in contexts are presumed to have little to do with how individuals learn and develop across them. (pp.102–103)

In contrast, Beach (1999) submitted that learners and contexts “exist in a recursive and mutually constitutive relation to one another across time” (p.111). A similar argument is made in ecological psychology (Gibson, 1979/1986).

From this perspective, knowledge is seen to be “an epiphenomenon of an agent interacting with an environment, in that knowledgeable behavior is co-determined by properties of the learner interacting on-the-fly with properties of the tools, information, and other learners available at the time” (Young, Kulikovich, & Barab, 1997: 133–134). This position builds on Gibson’s idea of affordances: The characteristics of the environment that support agents’ contributions to interactive activity and, therefore, the characteristics of the environment that agents need to perceive.<sup>5</sup>

It was a concern for learners’ being unable to perceive the environmental affordances<sup>6</sup> (although I did not call it this) that led me to coin the term “grammaring” (Larsen-Freeman, 1995, 2003). I reasoned that a contributing cause to the inert knowledge problem, when it came to grammar instruction, was the confusion in students’ minds stemming from learning grammar as a decontextualized body of knowledge, a static system of rules, rather than *experiencing* it as a dynamic system interacting with the environment, resulting from speakers’ choices, which it is (Larsen-Freeman, 1997). In other words, a rule-bound conception of grammar might not make salient to learners any affordance in the context for transfer.

Greeno, Smith, and Moore (1993) adopted this position. While not ruling out the possibility of symbolic cognitive abstractions playing a role in transfer, they observed that transfer mediated in this way is atypical. Instead, they argued that it is less that transfer depends on mental representations of structure that the learner has acquired in initial learning and later applies in the transfer situation and more that during initial learning, the learner acquires invariant structures of activity (what they call action schemata) responsive to the affordances — the action opportunities — of the learning situation. If the potential transfer situation presents similar affordances and, *importantly*, the person recognizes them, the person may apply the same, or a somewhat adapted, action schema there. Thus, “in the affordance — activity view, the structure that enables transfer is in the interactive activity of the person in the situation” (Greeno et al., 1993: 146). When similar affordances are shared across different situations, there is the potential for transfer to occur (Day & Goldstone, 2012).

## THE ADAPTIVE VALUE OF NONTRANSFER

I have been careful to use the word “mitigate”, not “solve”, in conjunction with the inert knowledge problem. One of the reasons for

my caution (besides the complexity of the issue and the nascence of our understanding) is that the problem may be inevitable. Bjork (2011) pointed out that there are times when it is not to our advantage to remember what we have learned. While our capacity for remembering is almost limitless, our capacity for retrieval is not. This is not necessarily a bad thing. For instance, we may not want phone numbers we have learned in the past to be easily accessible. Instead, we want our memories to be “updated”, where previously stored information is sometimes inhibited. Retrieval inhibition, according to Bjork, is an adaptive mechanism in human memory. It does not result in the permanent loss of memories, but rather they become less accessible because other items interfere or get in the way. “Thus, retrieval-induced forgetting is the consequence of an adaptive mechanism that facilitates remembering by causing forgetting.”<sup>7</sup> (Storm, 2011: 292)

It is perhaps inevitable, therefore, that although the potential for transfer of some previous learning is present on a given occasion, it is not activated because of retrieval inhibition. This may explain the waxing and waning of patterns used by L2 learners (Ellis & Larsen-Freeman, 2006; Larsen-Freeman, 2006). At any one point in time, from a target-language perspective, regress is as much a part of the language-learning process as is progress (de Bot & Schrauf, 2009). It is also important to note that thoughts of “regress” and “progress” are consistent with a view of language learning as a telic process. In the absence of a target-centric perspective, the waxing and waning of language-using patterns might be more appropriate as a focus of scholarly inquiry and less a matter of concern. This same focus motivates a need to reframe the overall understanding of transfer, for researchers have yet to look closely at what is being transferred.

## **REFRAMING THE UNDERSTANDING OF TRANSFER: TRANSFORMATION**

A problem that I have hinted at, but have not yet fully articulated, is that the term TRANSFER suggests that “the tasks or situations across which transfer occurs remain unchanged during the transfer and that the ‘transferor’ reproduces existing relations between fixed tasks” (Lobato, 2006: 444). Indeed, as I have shown, explanations for transfer are based on the psychological invariance of mental representations and action schemata.

This assumption of invariance runs contrary to what Carraher and Schliemann (2002) found when studying what students did to solve a

mathematical problem:

They have not simply unloaded a prior solution from their storehouse of knowledge. They have crafted it on the spot, adjusting and adapting their prior knowledge in the process. It is precisely this active accommodation of knowledge to the demands of the situation (as understood by them) that so notably lacks in transfer accounts of learning. (p.18)

In other words, Carraher and Schliemann rejected the notion of transfer in its passive “carrying over” sense (p.19). This transportation metaphor, that learners carry over knowledge from one situation to another, is problematic for several reasons. First, the transfer process itself is likely to be much more dynamic, one in which students construct, rather than carry over their knowledge to the new situation (Rebello, Cui, Bennett, Zollman, & Ozimek, 2007). Closely related is the second reason: There is no room in earlier accounts of transfer for the possibility that the knowledge acquired in the classroom is transformed. We know from a consideration of language as a complex adaptive system (Ellis & Larsen-Freeman, 2009), it is in using language that it is transformed. The transformation is partly due to the learner’s interacting with a different and changing context and partly due to internal reorganization of the learner’s language resources. Transformation is an optimizing process whereby learners alter their language resources to adapt to a changing environment or their changing goals. According to Spivey (2007), this entails dropping “the assumption of stable symbolic internal representations (holdovers from an information-processing perspective on cognitive processes) ... continuing on to a fully ecological dynamical account of perception, cognition, and action that connects the brain, body, and world” (p.332).

In L2 writing, De Palma and Ringer (2011) construed transfer as a dynamic process, not only centered on how students apply, but also on how they reshape, L2 writing skills they have learned in prior contexts to fit new ones. They referred to this phenomenon as adaptive transfer: “Rather than viewing students as novice writers, adaptive transfer allows for students to be perceived as agents who possess a variety of language resources and a range of knowledge bases that they might draw on in each writing context.” (p.142) A similar claim was advanced by Macqueen (2009). Applying a complexity theory perspective to analyzing students’ writing in a second language, Macqueen highlighted the process of adaptive imitation. In the gradual process of developing the means of participation

in an English-speaking speech community, the participants in her study adapted lexicogrammatical patterns in their writing to suit their changing goals.

From a complexity theory perspective the crucial point is that linguistic knowledge is not *given* or *transferred* but adaptively *achieved* by the individual in the environment (Leather & van Dam, 2003). What this means is that language is not located exclusively in the brain, in the body, in the environment, or in a particular linguistic form: It is latent and becomes manifest only as a function of the global state of the system, which emerges in the interaction (Varela, Thompson, & Rosch, 1991; see also Atkinson, 2011; Larsen-Freeman & Cameron, 2008).

## APPLICATIONS

By reframing our understanding of transfer as transformed, the claim is that learners transform what they are taught in the classroom; they do not merely implement or repeat it. This is true of low-road transfer as much as high-road. Indeed, the very process of retrieval consolidates (Karpicke & Roediger, 2008) and modifies what has been learned (Bjork, 2011); moreover, exact repetition never takes place.

The failure to transfer as it has been traditionally understood may be unavoidable; nevertheless, teachers must teach as if this is not the case. Therefore, before concluding, I speculate on several teaching practices and conditions that might mitigate the inert knowledge problem (see also Bransford et al., 1999; James, 2006; Lightbown, 2008).

## PSYCHOLOGICAL AUTHENTICITY

For transfer appropriate processing to take place, it is important for students to engage in activities that are rich with affordances and that have psychological authenticity.<sup>8</sup> To increase the fidelity between situations of learning and retrieval, students should have a genuine need to successfully receive and convey the information at the core of the communication. Further, learners need to engage in the kinds of cognitive processing that include establishing joint attention, reading communicative intentions, processing perspective/construal, and so on, because it is these aspects of L2 processing that will need to be transferred to other communicative settings (Segalowitz & Trofimovich, 2012).



In addition, classroom activities should be designed to allow learners to experience some of the normal psychological pressures and social interaction felt by people engaged in real communication (Gatbonton & Segalowitz, 1988), modulated for their proficiency level (Larsen-Freeman, 2003). Along similar lines, Bjork suggested that the most effective instruction introduces “desirable difficulties” into classroom learning (Bjork & Linn, 2006).

### **Language Use as Choice**

“A complex systems view ... foregrounds the centrality of variation among different speakers and their developing awareness of the choice they have in how they use patterns within a social context” (Larsen-Freeman & Cameron, 2008: 116). Of course, Halliday (1994) has long discussed language as a system of choices, and I have written about grammaring as choice-making (Larsen-Freeman, 2002). Consistent with this assumption is that what is taught in the first place should not be language as a single homogenous idealized construct, but rather as a system of variable, mutable, language-using patterns (Larsen-Freeman & Cameron, 2008).

### **Reminding**

Earlier, I mentioned that students do not always transfer from one situation to another on their own initiative. They need hints or reminding (Benjamin, 2011) to do so. Reed (2012) reported on research that suggests a manifold increase in transfer when students are given a hint to use previous information to come up with a solution to a new problem (from 8% to over 50%), but this should be tempered with James’s (2009) sobering report that when ESL students were asked to find the similarities between a task and work they were doing in their writing course, they did not demonstrate transfer any more than students who were not asked to search for similarities.

Yet, a critical requirement for transfer is that students attend to the dimensions relevant to the solution of the new problem (Detterman, 1993). Of course, teachers are not always going to be present to remind students to think back to a specific similar example to solve a current problem. Engle (2006), therefore, made a case for framing discussions with learners to enhance transfer. Learners need to understand “that what they are currently doing is part of a larger intellectual conversation that extends across time” (p.457), a framing that creates “intercontextuality”.

### **Calling Attention to Difference**

A lot of attention has been given in this chapter to common or similar features between occasions of learning and of transfer. However, Marton (2006) maintained that it is the contrasts that matter: “In order for the learner to perceive similarity, the learner must also have previously experienced something it differs from. Seeing one thing affects how the learner sees another thing — not because of the sameness of the two, but because of both similarities and difference.” (pp.531–532) He illustrated his point in discussing the learning of Cantonese tones. According to Marton, “[a]lthough the sameness of the sounds across the two words was a necessary condition for discerning the tone, it was the difference — and not the sameness — that was attended to, discerned, and transferred” (p.529).

### **Iteration**

One way to help learners notice similarities and differences is to present students with slightly varied consecutive activities in which students must enact their language-using resources iteratively (Larsen-Freeman, 2012). Iteration, or the opportunity to revisit the same territory again and again, is different from repetition; it is the former that is important for language learning and for transfer. “Teaching for transfer then involves returning again and again to an idea or procedure on different levels and in different contexts ..., with what appears to be different examples. But from a transfer perspective, ‘different examples’ are but variations on a single idea or concept.” (Haskell, 2001: 214)

### **Adaptation**

Larsen-Freeman (2013) also proposes that what should be taught is not only language, but also the process of adaptation: Teaching students to take their present system and mold it to a new and changing context for a present purpose. Learners transform their knowledge; they don’t merely implement knowledge in the form in which it was delivered through instruction, and this happens at all levels of language proficiency.

Thus, a unified view of context and learner lies in the recognition that giving learners an opportunity to do something a little bit different each time they engage in a particular activity is good training not only for perceiving difference, but also for being able to make the adaptations they need when faced with a different context or task. At a product level,

this also means teaching variants — going from teaching one form = one meaning to one meaning = many forms, and at the process level, teaching adaptation as a process (with feedback).

Such practice is not about rehearsal or “transferring intact knowledge”. Iteration and adaptation are critical components not only of learning in the classroom, but also of mobilizing learning beyond the classroom. After all, second language acquisition is not a matter of conformity to uniformity (Larsen-Freeman, 2003), and language is not fixed, but is rather a dynamic system (Larsen-Freeman, 1997).

## CONCLUSION

In this chapter, I have traced developments in the evolution of thinking about learning transfer. My starting point was cognitive,<sup>9</sup> followed by emotional, motivational, contextual, individual, interactional, and transformational views. One could make the case that this sequence also characterizes the evolution of research in the field of second language learning overall. Of course, although I have treated developments more or less chronologically, much productive work is being done in each of these areas today. Nevertheless, it seems to me that the latest view, one that understands transfer not as the reuse of past learning, but rather its transformation, shows great promise, and is a worthy current in language learning — though surely and happily, the currents will continue to flow.

## Notes

1. Thorndike and Woodworth (1901) concluded that where specific training in one task seemed to cause improvement in learning another, the improvement could be attributed to common elements in the two exercises. This “common elements” claim has spurred much of the transfer research over the decades since, although the nature of the elements has changed.
2. The U.S. National Science Foundation thought enough about the issue of transfer to convene two symposia within two years of each other, to which some of the leading contributors of research on transfer were invited to participate (see edited collections by Mestre, 2002 and Lobato, 2004), and just this year, special issues of the *Journal of the Learning Sciences* and *Educational Psychologist* have been dedicated to learning transfer.
3. Because it has been studied for a long time and because it has received a

great deal of attention (e.g. “There is perhaps no more important topic in the psychology of learning than transfer of learning”, Ellis, 1965: 5), the review is highly selective. I am also aware that when reviewing the literature on transfer, what is discussed as being transferred is not always the same. For instance, in this review, sometimes it is “items” or “constructions”; other times it is a skill or some subject matter.

4. Perhaps one point is worth noting: In his dissertation on transfer, Helfenstein (2005: 34) gave L2 interlanguage research credit for the reciprocal view on transfer between source and target. Not only can past experiences influence present ones, but current activities can alter the quality of previously acquired skills and memories.
5. See van Lier (2000) for a discussion of affordances and language learning.
6. Indeed, in a recent *New York Times* article (March 17, 2012), Albert Costa of the University of Pompea surmises that an advantage that bilinguals enjoy over monolinguals may be their heightened ability to monitor the environment.
7. On a more positive note, memories no longer easily accessible, due to competition from other memories, are still available and may be relearned at an accelerated rate (Bjork, 2011).
8. One practice this perspective might suggest is to give students more authentic experiences in the classroom so that the distance between the classroom and the outside world is not so wide, for example, turning the classroom into a market, for instance, in order to practice the language of shopping. While simulating the “outside world” in the classroom may have motivational appeal, it is not very practical. Besides, it seems to me “[t]he central question is not what learners have to do to use language naturally, but what they have to do to learn to use language naturally” (Widdowson, 1990: 46–47).
9. I could have started earlier, for example, with behaviorism (e.g. Osgood, 1949).

## References

- Alexander, K. L., D. R. Entwisle & L. S. Olson. (2001). Schools, achievement, and inequality: A seasonal perspective. *Educational Evaluation and Policy Analysis*, 23: 171–191.
- Anderson, J. R. (1990). *The Adaptive Character of Thought*. Hillsdale, NJ: Lawrence Erlbaum.
- Anderson, J. R. (1995). *Learning and Memory*. New York: Wiley.
- Anderson, J. R., H. A. Simon & L. M. Reder. (1996). Situated learning and education. *Educational Researcher*, 25 (4): 5–11.
- Atkinson, D. (Ed.). (2011). *Alternative Approaches to Second Language Acquisition*. London: Routledge.
- Barnett, S. & S. J. Ceci. (2002). When and where do we apply what we learn? A taxonomy

- for far transfer. *Psychological Bulletin*, 128: 612–637.
- Beach, K. D. (1999). Consequential transitions: A sociocultural expedition beyond transfer in education. *Review of Research in Education*, 28: 101–139.
- Beach, K. D. (2003). Consequential transitions: A developmental view of knowledge propagation through social organizations. In T. Tuomi-Gröhn & Y. Engeström (Eds.), *Between School and Work: New Perspectives on Transfer and Boundary-crossing* (pp.39–62). Oxford, UK: Elsevier Science.
- Belenky, D. M. & T. J. Nokes-Malach. (2012). Motivation and transfer: The role of mastery-approach goals in preparation for future learning. *Journal of the Learning Sciences*, 21: 399–432.
- Benjamin, A. S. (Ed.). (2011). *Successful Remembering and Successful Forgetting: A Festschrift in Honor of Robert A. Bjork*. New York: Taylor and Francis.
- Bjork, R. A. (2011). On the symbiosis of learning, remembering, and forgetting. In A. S. Benjamin (Ed.), *Successful Remembering and Successful Forgetting: A Festschrift in Honor of Robert A. Bjork* (pp.1–22). London: Psychology Press.
- Bjork, R. A. & A. Richardson-Klavehn. (1989). On the puzzling relationship between environmental context and human memory. In C. Izawa (Ed.), *Current Issues in Cognitive Processes: The Tulane Flowerree Symposium on Cognition* (pp.313–344). Hillsdale, NJ: Lawrence Erlbaum.
- Bjork, R. A. & M. C. Linn. (2006). The science of learning and the learning of science: Introducing desirable difficulties. *American Psychological Society Observer*, 19, 29, 39.
- Blaxton, T. A. (1989). Investigating disassociations among memory measures: Support for a transfer-appropriate processing framework. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15: 657–668.
- Bransford, J. D. & B. S. Stein. (1993). *The IDEAL problem solver* (2<sup>nd</sup> edn.). New York: Freeman.
- Bransford, J. D. & D. L. Schwartz. (1999). Rethinking transfer: A simple proposal with interesting applications. *Review of Research in Education*, 24: 61–100.
- Bransford, J. D., A. Brown & R. Cocking. (Eds.). (1999). *How People Learn: Brain, Mind, Experience, and School*. Washington, DC: National Academies Press.
- Brown, A. L. (1978). Knowing when, where, and how to remember: A problem of metacognition. In R. Glaser (Ed.), *Advances in Instructional Psychology* (Vol. 1, pp.77–165). Hillsdale, NJ: Lawrence Erlbaum.
- Brown, J. S., A. Collins & P. Duguid. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18 (1): 32–42.
- Bruner, J. (1986). *Actual Minds, Possible Worlds*. Cambridge, MA: Harvard University Press.
- Butterfield, E. & G. Nelson. (1989). Theory and practice of teaching for transfer. *Educational Technology Research and Development*, 3: 5–38.
- Bybee, J. (2008). Usage-based grammar and second language acquisition. In P. Robinson & N. C. Ellis (Eds.), *Handbook of Cognitive Linguistics and Second Language Acquisition* (pp.216–236). London: Routledge.

- Carraher, D. & A. D. Schliemann. (2002). The transfer dilemma. *Journal of the Learning Sciences*, 11: 1–24.
- Clarke, M. (1979). Reading in Spanish and English: Evidence from adult ESL students. *Language Learning*, 29: 121–150.
- Craik, F. & R. Lockhart. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, 11: 671–684.
- Day, S. B. & R. L. Goldstone. (2012). The import of knowledge export: Connecting findings and theories of transfer of learning. *Educational Psychologist*, 47: 153–176.
- de Bot, K. & R. Schrauf. (2009). *Language Development over the Lifespan*. London: Routledge.
- DeKeyser, R. (Ed.). (2007). *Practice in a Second Language*. Cambridge, UK: Cambridge University Press.
- De Palma, M.-J. & J. M. Ringer. (2011). Toward a theory of adaptive transfer: Expanding disciplinary discussions of “transfer” in second-language writing and composition studies. *Journal of Second Language Writing*, 20: 134–147.
- Detterman, D. K. (1993). The case for the prosecution: Transfer as an epiphenomenon. In D. K. Detterman & R. J. Sternberg (Eds.), *Transfer on Trial: Intelligence, Cognition, and Instruction* (pp.1–24). Norwood, NJ: Ablex.
- Ellis, H. C. (1965). *The Transfer of Learning*. New York: Macmillan.
- Ellis, N. C. (2002). Frequency effects in language processing: A review with implications for theories of implicit and explicit language acquisition. *Studies in Second Language Acquisition*, 24: 143–188.
- Ellis, N. C. & Larsen-Freeman, D. (Eds.). (2006). Language emergence: Implications for applied linguistics [Special Issue]. *Applied Linguistics*, 27 (4).
- Ellis, N. C. & Larsen-Freeman, D. (Eds.). (2009). Language as a complex adaptive system [Special issue]. *Language Learning*, 59 (Supplement 1).
- Engle, R. A. (2006). Framing interactions to foster generative learning: A situative account of transfer in a community of learners classroom. *Journal of the Learning Sciences*, 15: 451–498.
- Eskildsen, S. (2012). L2 negation constructions at work. *Language Learning*, 62: 335–372.
- Flavell, J. (1976). Metacognitive aspects of problem solving. In L. Resnick (Ed.), *The Nature of Intelligence* (pp.231–236). Hillsdale, NJ: Lawrence Erlbaum.
- Franks, J., C. Bilbrey, K. Lien & T. McNamara. (2000). Transfer-appropriate processing (TAP) and repetition priming. *Memory & Cognition*, 28: 1140–1151.
- Gatbonton, E. & N. Segalowitz. (1988). Creative automatization: Principles for promoting fluency within a communicative framework. *TESOL Quarterly*, 22: 473–492.
- Gibson, J. J. (1979/1986). *The Ecological Approach to Visual Perception*. Hillsdale, NJ: Lawrence Erlbaum.
- Gick, M. L. & K. J. Holyoak. (1983). Schema induction and analogical transfer. *Cognitive Psychology*, 15: 1–38.
- Greeno, J. G., D. R. Smith & J. L. Moore. (1993). Transfer of situated learning. In D. K.

- Detterman & R. J. Sternberg (Eds.), *Transfer on Trial: Intelligence, Cognition, and Instruction* (pp.99–167). Norwood, NJ: Ablex.
- Halliday, M. A. K. (1994). *An Introduction to Functional Grammar* (2<sup>nd</sup> edn.). London: Edward Arnold.
- Hansen, J. G. (2000). Interactional conflicts among audience, purpose, and content knowledge in the acquisition of academic literacy in an EAP course. *Written Communication*, 17: 27–52.
- Haskell, R. A. (2001). *Transfer of Learning*. San Diego, CA: Academic Press.
- Helfenstein, S. (2005). *Transfer: Review, reconstruction, and resolution*. Unpublished doctoral dissertation, University of Jyväskylä.
- James, M. A. (2006). Teaching for transfer in ELT. *ELT Journal*, 60: 151–159.
- James, M. A. (2008). The influence of perceptions of task similarity/difference on learning transfer in second language writing. *Written Communication*, 25: 76–103.
- James, M. A. (2009). “Far” transfer of learning outcomes from an ESL writing course: Can the gap be bridged? *Journal of Second Language Writing*, 18: 69–84.
- James, M. A. (2012). An investigation of motivation to transfer second language learning. *Modern Language Journal*, 96: 51–69.
- Karpicke, J. & H. Roediger. (2008). The critical importance of retrieval for learning. *Science*, 319: 966–968.
- Larsen-Freeman, D. (1995). On the teaching and learning of grammar: Challenging the myths. In F. Eckman, D. Highland, P. Lee, J. Mileham & R. Rutkowski Weber (Eds.), *Second Language Acquisition Theory and Pedagogy* (pp.131–150). Mahwah, NJ: Lawrence Erlbaum.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18: 141–165.
- Larsen-Freeman, D. (2000). Rules and reasons in grammar teaching. *ESL Magazine*, January/February.
- Larsen-Freeman, D. (2002). The grammar of choice. In E. Hinkel & S. Fotos (Eds.), *New Perspectives on Grammar Teaching* (pp.103–118). Mahwah, NJ: Lawrence Erlbaum.
- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Grammmaring*. Boston: Heinle/Cengage.
- Larsen-Freeman, D. (2006). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, 27: 590–619.
- Larsen-Freeman, D. (2012). On the role of repetition in language teaching and learning. *Applied Linguistics Review*, 3 (2): 195–210.
- Larsen-Freeman, D. (2013). Complex, dynamic systems and technemes. In J. Arnold Morgan & T. Murphey (Eds.), *Meaningful Action: Earl Stevick's Influence on Language Teaching* (pp.190–201). Cambridge University Press.
- Larsen-Freeman, D. & L. Cameron. (2008). *Complex Systems and Applied Linguistics*. Oxford, UK: Oxford University Press.

- Lave, J. (1988). *Cognition in Practice: Mind, Mathematics, and Culture in Everyday Life*. Cambridge, UK: Cambridge University Press.
- Lave, J. & F. Wenger. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge, UK: Cambridge University Press.
- Leather, J. & J. van Dam. (Eds.). (2003). *Towards an Ecology of Language Acquisition*. Dordrecht: Kluwer Academic Publishers.
- Lightbown, P. M. (1983). Exploring relationships between developmental and instructional sequences in L2 acquisition. In H. Seliger & M. Long (Eds.), *Classroom Oriented Research in Second Language Acquisition* (pp.217–243). Rowley, MA: Newbury House.
- Lightbown, P. M. (2008). Transfer appropriate processing as a model for classroom second language acquisition. In Z.-H. Han (Ed.), *Understanding Second Language Process* (pp.27–44). Clevedon, UK: Multilingual Matters.
- Lobato, J. (2003). How design experiments can inform a rethinking of transfer and vice versa. *Educational Researcher*, 32 (1): 17–20.
- Lobato, J. (2004). *An international working conference: Addressing the transfer dilemma*. Unpublished proposal REC-0450208 funded by the National Science Foundation. Department of Mathematics and Statistics, San Diego State University.
- Lobato, J. (2006). Alternative perspectives on the transfer of learning: History, issues, and challenges for future research. *Journal of the Learning Sciences*, 15: 431–449.
- Lobato, J., A. B. Ellis & Muñoz, R. (2003). How “focusing phenomena” in the instructional environment afford students’ generalizations. *Mathematical Thinking and Learning*, 5 (3): 1–36.
- Lobato, J., B. Rhodhamel & C. Hohensee. (2012). “Noticing” as an alternative transfer of learning process. *Journal of the Learning Sciences*, 21: 433–482.
- Logan, G. (1988). Toward an instance theory of automatization. *Psychological Review*, 95: 492–527.
- Macquoen, S. (2009). The emergence of patterns in second language writing. A sociocognitive exploration of lexical trails. Unpublished doctoral dissertation, University of Melbourne.
- Marton, F. (2006). Sameness and difference in transfer. *Journal of the Learning Sciences*, 15: 499–535.
- Mestre, J. (2002). *Transfer of Learning: Issues and Research Agenda* (No. NSF03–212). Arlington, VA: National Science Foundation.
- Mestre, J. (Ed.). (2005). *Transfer of Learning from a Modern Multidisciplinary Perspective*. Greenwich, CT: Information Age.
- Morris, D. D., J. D. Bransford & J. J. Franks. (1977). Levels of processing versus transfer appropriate processing. *Journal of Verbal Learning and Verbal Behavior*, 16: 519–533.
- Nasir, N. (2000). Points ain’t everything: Emergent goals and average and percent understandings in the play of basketball of African-American students. *Anthropology and Education Quarterly*, 31: 283–305.



- Ninio, A. (2011). *Syntactic Development, Its Input and Output*. Oxford, UK: Oxford University Press.
- Osgood, C. (1949). The similarity paradox in human learning: A resolution. *Psychological Review*, 56: 132–143.
- Pellegrino, J. W. & M. L. Hilton. (Eds.). (2012). *Education for life and work: Developing transferable knowledge and skills for the 21st century. A report of the National Research Council*. Washington, DC: National Academies Press.
- Perkins, D. N. & G. Salomon. (1992). *Transfer of Learning: International Encyclopedia of Education* (2<sup>nd</sup> edn.). Oxford, UK: Pergamon Press.
- Perkins, D. N. & G. Salomon. (2012). Knowledge to go: A motivational and dispositional view of transfer. *Educational Psychologist*, 47: 248–258.
- Pintrich, P. R. & D. H. Schunk. (2002). *Motivation in Education: Theory, Research and Applications* (2<sup>nd</sup> edn.). Upper Saddle River, NJ: Merrill/Prentice-Hall.
- Pugh, K. J. & D. A. Bergin. (2006). Motivational influences on transfer. *Educational Psychologist*, 41: 147–160.
- Rebello, N. S., L. Cui, A. G. Bennett, D. A. Zollman & D. J. Ozimek. (2007). Transfer of learning in problem solving in the context of mathematics and physics. In D. H. Jonassen (Ed.), *Learning to Solve Complex Scientific Problems* (pp.223–246). Hillsdale, NJ: Lawrence Erlbaum.
- Reed, S. K. (2012). Learning by mapping across situations. *Journal of the Learning Sciences*, 21: 353–398.
- Royer, J., J. Mestre & R. Dufresne. (2005). Framing the transfer problem. In J. Mestre (Ed.), *Transfer of Learning from a Modern Multidisciplinary Perspective* (pp.vii-xxvi). Greenwich, CT: Information Age.
- Salomon, G. & D. Perkins. (1989). Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. *Educational Psychologist*, 24: 113–142.
- Segalowitz, N. & P. Trofimovich. (2012). Second language processing. In S. Gass & A. Mackey (Eds.), *Handbook of Second Language Acquisition* (pp.179–192). London: Routledge.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10: 209–231.
- Singley, M. K. & J. R. Anderson. (1989). *The Transfer of Cognitive Skill*. Cambridge, MA: Harvard University Press.
- Smit, D. W. (2004). *The End of Composition Studies*. Carbondale: Southern Illinois University Press.
- Soini, T. (1999). *Preconditions of active transfer*. Unpublished doctoral dissertation, Helsinki University.
- Spivey, M. (2007). *The Continuity of Mind*. Oxford, UK: Oxford University Press.
- Storm, B. (2011). The benefit of forgetting in thinking and remembering. *Current Directions in Psychological Science*, 20: 291–295.
- Thagard, P. & C. Shelley. (2001). Emotional analogies and analogical inference. In D. Gentner, K. Holyoak & B. Kokinov (Eds.), *The Analogical Mind: Perspectives from*

- Cognitive Science* (pp.335–362). Cambridge, MA: MIT Press.
- Thorndike, E. L. & R. S. Woodworth. (1901). The influence of improvement in one mental function upon the efficiency of other functions. *Psychological Review*, 8: 247–261.
- Truscott, J. (1998). Instance theory and universal grammar in second language research. *Second Language Research*, 14: 257–291.
- van Lier, L. (2000). From input to affordances. In J. Lantolf (Ed.), *Sociocultural Theory and Second Language Learning* (pp.245–260). Oxford, UK: Oxford University Press.
- Varela, F., E. Thompson & E. Rosch. (1991). *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, MA: MIT Press.
- Whitehead, A. N. (1929). *The Aims of Education*. New York: Macmillan.
- Widdowson, H. W. (1990). *Aspects of Language Teaching*. Oxford, UK: Oxford University Press.
- Young, M., J. Kulikovich & S. Barab. (1997). The unit of analysis for situated assessment. *Instructional Science*, 25: 133–150.
- Zehr, M. (2011). Teacher: Transfer from first language to English isn't automatic. *Education Week's Blogs*, June 15.

## Comment after Chapter 15

I had a chance to think further about the pedagogical implications I put forth in the previous article when I was invited to present a paper at Teacher's College, Columbia University in October 2012. The occasion was to commemorate the 40<sup>th</sup> anniversary of the publication of Larry Selinker's article "Interlanguage". As you may know and as I have mentioned in this book, Selinker is given credit for helping to launch the present-day study of second language acquisition due to his proposal that there exists an interlanguage continuum reflecting the learners' language system, which is neither a product of the L1 grammar nor that of the L2. Learners are said to traverse the interlanguage continuum until they reach the endpoint, which is performance that is identical to a native speaker of the target language.

As I remark in the chapter that follows, Selinker's position was revolutionary in 1972 because it represented a departure from the understanding at the time, which was that learners' productions were largely a product of the habits of the L1. Selinker argued instead that learners were operating with a separate linguistic system, a language or interlanguage in its own right. In my article, I praised Selinker for his insight. Then, I went on to suggest that there was "another step to be taken" in the evolution

of the interlanguage concept. This step was to reject the notion that there was an endpoint to the continuum, which was identical to native speaker performance. The point is that language development is a non-teleological process. In other words, interlanguage is not implicitly determined with respect to the L2. Instead, I believe that the act of learning another language is not about conformity to a fixed system. It is about learners' ability to continue to adapt to an ever-changing context. This capacity changes and evolves as the person goes through new linguistic and cultural experiences. It is fluid, not static.

While this belief is consistent with my understanding of language as a complex dynamic system, I recognize that it does present problems for educators. After all, teaching and assessment are norm-based. I therefore conclude the chapter with 10 suggestions for how to reconcile a normative view of teaching and assessment with a non-teleological perspective on the nature of language.



# Chapter 16

## Another Step to Be Taken — Rethinking the Endpoint of the Interlanguage Continuum

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### INTRODUCTION

I can still remember the excitement that the introduction of Larry Selinker's article on interlanguage generated in 1972. I was a graduate student at the University of Michigan at the time. My professor at Michigan, H. Douglas Brown, came to class one day that year and announced that he had just read an article entitled "Interlanguage", which he believed would prove very important to the field. Professor Brown was right. The publication of "Interlanguage" (IL) was a watershed moment in many ways. One significant way was Selinker's call to distinguish second language learning from second language teaching and to study the former apart from the latter. At the time, this call was revolutionary, and it gave momentum to what S. Pit Corder's (1967) article had inspired five years earlier: the modern day study of second language acquisition.

I begin this chapter by introducing five contributions of the "Interlanguage" article, which I later return to in this chapter. I have chosen to highlight these five because I personally feel that they have made an enduring contribution. I list the five in the order they appear in the article. Next, I explain why I believe that at this juncture, another step needs to be taken. I conclude by offering some preliminary thoughts on what implications this next step might augur for language teaching and research.

### FIVE ENDURING CONTRIBUTIONS OF THE INTERLANGUAGE ARTICLE

Selinker was remarkably prescient. The call for studying second

language production was revolutionary when it was issued, and many of the claims in the article have withstood the test of time. Here are five of them that I single out for their far-reaching consequences.

### **The Separation of Teaching from Learning**

The first I have already mentioned is Selinker's call to separate teaching from learning. In the second paragraph of his article, Selinker writes:

It is also important to distinguish between a teaching perspective and a learning one ... In distinguishing between the two perspectives, claims about the internal structures and processes of the learning organism take on a very secondary character in the teaching perspective ... But such claims do provide the *raison d'être* for viewing second-language learning from the learning perspective. This paper is written from the learning perspective ... (Selinker, 1972: 209–210)

Selinker's distinguishing between teaching and learning and choosing to write from a learning perspective were important moves in promoting the study of second language acquisition.

### **The Definition of Acceptable Data**

The second contribution that stands out for me is Selinker's definition of acceptable data.

In the learning perspective, what would constitute the psychologically-relevant data of second-language learning? My own position is that such data would be those behavioral events which would lead to an understanding of the psycholinguistic structures and processes underlying "attempted meaningful performance" in a second language. The term "meaningful performance situation" will be used here to refer to the situation where an "adult" attempts to express meanings, which he may already have, in a language which he is the process of learning. (Selinker, 1972: 210)

With this definition of data, Selinker deftly removes from contention as data student production in performance drills, the use of which was a common teaching practice at the time. The focus he ascribed to meaning anticipated the huge shift which ensued, where language came to be seen not only as a formal system, but also as a system for making meaning, not only in SLA, but in linguistics and applied linguistics more generally.<sup>1</sup>

## The Existence of a Separate Linguistic System

... one would be completely justified in hypothesizing, perhaps even *compelled* to hypothesize, the existence of a separate linguistic system based on the observable output which results from a learner's attempted production of a TL [target language] norm. This linguistic system we will call "interlanguage" (IL). (Selinker, 1972: 214)

Indeed, perhaps, the most enduring legacy of the article was its invitation to view the learner's attempts at producing the target language as a linguistic system, as a language in its own right. This focused attention on the systematicity of learner production, rather than seeing it as random performance.

### Fossilization

As a fourth contribution, Selinker introduces the important, but contentious, idea of fossilization to explain seemingly immutable forms in learners' interlanguages.

Fossilizable linguistic phenomena are linguistic items, rules, and subsystems which speakers of a particular NL will tend to keep in their IL, relative to a particular TL, no matter what the age of the learner or amount of explanation and instruction he receives in the TL. (Selinker, 1972: 215)

### Distinguishing Linguistic Units from Psychological Units

And, finally, in my select group, I put Selinker's distinction between linguistic units and units of the psychology of second language learning. There is, after all, no reason to expect learners' language to be composed of some form of morphosyntactic structures.

... we should state that there is no necessary connection between relevant units of linguistic theory and linguistically-relevant units of a psychology of second-language learning. (Selinker, 1972: 225)

Anyone would be very happy to leave a legacy as rich as this one. Perhaps the ultimate compliment, though Selinker may not see it as one, is that the term "interlanguage" is so ubiquitous in professional literature these days that it is often used without attribution. One further point that I would like to make here is that Selinker did not rest on his laurels. Over the years, modifications to the interlanguage concept have been made, such as adding the qualifying construct of discourse domains (Selinker & Douglas, 1985), which I take up at the end of this chapter. Such updating is the very

essence of good scholarship it seems to me: the willingness to refine and even modify one's views as they mature. So there is a lot to appreciate in the article "Interlanguage" and its author.

## AN ENDURING CONTROVERSY, TOO

However, despite its enduring contributions, one significant question and answer sequence in the article (which may stem from retaining a language teaching perspective) has sparked controversy:

... how does a second-language-learning novice become able to produce IL utterances whose surface constituents are correct, i.e. "correct" with respect to the TL whose norm he is attempting to produce? (Selinker, 1972: 223)

A question followed immediately with his reply:

This question finally brings us face-to-face with the notion of "success" in absolute terms: productive performance in the TL by the second-language-learner which is identical to that produced by the native speaker of that TL. (Selinker, 1972: 223)

He quickly adds: "Of course, success need not be defined so absolutely. The teacher or learner can be satisfied with the learner's achieving what has been called 'communicative competence'." (p.223) Nevertheless, despite his making allowances for learners whose language production is not that of native speakers, Selinker persists in defining successful learning as being "*the reorganization of linguistic material* from an IL to identity with a particular TL" (Selinker, 1972: 224).

## ANOTHER STEP TO BE TAKEN

Now, the IL article was written at a time when our conception of language was very much influenced by Chomsky and Lenneberg. Terms such as "native speaker competence" (p.212) and "surface constituents" (p.223) reflected the then current theory and were the discourse of the time. It would be unfair to judge these expressions with today's sensibilities. They made sense in their day, and to many, they still do. Nevertheless, at this time, I believe that there is a step that needs to be taken — and that is to challenge equating success with conformity to native speaker norms. This position has already been challenged many times; here I will summarize the challenges on conceptual, ideological, and theoretical grounds.



As Ortega has put it

That is, wittingly or unwittingly, SLA researchers often portray development as a transitional state that is (or should be) ever changing *towards* the target. Implied in this construal is also an idealized monolingual native speaker, who is held to be the ultimate yardstick of linguistic success. (Ortega, 2009: 140)

Embedded in Ortega's statement are three ideas worth expanding upon:

- development as a transitional state ever changing towards the target
- idealized monolingual native speaker
- ultimate yardstick of linguistic success

I will address these three in turn.

### **Development as a Transitional State Changing towards the TL**

Many others before me have pointed out the value of studying second language development as its own system (e.g. Huebner, 1983) and of the misconception of entertaining a view of IL in light of its development towards the TL. Perhaps most famously, Bley-Vroman (1983) cautioned against the “comparative fallacy”, comparing L2 learners' systems to the TL norms, a practice that may distort our understanding of the development of L2 speakers' knowledge.

Vivian Cook (1996: 11) underscored this point by later adding

Bringing in the target L2 too soon may warp our analysis of the learner's own grammar towards the idiosyncrasies of the L2 rather than seeing it as a possible human language that has to be discussed as a thing of its own.

In other words, introducing a target L2 perspective undermines the strongest argument for the interlanguage construct, i.e. that it is a language in its own right, and needs to be examined as such.

As Year (2004) more recently observed

... the central issue of the comparative fallacy is that the IL data is not comparable to the target language norm because this is ultimately an invalid comparison of L2 learners' *performance* to native speakers' *hypothesized grammatical knowledge* (or *competence*). (Year, 2004: 2)

Besides the mismatch between learners' performance and native speakers' (Year calls it “hypothesized” — I prefer “idealized”) idealized competence, there is an additional problem: There is no definitive understanding of a

native speaker. Han (2004: 166) comments that the construct of the native speaker figures prominently in SLA research and yet it is one of the least investigated and least understood concepts in the field. This observation is especially troubling, she adds, because despite the lack of clarity concerning the concept, the native speaker has been depicted, among other things, “as a goal or a model for SLA or ... as a yardstick to measure second language knowledge” (p.166).

Indeed, Davies (2003: 180) as cited in Han (2004: 167) claims

SLA research has always been more interested in the native speaker than in language proficiency. In particular it has compared native-speaker behavior and that of various second language learners, asking the question: What does the second language learner know and to what extent does this differ from what the native speaker knows?

Han goes on (p.167) to state that, “Few would deny that Davies does herein capture a fundamental question of SLA researchers over the years, that is, whether or not (adult) L2 learners can achieve linguistic competence that is indistinguishable from that of a native speaker”. Of little comfort to those who opt to answer the question is the title of Han’s article, suggested by Davies’ definition “to be a native speaker means not to be a nonnative speaker”, which Han understandably says is the only possible operational definition one can give of the native speaker concept (Han, 2004: 166). So, the point is that if we are to continue to compare nonnative and native speakers, we are standing on shaky ground. But, the problem is not only a conceptual one.

### **(Idealized) Monolingual Native Speaker**

Several researchers (Cook, 1991; Ortega, 2005; Seidlhofer, 2004) have rightly asserted that the monolingual native speaker is not a legitimate model for L2 learning. Yet, despite this assertion, it can still be said that most researchers

continue to apply monolingual norms, when conducting research on bi- and multilingualism, which means that, among other aspects, native-speaker language proficiency is still used as the yardstick for all the languages of the multilingual person and the multilingual subject and their languages can be investigated without taking all the languages in contact into consideration ... (Herdina & Jessner, 2013: 755)

Herdina and Jessner’s words ring even truer in light of the superdiversity

(Vertovec, 2007) that characterizes mobility of populations, especially in Western Europe these days. Although population flows are not a new phenomenon, we are more aware that it is no longer possible to assume that language use is tied to particular nationalities or ethnicities. Even an appeal to “hybridity” to challenge this essentialism is problematic because as Makoni and Makoni (2010) note, hybridity is predicated upon and privileges the notion of languages as discrete entities. This implies that one can determine where one language ends and the other begins. In contrast, Makoni and Makoni’s term “vague linguistique” acknowledges that speakers have access to diverse linguistic resources and use them in unpredictable ways. Their approach accords speakers agency in using “bits and pieces” of languages. Along similar lines, but going even further, is Canagarajah’s (2013) notion of *translingual practice*. While in agreement that there are not “separate competences for separately labeled languages”, Canagarajah also includes other semiotic resources in translingual practice, writing that “communication transcends words” (p.7). Besides, many speakers have no desire or intention of attempting to conform to the native speaker community-established standards of language practice (Preston, 1989). Even for those who do, the fact is that the learner’s system and any idealized system will never converge.

In any case, a homogeneous native speaker speech community (or non-native speaker, for that matter) does not exist (e.g. Firth & Wagner, 1997), and never has, which brings us to the third factor.

### **The Ultimate Yardstick of Linguistic Success**

There are several problems with this concept. First, the metaphor of a yardstick suggests unidirectionality to the SLA process, which does not characterize L2 learning. Second, reprising the themes of the inappropriacy of using distinct L1 and L2 norms with multilinguals and of the impact of context on language use, Herdina and Jessner (2013) continue

The reconstruction of the development of language systems based on the linear projection from endpoint measures, as common in L1 and L2 acquisition models, can be shown to be essentially misguided as within multilingual systems there might be considerable fluctuation and variation within the respective language systems as the respective languages wax and wane depending on environmental demands. (Herdina & Jessner, 2013: 754)

A developmental yardstick also assumes that there is some agreed upon

static target — some common native speaker endpoint — which we have already seen is a vexing issue.

Finally, besides problems with the definition of native speaker endpoint, the metaphor of a yardstick assumes that there is consensus on “success”. However, for researchers, success is conceived of differently depending on one’s theoretical commitment. For instance, from a socio-cultural perspective, success would not be determined by a learner’s individual performance, but instead by a learner’s “responsiveness to mediation. This means that what an individual is capable of with assistance at one point in time, he or she will be able to do without assistance at a future point in time” (Lantolf & Thorne, 2007: 214). In short, for all these reasons, conceptual, ideological, and theoretical, the definition of success as conformity to native speaker norms is problematic.

Byrnes (2013: 221) sums up the dilemma with regard to some of the points I have been making:

In what has been called the “bilingual turn” in language studies, authors find fault with (1) the undue weight being given to an accident of birth and a concomitant denial of the effects of history, culture and societal use; (2) the undisputed authority and legitimacy in representing and arbitrating standards of form and use enjoyed by native speakers; and (3) the troubling disregard of current social, political and cultural realities of multilingualism and ever-changing forms of hybridity between multiple languages as learners adopt and adapt various identities in diverse circumstances of life.

Given these serious and mounting criticisms, one can justifiably wonder why then the native speaker target still affords a benchmark for second language development at all. It may be useful at this point to review what Wolfgang Klein (1998) has written about the matter. Klein offers three answers to this question: First, a normative perspective is retained in teaching, with teachers helping students move as close as possible to some arbitrarily imposed norm. Second, this normative point of view is reinforced by all of us who have learned a language through formal instruction, where the language is well-defined in textbooks, grammars and dictionaries and correspondingly assessed (though see VanPatten, 2014). Third, according to Klein, researchers are implicated as well. Having a TL perspective from which we can measure IL deviance provides a simple clear design for empirical work.

Klein has therefore broadened culpability to include members of

the research community as offenders. If we accept that a TL perspective should not be entertained, at least exclusively, then what can be done about it? My answer is that we need to take another step. We need to reconceive language and therefore interlanguage. SLA is still suffering from an externally teleological view of (inter-)language (Ortega, 2009, 2014; see also Ortega & Byrnes, 2008: 287). But, this view is flawed. As I wrote some years ago, language has no end, and it has no state (Larsen-Freeman, 2006a).

### **A Teleological View of Language**

Teleology means completion or end-directedness, goal, purpose. The genitive form of its Greek root, *telos-*, is also germane. It forms the prefix of English words such as “telescope” and “telepathy”, both of which imply a relationship to something occurring at a distance, despite physical discontinuity. In other words, Deacon (2012: 24) writes “We recognize teleological phenomena by their development toward something they are not, but which they are implicitly determined with respect to ... It is the *end* for the sake of which they exist ...” (p.24) I believe that this has been the assumption that the field of SLA has been operating under: That IL is a teleological phenomenon (implicitly) determined with respect to the TL. As we have already seen, this assumption is faulty for a number of reasons. I will use Deacon’s example, contrasting a discussion of artifacts crafted by humans with natural phenomena that develop on their own, to make this point another way.

Think about a human craft, such as pottery. I imagine that the potter has a mental image of a finished ceramic bowl when she begins. However, it takes shape and is somewhat remodeled as the clay is worked on the wheel. The bowl is being constructed for some purpose, and whatever that is, it is likely that the purpose “guides the selection and modification of its physical characteristics”, e.g. the bowl should be shaped with a flat bottom to keep its contents within. The point is that what guides the creation and use of the bowl is located extrinsically, so a bowl “derives its end-directed features parasitically, from the teleology of the designer or user. It is not intrinsic” (Deacon, 2012: 25). In contrast, a body organ is not dependent on any extrinsic teleology. Of course, it, too, has a function but “a biological function lacks an explicit representation of the end with respect to which it operates” (Deacon, 2012: 25). It could be said, though, to have an intrinsic or “immanent teleology” (Weber & Varela, 2002).

How organisms work is just *not* the way artifacts work: the latter always point to an external purpose they are made or used for, the former *are* purposes with the goal of keeping existent by organizing themselves. (Weber & Varela, 2002: 106–107)

In other words, a biological organism is autopoietic. “[A]utopoiesis entails the production and maintenance of a dynamic entity in the face of material change.” (Thompson, 2007: 146) Its identity is not fixed, as it is with a ceramic bowl, because the cells it is composed of are constantly being renewed. Further, an autopoietic organism needs to be adaptive, to change in relation to changing conditions (Thompson, 2007).<sup>2</sup> Importantly, though, this understanding of adaptivity is not as it is in Darwin’s theory of evolution. “For neo-Darwinians, evolution involves the optimization of adaptation through natural selection. From an autopoietic perspective, however, adaptation is an invariant background condition of all life (Maturana & Varela, 1987: 94–117) ...” (as cited in Thompson, 2007: 159). Furthermore, interaction with the environment can alter its development (Gilbert & Sarkar, 2000)<sup>3</sup> and its size.

Thus, in these ways (independence from an extrinsic teleology and its continual adaptation to changing conditions), I think language is more like a biological organ than an artifact. There are several other key differences between the bowl and a body organ. The potter begins with the clay for the pot from the start. From these, she shapes her bowl. On the other hand, an organ, like the heart, grows from one cell by dividing, multiplying, and differentiating. Even when the heart reaches full size, it does not stop changing. As I have just noted, its cells are constantly being replaced (Wade, 2009). Finally, the life of an organism is not resident in its parts. It is whole from the start, embodied in the global organization of the living processes (Deacon, 2012: 135).

I do not want to carry this analogy too far. Clearly, human language is not a biological organ. It is functionally different. We are not just the carriers, but its authors. Its construction takes place within the context of a collective speech community. Furthermore, language in use is semiotic.<sup>4</sup> On the other hand, language in use does have an autopoietic nature, maintaining its identity all the while it is changing (Larsen-Freeman, 2011a). In addition, we should remember that, just like a biological organ,<sup>5</sup> a language in use grows and changes with very little conscious intervention of humans (Keller, 1985) (cf. VanPatten, 2014). Moreover, seeing language in use more as an organism than an artifact also does away with the need to posit preformationism (“the

assumption that in order to build a complex structure you need to begin with a detailed plan or template”) (Deacon, 2012: 50). Indeed, from a complex systems point of view, language complexity is not due to the unfolding of some prearranged plan (Tucker & Hirsh-Pasek, 1993: 364) because all that is required to account for complexity is a sensitive dependence on initial conditions and a language-using context within which the system can adapt and change.

Even when we speak not of the language of a speech community, but rather those language resources of the individual learner, the analogy is useful. The language resources of an individual may be few, but they constitute a wholly functional system, one that grows under propitious conditions. One way it grows is, as with cells, through differentiation (cf. Andersen’s (1984) “one to one principle”), following from meaningful interaction, be it in conversation, in private speech, in interaction with a computer or a written text. New forms are not mere additions to the system; they change the system itself (Feldman, 2006). The system develops from experience (Ellis & Larsen-Freeman, 2006), afforded by the environment. The ambient language does, therefore, have a role in its shape. But the point is that it does not determine it, nor does it define the learning trajectory. If it did, there would be no way to account for the individual developmental paths that learners take. Larsen-Freeman and Cameron (2008: 158) put it this way:

Embodied learners soft assemble their language resources interacting with a changing environment. As they do so, their language resources change. Learning is not the taking in of linguistic forms by learners, but the constant adaptation [creation,] and enactment of language-using patterns in the service of meaning-making in response to the affordances that emerge in a dynamic communicative situation.

This view of language as a complex adaptive system (Ellis & Larsen-Freeman, 2009) counters the tendency to portray learner language as being an incomplete and deficient version of native speaker language. Indeed, implicit in this understanding of language as a self-modifying, emerging system is that the developmental change process is never complete and neither is its learning. It also, to my mind, offers an interpretation of fossilization from a probabilistic variationist approach, which attributes an apparent halt in development to “an entrenched item-based pattern which simply remains available for use for the time being” (Eskildsen, 2012:

366), in other words a probabilistic pattern, not an absolute one (Berdan, 1996). Furthermore, this point of view supports Selinker's observation that learners' language production units are not linguists' constructs. Instead, they are language-using patterns, variegated in form and length, which are psycholinguistically identical (Croft & Cruse, 2004). "It [language] is the way it is because of the way it has been used, its emergent stabilities arising out of interaction" (Larsen-Freeman & Cameron, 2008: 115), not because of an extrinsic teleology.

In sum, the view I am putting forth here (as I have for some time, e.g. Larsen-Freeman, 1997) is that language as realized in a speech community is an open system, always changing, never fixed and that the language resources of its speakers are a dynamic network of language-using patterns: emergent, mutable and self-organizing. Their development within language learners, then, is not as an act of conformity, but rather is extended from continuing dynamic adaptedness to a specific present and ever-changing context (Larsen-Freeman, 2006b, 2011b).

Thibault (2011: 211) put it this way

Advances in the theory of dynamical systems, grounded in our understandings of neurobiology ... and ecosocial systems, have opened up the possibility of a different approach. The new approach stresses the centrality of co-acting agents who extend their worlds and their own agency through embodied, embedded processes of *linguaging*, rather than uses of an abstract language system ...

### **Reconciling the Non-teleological Nature of Language with the Normativity of Language Teaching**

It is important to acknowledge that the view of language learning that I have been promulgating in this chapter is that of natural language development. While it is essential for teachers to understand the natural process, they are responsible for aiding learners to at least approach the norms of the community in which the learners seek membership. To do so, teachers need to be concerned not only with change from below, i.e. the change initiated by language learners, but also with change from above (Tarone, 2007), i.e. change prompted by instruction, often itself influenced by standardized examinations. The question then becomes how to help learners extend their linguistic worlds, all the while making possible their membership in the discourse communities to which they desire admission. The following are some possible moves to reconcile the two:



1. *Set the overall goal of language teaching as developing capacity (Widdowson, 1983).*

By capacity, Widdowson means the ability to create meaning with language. Capacity is that which enables learners to move beyond speech formulas in order to innovate. It is what accounts for the fact that language changes all the time, and that it does so due to the cumulative innovations that language users make at the local level as they adapt their language resources to new communicative contexts (see Montrul, 2014). Capacity is “an active force for continuing creativity” (Widdowson, 1983: 27).

2. *Within this overall goal, identify particular contexts of use, contexts in which norms for local “success” can be established.*

As Schleppegrell (2006) proposes, such contexts, e.g. tasks, genres, assignments, and situations, establish the expectations for language use. In other words, we should not be thinking of teaching language, writ large, but rather teaching the lexicogrammatical resources present in particular oral or written texts (Byrnes, 2014). We need to think of language as locally contingent and situated (Eskildsen, 2012: 353).

On a related note, Selinker and Douglas (1985) also point out that local contingency is true for individual learners. [Interlanguage] “processes do not take place primarily across ILs, but in fact take place in internally created discourse domains that are important to individual learners: domains that the learner greatly needs or wishes to interact in ...” (1985: 199)

3. *Engage learners in activities that are rich in affordances.*

The concept of affordances recognizes that learners perceive their own learning opportunities, despite what the teacher’s goal is for a particular pedagogical activity. Rather than thinking of providing students with input, then, teachers should think of activities which allow students access to the language through multiple entry points. If the language learner is active and engaged, she will perceive linguistic affordances and use them for linguistic action (van Lier, 2000: 252). Indeed, the gap between the teacher’s intentions for a given activity and how a learner engages in the same activity can be a key resource “for understanding the processes of learning as processes of formation of agency” (Engeström & Sannino, 2012: 46).

4. *Create activities that encourage transfer appropriate processing (Lightbown, 2008, 2013; Larsen-Freeman, 2013a).*

Transfer appropriate processing takes place when the conditions of learning and the conditions of use are aligned. It is not the same as using

language in authentic situations. What is important is that the conditions are semiotically aligned, where speakers have a psychologically genuine need to communicate.

5. *Design activities where language-using patterns as identified by contexts of use (in keeping with the learners' goals) are iterated (Larsen-Freeman, 2012a).*

Students need to encounter and use the patterns present in the contexts of use iteratively. It is navigating the tension between convention and innovation that is central to learning. As Larsen-Freeman and Cameron (2008: 190) have observed: "When we make use of genres in speaking or writing, we use the stabilized patterns but exploit the variability around them to create what is uniquely needed for that particular literacy or discourse event." The challenge for the teacher is to provide for iteration in a way that does not undermine the meaningful use of language. This can be achieved by designing learning activities that are inherently repetitive (Gatbonton & Segalowitz, 2005), but offer affordances for creativity.

6. *Teach reasons for form-based rules (Larsen-Freeman, 2003).*

Help students develop awareness of the choice they have in how they use patterns within a context of use (Larsen-Freeman, 2002). Teach students to understand that language rules are not as arbitrary and fixed as they seem. For example, a rule of English grammar that says that you cannot use the present participle with a stative verb is not inviolate, if you use the stative verb meaningfully in an active sense ("He is being humble"), or use it to emphasize change ("We are loving our new schedule"), or a span of time ("I have been wanting a new car"). Helping students see the reasons equips them better to see language as a meaning-making system, not one filled with arbitrary rules.

7. *Teach adaptation.*

What we should be teaching is not only language, but also the process of adaptation: Teaching students to take their present system and mold it to a new context for a present purpose (Larsen-Freeman, 2013b). One means of doing so is to build on Stevick's idea of technemes: When teachers change the conditions for completing a task successfully from one time to the next, however slightly, a new challenge is presented. For instance, if the students have to complete the same task a second time, but do so taking less time, students have an opportunity to learn to adapt their language resources.

8. *Develop students' capacity for semiotic agility.*

Prior's concept of semiotic agility is the capacity for shifting "rapidly and fluently between and among semiotic worlds" (Prior, 2010: 233). To

do this, teachers would guide students to move easily among the many different modes of communication in the many different contexts students encounter. As Thorne (2011) has put it: “This calls for an ontological shift in how cognition/action and development are related from ‘the dead hand of competence’ (Geertz, 1973: 88) to semiotic agility.”

9. *Help students learn to negotiate in translingual contexts (Canagarajah, 2013).*

Helping students to negotiate effectively for intelligibility and communicative success in global contact zones calls for them to develop performance competence (Canagarajah, 2013). As there is no homogeneous norm to call upon in such zones, performance competence requires suitable translingual negotiation strategies beyond teaching students to negotiate meaning. They include rhetorical and social considerations as well as cultivating cooperative dispositions.

10. *As a counterbalance to the use of formal assessment for measuring what learners have acquired, find ways of assessing progress in terms of development.*

This entails assessing learning in a self-referential way: Looking at what learners are doing over time, expanding their repertoire of language resources, for instance, and defining progress in terms of where a learner wants to go, not looking at what the learner is not doing in light of some idealized “target”. As Clarke (2013: 295) writes, “we have to recognize that measures of success cannot be universally applied to all ... students”. This injunction applies to both teachers and researchers, no doubt a different and perhaps difficult way of operating, but one that improves on the assumption that progress is unidirectional and achieved when it is identical with native speaker production.

## CONCLUSION

In this chapter, I have suggested that the concept of IL provided an indispensable initial step in establishing the legitimacy of looking at language learning, independent of the normative perspective of language teaching. It has stimulated much research and has had a formative role in setting research agendas. Furthermore, it did later itself move in a non-teleological direction through the construct of discourse domain, as internally defined by the learner.

We must now take another step to distance our focus from a teleological view. By continuing to equate identity with idealized native speaker production as a definition of success, it is difficult to avoid seeing the

learner's IL as anything but deficient. Instead, I have called for reconceiving language as a complex adaptive dynamic system, one locally constituted without an extrinsic teleology. This reconception means that language learning success need not be determined by a common distal endpoint. I believe that enacting an instructional approach, such as called for here, would facilitate membership in the learners' preferred discourse community as well as support their capacity for extending the system. We can then look to the learners' ever-expanding capacity to use their palette of lexicogrammatical resources (Byrnes, 2014) to engage in meaningful languaging in a multitude of socially created and internally defined contexts in an agile fashion. In actuality, learners actively transform their linguistic world; they do not merely conform to it (Larsen-Freeman, 2012b).

## Notes

1. Of course, the importance of treating language as a meaning-making system did not originate with Selinker. Linguists such as Firth and Halliday long maintained this position.
2. In organisms, there is "a twofold purpose of identity (self-production) and sense making (adaptivity and cognition), based on autopoiesis" (Thompson, 2007: 153). Sensemaking "is behavior or conduct in relation to environmental significance and valence, which the organism itself enacts or brings forth on the basis of its autonomy" (Thompson & Stapleton, 2008: 3).
3. Gilbert and Sarkar give some fascinating examples, such as that a female ant larva can become a queen or a worker, depending on the food she has been given, a turtle can develop into male or a female, depending on the temperature at a critical point in its incubation, and a wrasse fish can become a male or a female depending on whether there is a male already resident in the reef. These "life history strategies" make up a large part of contemporary ecology (Gilbert & Sarkar, 2000: 7).
4. I note, though, that there is a field of biosemiotics, which introduces a "profound change of perspective implied when life is considered not just from the perspectives of molecules and chemistry, but as signs conveyed and interpreted by other living signs in a variety of ways ..." (Wikipedia entry on biosemiotics). Biosemiotics seeks to link "the two kingdoms" of "mind and matter", in order to "give humanity its place in nature" (Hoffmeyer, 1996: 94, as cited in Kull, 1999).
5. Rutherford (1987), too, has argued for a more organic metaphor for grammar, in contrast to a machine metaphor.

## References

- Andersen, R. (1984). The one-to-one principle of interlanguage construction. *Language Learning*, 34: 77–95.
- Berdan, R. (1996). Disentangling language acquisition from language variation. In R. Bayley & D. R. Preston (Eds.), *Second Language Acquisition and Linguistic Variation* (pp.203–243). Amsterdam: John Benjamins.
- Bley-Vroman, R. (1983). The comparative fallacy in interlanguage studies: The case of systematicity. *Language Learning*, 33: 1–17.
- Byrnes, H. (2013). Renting *language* in the ownership society: Reflections on language and learning in a multilingual world. In J. Arnold & T. Murphey (Eds.), *Meaningful Action: Earl Stevick's Influence on Language Teaching* (pp.216–234). Cambridge: CUP.
- Byrnes, H. (2014). Theorizing writing development at the intersection of “task” and L2 writing: Reconsidering complexity. In H. Byrnes & R. Manchón (Eds.), *Task-based Language Learning: Insights from and for L2 Writing* (pp.79–103). Amsterdam: John Benjamins.
- Canagarajah, S. (2013). *Translingual Practice*. New York, NY: Routledge.
- Clarke, M. A. (2013). Individual and organizational learning: Exploring the psycho-social dynamics of change. In J. Arnold & T. Murphey (Eds.), *Meaningful Action: Earl Stevick's Influence on Language Teaching* (pp.281–297). Cambridge: CUP.
- Cook, V. J. (1991). The poverty-of-the-stimulus argument and multi-competence. *Second Language Research*, 7 (2): 103–117.
- Cook, V. J. (1996). Some relationships between linguistics and second language acquisition. In K. Sajavaara & C. Fairweather (Eds.), *Approaches to Second Language Acquisition, Jyväskylä Cross-Language Studies*, 17, 7–13.
- Corder, S. P. (1967). The significance of learners' errors. *International Review of Applied Linguistics*, 5: 161–170.
- Croft, W. & A. Cruse. (2004). *Cognitive Linguistics*. Cambridge: CUP.
- Davies, A. (2003). *The Native Speaker: Myth and Reality*. Clevedon: Multilingual Matters.
- Deacon, T. (2012). *Incomplete Nature*. New York, NY: W. W. Norton & Company.
- de Angelis, J. & U. Jessner. (2012). Writing across languages in a bilingual context: A dynamic systems theory approach. In R. Manchón (Ed.), *L2 Writing Development: Multiple Perspectives* (pp.47–68). Berlin: de Gruyter.
- Ellis, N. C. & D. Larsen-Freeman. (2006). Language emergence: Implications for applied linguistics. *Applied Linguistics*, 27(4): 558–589.
- Ellis, N. C. & D. Larsen-Freeman. (Eds.). (2009). Language as a complex adaptive system. *Language Learning*, 59 (Suppl. 1): 90–112.
- Engeström, Y. & A. Sannino. (2012). Whatever happened to process theories of learning? *Language, Culture and Social Interaction*, 1: 45–56.
- Eskildsen, S. (2012). L2 negation constructions at work. *Language Learning*, 62 (2): 335–372.

- Feldman, J. (2006). *From Molecule to Metaphor. A Neural Theory of Language*. Cambridge, MA: The MIT Press.
- Firth, A. & J. Wagner. (1997). On discourse, communication, and (some) fundamental concepts in SLA research. *The Modern Language Journal*, 81 (3): 285–300.
- Gatbonton, E. & N. Segalowitz. (2005). Rethinking communicative language teaching. *The Canadian Modern Language Review*, 61 (3): 325–353.
- Geertz, C. (1973). *The Interpretation of Cultures*. New York: Basic Books, Inc.
- Gilbert, S. F. & S. Sarkar. (2000). Embracing complexity: Organicism for the 21<sup>st</sup> Century. *Developmental Dynamics*, 219 (1): 1–9.
- Han, Z.-H. (2004). To be a native speaker means not to be a nonnative speaker. *Second Language Research*, 20 (2): 166–187.
- Herdina, P. & U. Jessner. (2013). Epilogue: The implications of language attrition for dynamic systems theory: Next steps and consequences. *International Journal of Bilingualism*, 17 (6): 752–756.
- Hoffmeyer, J. (1996). *Signs of Meaning in the Universe*. (translated by B. J. Haveland). Bloomington, IN: Indiana University Press.
- Huebner, T. (1983). *A Longitudinal Analysis of the Acquisition of English*. Ann Arbor, MI: Karoma.
- Keller, R. (1985). Toward a theory of linguistic change. In T. Ballmer (Ed.), *Linguistics Dynamics: Discourses, Procedures and Evolution* (pp.212–237). Berlin: Walter de Gruyter.
- Klein, W. (1998). The contribution of second language acquisition research. *Language Learning*, 48 (4): 527–550.
- Kull, K. (1999). Biosemiotics in the twentieth century: A view from biology. *Semiotica*, 127–1/4: 385–414.
- Lantolf, J. & S. Thorne. (2007). Sociocultural theory and second language learning. In B. VanPatten & J. Williams (Eds.), *Theories in Second Language Acquisition* (pp.201–224). New York, NY: Routledge.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18: 141–165.
- Larsen-Freeman, D. (2002). The grammar of choice. In E. Hinkel & S. Fotos (Eds.), *New Perspectives on Grammar Teaching* (pp.103–118). Mahwah, NJ: Lawrence Erlbaum Associates.
- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Grammaticing*. Boston: Heinle/Cengage.
- Larsen-Freeman, D. (2006a). Second language acquisition and the issue of fossilization: There is no end, and there is no state. In Z.-H. Han & T. Odlin (Eds.), *Studies of Fossilization in Second Language Acquisition* (pp.189–200). Clevedon: Multilingual Matters.
- Larsen-Freeman, D. (2006b). On the need for a new understanding of language and its development. *Journal of Applied Linguistics*, 31(3): 281–304.

- Larsen-Freeman, D. (2011a). A complexity theory approach to second language development/acquisition. In D. Atkinson (Ed.), *Alternative Approaches to Second Language Acquisition* (pp.48–72). Oxford: Oxford University Press.
- Larsen-Freeman, D. (2011b). Saying what we mean: Making a case for second language acquisition to become second language development. A plenary address delivered at the 16<sup>th</sup> World Congress of Applied Linguistics (AILA), August 28, 2011, Beijing.
- Larsen-Freeman, D. (2012a). On the roles of repetition in language teaching and learning. *Applied Linguistics Review*, 3 (2): 195–210.
- Larsen-Freeman, D. (2012b). The emancipation of the language learner. *Studies in Second Language Learning and Teaching*, 2 (3): 297–309.
- Larsen-Freeman, D. (2013a). Transfer of learning transformed. *Language Learning*, Supplement 1: 107–129.
- Larsen-Freeman, D. (2013b). Complex systems and technemes: Learning as iterative adaptations. In J. Arnold & T. Murphey (Eds.), *Meaningful Action: Earl Stevick's Influence on Language Teaching* (pp.184–195). Cambridge: CUP.
- Larsen-Freeman, D. & L. Cameron. (2008). *Complex Systems and Applied Linguistics*. Oxford: Oxford University Press.
- Lightbown, P. M. (2008). Transfer appropriate processing as a model for classroom second language acquisition. In Z.-H. Han (Ed.), *Understanding Second Language Process* (pp.27–44). Clevedon: Multilingual Matters.
- Lightbown, P. M. (2013). Transfer appropriate processing. In P. Robinson (Ed.), *Encyclopedia of Second Language Acquisition* (pp.652–655). London: Routledge.
- Makoni, B. & S. Makoni. (2010). Multilingual discourses on wheels and public English in Africa. A case for vague linguistique. In J. Maybin & J. Swann (Eds.), *The Routledge Companion to English Language Studies* (pp.258–270). Abingdon: Routledge.
- Maturana, H. & F. Varela. (1989). *The Tree of Knowledge: The Biological Roots of Human Understanding*. Boston: Shambala Press.
- Montrul, S. (2014). Interlanguage, transfer and fossilization: Beyond second language acquisition. In Z.-H. Han & E. Tarone (Eds.), *Interlanguage: Forty Years Later* (pp.75–104). Amsterdam: John Benjamins.
- Ortega, L. (2005). For what and for whom is our research? The ethical as transformative lens in instructed SLA. *The Modern Language Journal*, 89: 427–443.
- Ortega, L. (2009). *Understanding Second Language Acquisition*. London: Hodder Education.
- Ortega, L. (2014). Trying out theories on interlanguage: Description and explanation over 40 years of L2 negation research. In Z.-H. Han & E. Tarone (Eds.), *Interlanguage: Forty Years Later* (pp.173–201). Amsterdam: John Benjamins.
- Ortega, L. & H. Byrnes. (Eds.). (2008). *The Longitudinal Study of Advanced L2 Capacities*. New York, NY: Routledge.
- Preston, D. (1989). *Sociolinguistics and Second Language Acquisition*. Oxford: Blackwell.
- Prior, P. (2010). Remaking IO: Semiotic remediation in the design process. In P. Prior &

- J. Hengst (Eds.), *Exploring Semiotic Remediation as Discourse Process* (pp.206–235). Houndmills: Palgrave Macmillan.
- Rutherford, W. (1987). *Second Language Grammar: Learning and Teaching*. London: Longman.
- Schleppegrell, M. (2006). The linguistic features of advanced language use: The grammar of exposition. In H. Byrnes (Ed.), *Advanced Language Learning: The Contribution of Halliday and Vygotsky* (pp.134–146). London: Continuum.
- Seidlhofer, B. (2004). Research perspectives on teaching English as a lingua franca. *Annual Review of Applied Linguistics*, 24: 209–239.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10 (3): 209–231.
- Selinker, L. & D. Douglas. (1985). Wrestling with “context” in interlanguage theory. *Applied Linguistics*, 6: 190–204.
- Tarone, E. (2007). Sociolinguistic approaches to second language acquisition research—1997–2007. *The Modern Language Journal*, 91: 837–848.
- Thibault, P. (2011). First-order languaging dynamics and second-order language: The distributed language view. *Ecological Psychology*, 23: 210–245.
- Thompson, E. (2007). *Mind in Life*. Cambridge, MA: Harvard University Press.
- Thompson, E. & M. Stapleton. (2008). Making sense of sense-making: Reflections on enactive and extended mind theories. *Topoi*, 28 (1): 23–30.
- Thorne, S. (2011). Languaging phenomenologies of time, place, and space. Insights into applied linguistics: Languaging, agency and ecologies. Plenary at the 30<sup>th</sup> Summer School of Applied Language Studies. June 7, 2012. Jyväskylä, Finland.
- Tucker, M. & Hirsh-Pasek, K. (1993). Systems and language: Implications for acquisition. In L. Smith & E. Thelen (Eds.), *A Dynamic Systems Approach to Development: Applications* (pp.359–384). Cambridge, MA: The MIT Press.
- van Lier, L. (2000). From input to affordance: Social-interactive learning from an ecological perspective. In J. Lantolf (Ed.), *Sociocultural Theory and Second Language Learning* (pp.243–259). Oxford: Oxford University Press.
- VanPatten, B. (2014). The limits of instruction: 40 years after “Interlanguage”. In Z.-H. Han & E. Tarone (Eds.), *Interlanguage: Forty Years Later* (pp.105–126). Amsterdam: John Benjamins.
- Vertovec, S. (2007). Super-diversity and its implications. *Ethnic and Racial Studies*, 9 (6): 1024–1054.
- Wade, N. (2009). Heart muscle renewed over lifetime. *New York Times*, April 3, 2009, p. A12 of the New York edition.
- Weber, A. & F. Varela. (2002). Life after Kant: Natural purposes and the autopoietic foundations of biological individuality. *Phenomenology and the Cognitive Sciences*, 1: 97–125.
- Widdowson, H. G. (1983). Competence and capacity in language learning. In M. Clarke & J. Handscombe (Eds.), *On TESOL '82: Pacific Perspectives on Language Learning and Teaching* (pp.97–106). Washington, DC.
- Year, J. E. (2004). Instances of the comparative fallacy. *Teachers College, Columbia University Working Papers in TESOL & Applied Linguistics*, 4 (1): 1–7.



## Comment after Chapter 16

I wrote in the previous chapter that language learning does not have an endpoint that is identical with what a native speaker of the language knows and can do. In fact, in the next chapter, I go even further. I suggest that there is no endpoint at all to second language learning. Of course, the learner has to want to continue to learn and has to have continued access to the L2. If these two conditions are met, then I argue learning never stops (although as mentioned earlier, language learners may achieve differential success).

The following chapter is the published version of a plenary address that I delivered in Beijing at AILA in August 2011. In it, I make the case for changing the name of the field from second language acquisition to second language development. Of course, it would be overly ambitious to really think that everyone would agree to replace SLA with SLD. That said, I do think that especially we who are interested in language should use terms that reflect our thinking. For me, the term “development” is more apt than “acquisition” for a number of reasons. In the next chapter, I give 12 of them, among them to avoid the commodification of language — not seeing it as a thing you possess as the result of ingestion. Furthermore, as with other developmental processes, language development is not a straightforward linear process. It is not as though you acquire something and then you have it forever. In fact, due to the ups and downs of the process, second language researchers have struggled to define any point in time when they could say something has been “acquired”. This is because we use our language resources differently with different others at different times. Therefore, there is no single homogenized language competence.

This viewpoint also entails the “non-sameness” of one particular learner’s developing language. Each time an L2 construction is used, it may be similar to earlier ones, but it will also be a bit different. When using it, a learner constructs his or her own version. Furthermore, the learner is able to go beyond existing constructions — to innovate — to create new forms for new meanings, just as I have done in coining the term “grammaring”. This point of view also accommodates what is today called “translanguaging” — the natural practice whereby bilinguals/multilinguals use all their language resources to make meaning. Each language is not in a separate compartment, set apart from the others.



## Saying What We Mean: Making a Case for “Language Acquisition” to Become “Language Development”\*

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### INTRODUCTION

Modern-day interest in second language acquisition (SLA) began over forty years ago. A lot has been learned in these four decades. However, it may be time to re-examine its founding premise, specifically, that what is of scholarly concern is the ACQUISITION of second languages. As applied linguists know very well, how we use language both constructs and reflects our understanding, also potentially transforming it. For this reason, it is important that we use terms that do justice to our concerns as applied linguists. In this plenary, I suggest that a more apt designation for SLA is MULTILINGUAL OR SECOND LANGUAGE DEVELOPMENT (SLD). I adopt the lens of Complexity Theory (CT) to give 12 reasons why I think SLD is a better way to conceptualize this academic area. Although, admittedly, some of the reasons are overlapping, I maintain that it makes a big difference to our understanding when we use “development” rather than “acquisition”. I will conclude by saying what the implications are for this understanding in research and teaching.

So, to begin: we applied linguists, of all people, know that how we use language makes a difference. It makes a difference in how we conceive objects of interest. I coined the term GRAMMARING, for instance, to challenge the notion of grammar as a static system with a finite number of rules. The term LEXICO-GRAMMAR (which I first encountered

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\* Revised version of a plenary address given at the AILA Congress, Beijing, 28 August 2011.

in the work of Michael Halliday) is a portmanteau that suggests that it is unproductive to separate lexicon from grammar. Although Halliday used the term before the advent of computer-assisted corpus analysis, corpus linguistics has certainly demonstrated the fact that grammar and the lexicon are intertwined in the production of phrasal units. When English speakers use separate lexical items in speaking of language and culture, instead of *LANGACULTURE* as Michael Agar (1995) proposes, we imply that each is different, overlooking the links between the two that cognitive linguists argue are there to be made. Further, Tecumseh Fitch (2011: 141) speculates that because English lacks a word for *A DRIVE TO SHARE OUR THOUGHT WITH OTHERS*, “perhaps this propensity to talk has escaped detailed consideration in the literature on language evolution” (written by English speakers). Fortunately, German has the perfect term (*Mitteilungsbedürfnis*), which refers specifically to verbal communication and the basic human drive to talk and share thoughts and feelings with others (cf. Schumann’s “interactional instinct”). I could go on, but I hope I have made my point. It may seem like a simple substitution to use *DEVELOPMENT* in place of *ACQUISITION*, but there are important consequences. Language does not just reflect thought, it construes it, and with different construals, new awarenesses arise.

Before I elaborate on the theme of my central message, though, I would like to relate a brief anecdote. I do so in recognition of the fact that I may be one of the few people here who knows why the term SLA was not used right at the beginning of its short life, even though we had a model in “first language acquisition”. I conducted an informal genealogy of the term SLA to see if I could determine when it was first used. I wasn’t entirely successful in pinpointing its first use, but I did learn that the early articles that most people consider seminal, “The significance of learners’ errors” (Corder, 1967) and “Interlanguage” (Selinker, 1972), did not contain the term. Corder and Selinker used “second language learning”, as did Cook in 1969, although in the same article Cook used *FIRST* language acquisition. Later, of course, Krashen (1982) contrasted “second language acquisition” with “second language learning”, but that was for a different purpose. So although we had an analogue in first language acquisition, when the term “acquisition” was initially used to refer to second languages, it was not SLA. The term used was “L2 acquisition”, and of course this term retains a currency today.

It was likely that SLA was not used originally, in North America at

least, because around the same time that studies of SLA were taking off, there was an urban militant group which went by the name Simbionese Liberation Army (SLA) and which was active between 1973 and 1975 in the United States. Notorious for their bank robberies and their kidnapping of media heiress Patty Hearst, “SLA” appeared in the newspaper headlines for months. Clearly, “SLA” was not a good acronym with which to anoint an emerging field of study.

In any case, after the Simbionese Liberation Army was no longer making headlines, the term “SLA” for L2 acquisition became acceptable. However, the purpose of my talk today is to go one step further and to recommend that we replace SLA with SLD, a move that de Bot, Lowie, & Verspoor (2005) also support. I do not really expect to succeed in this campaign, but as I have just mentioned, the field has already changed its name once, so why not again? In the time I have with you, I will suggest that there is a great deal to be gained by renaming the field and thereby encouraging us to think differently. I will give you 12 reasons for replacing SLA with SLD, using the lens that CT has given me.

Complexity theorists study complex dynamic systems, in which complexity is emergent, not built in. Complex systems comprise many components. As the components interact, they give rise to patterns at another level of complexity. In this way, it can be said that complex systems are self-organizing, showing the emergence of order without central direction or any sort of preformationism. The patterns are dynamic and inseparable from the environment. An example from the natural world, which might help to make these qualities clear, is that of an eddy in a stream. The whirling eddy is a pattern that emerges from water molecules as they pass through a channel of a particular dimension and a streambed of a particular contour. The water molecules that pass through the eddy are always different, yet the pattern endures in the flux, until the environment or the rate of water flow changes.

I believe that language is a complex system, one which grows and organizes itself as people use it, just as the water molecules in an eddy self-organize through the flow. As speakers interact, their language resources change. Importantly, while rules can be used to describe such resources, they are not the product of rules (Larsen-Freeman, 1997).

Now with this very brief introduction to a CT-inspired view of language, let me put forth 12 reasons for replacing SLA with SLD.

## TWELVE REASONS FOR PREFERRING SLD TO SLA

### 1. Avoiding the Commodification of Language

First, the term “acquisition” implies that language is a commodity to be acquired; something that moves from the external to the internal, something that gets taken in. The word comes from the Latin *acquisitionem*, the act of obtaining or getting. According to Douglas Harper’s *Online Etymology Dictionary* ([www.etymonline.com](http://www.etymonline.com)), its meaning of “thing obtained” came about in the fifteenth century. Seen in this light, the end result of language learning could be conceived of as “having something” (Larsen-Freeman, 2010).

Such conceptions of language as “a thing one has” are commonplace in applied linguistics. Linguistic knowledge is characterized as a collection of context-independent symbols, such as words, accompanied by morphosyntactic rules that specify the relationships between them. In SLA terms, it is assumed that once learners have learned an L2 word or rule, they HAVE it.

Indeed, teachers often speak of whether or not their students “have” the past tense, for instance, and SLA researchers report acquisition orders and staged sequences of development, with the claim that one form is acquired or “had” before another. The (at least) implicit goal of teaching and research from this perspective is to explain language acquisition as a process of taking in of linguistic forms as a mental act, albeit one that takes place through interaction with others. After learners acquire forms, they can then do something with them.

Of course, it is well known in SLA research that establishing when something is acquired (i.e. defined as available for use at another time) is complicated, due to the commonly observed fluctuations in performance. In recognition of the nonlinearity of the learning process, SLA researchers have gone to considerable lengths to define the point at which it could be said WITH ANY ASSURANCE that a form has been acquired. For example, soon after the founding of SLA as a separate area of inquiry, researcher Hakuta (1974) adapted Cazden et al.’s (1975) definition to his own longitudinal study of L2 morphological acquisition. In doing so, he defined his research subject’s point of acquisition as the “first of three consecutive two-week samples in which the morpheme is supplied in over 90% of obligatory contexts”. Notice not only that this definition recognizes the nonlinearity of learning (i.e. the acquisition criterion is defined in terms of three successive samples), but it also centers on consistency of native-like use

over time, a point to which I will return later.

Such definitions of acquisition may be necessary, but they also lead to the “longstanding tendency towards the objectification of language” (Dewey, 2009: 67). Now, linguists’ descriptions of language as an object can be helpful to educators.<sup>1</sup> However, as I suggested earlier, it is also possible to conceive of language differently, not as an object, but as a complex dynamic system. Since language is continually changing, even the term “target language” in language teaching is misleading because the target is always moving (Larsen-Freeman, 1997). Instead, perhaps we should see language as AN EVER-DEVELOPING RESOURCE, rather than something to be acquired once and for all.

Influenced by CT and its close relative, Dynamic Systems Theory (DST), researchers have focused on an examination of the flexible, transient, dynamic aspects of learner language which emerge from use (Ellis & Larsen-Freeman, 2006). Language development is no longer seen as a process of acquiring abstract rules, but as the EMERGENCE of language abilities through use in real time. Constructions emerge in learner production in a bottom-up fashion from frequently occurring patterns of language use<sup>2</sup> rather than as *a priori* components of fixed, autonomous, closed, and synchronic systems.

You might be asking how the patterns arise. An image of the Forbidden City, created by the Swiss/French artist Corinne Vionnet, offers a clue (see [www.corinnevionnet.com/site/1-photo-opportunities.html](http://www.corinnevionnet.com/site/1-photo-opportunities.html)).<sup>3</sup> You see that the image appears blurry. The artist created the image by superimposing many photographs of this landmark. In other words, photos, taken by different tourists, are layered one on top of another. Each tourist who has taken a photo of the Forbidden City chooses an ideal vantage point from which to capture the façade. What is remarkable is the consistency of the viewpoint, despite the fact that there is no marking on the pavement that indicates where a tourist should stand to capture the optimal image. The artist muses that tourists may be seeking perfect symmetry in their composition, or perhaps they frame the photo as they do because they are socially conditioned, having seen earlier images of the Forbidden City on postcards or in travel brochures, for instance.

This perspective on the Forbidden City, a product of overlapping images, seems to me to be a good way of understanding language emergence. Each exemplar that a language user/learner encounters is similar to earlier ones, but also a bit different. On the basis of this experience, a user/learner constructs his or her own version, with similarity, but not absolute fidelity, to previous

exemplars. Indeed, phoneticians have known for years that even within the same speaker, the pronunciation of the same word varies with each use (Milroy & Milroy, 1999). A dynamic system is built up through iteration or recursion, just as the image of the Forbidden City is constructed from many photographs. However, as we have also seen with the image of the Forbidden City, iterations of a pattern result in an imprecise or blurry image. By analogy, in the case of language use, we can come to understand why no two speakers speak exactly the same way. Iteration is not repetition or exact copying.

Because language is a dynamic system, continuously changing, its potential is boundless, never fully realized. In CT terms, the state space of a language-using system represents the landscape of possibilities of a system (Larsen-Freeman & Cameron, 2008).

## 2. Acknowledging Regress as Well as Progress (from the Perspective of Target-like Use)

Acquisition is irreversible, but development, at least as the term has been used with second languages, allows for the possibility of regress from “target-like use” as well as progress. “By using ‘development’ rather than ‘acquisition’, we want to make it clear that linguistic skills can grow and decline, and that following from this, language acquisition and language attrition are equally relevant outcomes of developmental processes” (de Bot & Larsen-Freeman, 2011: 6). In other words, what is used by a language learner on one occasion may not be used by the same learner on a subsequent occasion, despite its relevance. One construction may seem secure, but when a new, competing (potentially overlapping) construction is introduced, the semantic space they both occupy needs to be renegotiated and reallocated. In the meantime, the gains that appear to have been made with regard to target-like use of the first construction seem to disappear. For example, this is commonly observed in learners of English who appear to understand and to be able to use the simple past tense; however, when the present perfect is introduced, it disrupts, at least temporarily, the learners’ correct use of the past tense.

Here is a trilingual example from a paper written in 2010 by Maria Mueller, one of my Austrian students at the University of Innsbruck:

A German speaker from South Tyrol (Austria), studying Italian as an L2, introduced herself:

*Mi chiamo Anna e ho passato tre anni alla scuola media.*

‘My name is Anna and I spent three years in middle school.’



Even though at this point in time the learner's Italian utterance is grammatically correct, this doesn't mean that her language use has become fixed. After subsequently studying English, she later introduced herself this way:

*Me chiamo Anna e ho spento tre anni alla scola media.*

Here, the learner has combined her L3 with the L2. The English verb "to spend" can be used with expressions of time (e.g. "to spend a week"); however, in Italian, the verb *spendere* only collocates with money, while time is expressed with the Italian verb *passare*. In other words, in this second introduction, the learner used the English verb for spending time and added to it the Italian past tense morpheme. Her use of Italian thus "regressed", in that her first exemplar was more target-like while the second was a mix of Italian and English. From a traditional way of looking at learner language production, Anna's second utterance could be described as an error. From a CT perspective, however, such linguistic innovations are characteristic of both development and use. As Long (2009: 380) states, "development is not always target-oriented". Herdina & Jessner (2002) assert that growth and decline are normal phenomena in developing systems, both are developmental, but the direction of change depends on the impact of internal and external resources.

### 3. "Acquiring" a Language Implies There is an Endpoint

"Acquisition" suggests completion, but "development" is never complete. For one thing, our language resources change. For another, we use our resources differently with different individuals and also when we encounter and engage with different genres. While our language resources are not bounded, they are nevertheless shaped by the in-person, remote, and virtual interactions in which we engage. As Thelen & Bates (2003) note, the patterns are created and dissolved as tasks and environments change. Preferred patterns become stabilized through frequency of use and the strengthening of connection weights in neural networks (Hebb, 1949), but they are always subject to change. As I have subtitled one of my publications, "There is no end and there is no state" (Larsen-Freeman, 2006a), contrasting with the idea of there being "end-state" grammars.

### 4. Creating New Patterns

A fourth reason for talking about development rather than acquisition is that each learner has "the capacity to create his or her own patterns with

meanings and uses (morphogenesis) and to expand the meaning potential of a given language, not just to internalize a ready-made system” (Larsen-Freeman & Cameron, 2008: 116).

Whether the gatekeepers of a given language allow learners to do this, i.e. allow a neologism to endure, is of course another question — a political question of who possesses the political capital to innovate — but that is another matter, which I take up later. In any case, it can be said that

“language is not a fixed code” (Harris, 1996) that exists independently of its users, and that is ready-made for users before they start using it, but rather it is created, or at the very least assembled from conventional units, each time it is used. (Larsen-Freeman & Cameron, 2008: 111)

Typically, the innovations come in the form of analogizing from other exemplars. Speakers of English have no trouble when nouns such as “e-mail” come into existence. They easily convert them into verbs: “I e-mailed to see when the meeting was taking place.” Language users (and I include learners) actively transform their linguistic world; they do not just conform to it (Larsen-Freeman, 2006b: 285).

That means that there is no homogeneity. We create new patterns from old by analogy when we want to make new meanings, going beyond what is present in the input (Larsen-Freeman, 1997). Furthermore, we use our language resources differently with different others. There is no single homogenized language competence.

## **5. Making Meaning, Not Merely Acquiring Forms**

A closely related fallacy has to do with our definition of what is being acquired. Linguists’ descriptions of language can undoubtedly be helpful. However, despite the early morpheme studies of SLA, in which I myself took part, I have come to understand that it is not necessarily a morpheme affixation rule that is being acquired from the learners’ point of view. One reason is that learners, particularly untutored learners, do not see language as composed of linguists’ units. What do such learners know about morphemes? A more important reason is that learners are intent on making meaning, and to do this, they will use whatever language resources are available to them. Not only do their resources not necessarily coincide with linguists’ units, but they can also, as we have seen from corpus linguistics, be diverse forms of various lengths. For instance, it seems that the verbs to which morphemes are attached are often perceived

by learners as monomorphemes or as one unit. I say this because, as I have seen from my own research in the mid-1970s, there is often a preference to use certain morphemes with certain verbs; that is, with some verbs, a morpheme is much more likely to be used than with others. Learners' performance cannot stem from acquiring form-based rules, therefore, since learners' development is uneven: much more gradient in nature.

## 6. Participating as Much as Acquiring

It has been argued that learners participate in language as much as they acquire it (Sfard, 1998). In other words:

Language is socially constructed [...]. Language use, social roles, language learning, and conscious experience are all socially situated, negotiated, scaffolded, and guided. (Ellis & Larsen-Freeman, 2006: 572)

In CT/DST terms, we may speak of the [social] process of co-adaptation, in which the language resources of two or more people are modified through their interaction. As speakers interact, they modify their language, in part to align, or to show solidarity, with the other speaker, and in part to accommodate to the other's comprehension. For instance, as a child and its caretaker interact, their language resources are dynamically altered, as each adapts to the other. The social context thus affords the possibility for co-adaptation.

Shanker and King (2002) note that an apt metaphor for an information processing view of communication is a fax machine, where messages are transmitted from one machine to another. A CT/DST approach, on the other hand, finds the metaphor of a delicate dance more appropriate. A dance involves many different steps, each unique, and each negotiated as the dance progresses. According to Shanker and King, perfectly matched dancers display "interactional synchrony" in which the partners are mutually attuned in an interactional process. Even such dancers, however, do not always perform seamlessly. They exhibit waves of asynchrony and synchrony, striving to adapt to their partners' motion (de Bot, Lowie, & Verspoor, 2007: 9).

In CT/DST terms, we would say that the person is coupled with his or her environment. van Geert and Fischer (2009: 327) write that development applies to person-context assemblies across time. Contexts are no longer seen as independent variables, as background to the main developmental drama. Of course, it is analytically possible to separate the person from the context; however, that separation requires the untenable

assumption that the two are independent (van Geert & Steenbeek, 2005).

Quoting Keats, Kramsch (2002) makes a similar point. She asks “How can we know the dancer from the dance?” From a CT perspective, we would not draw the line between a person and context because development is never a function of a person or context alone, but results as a function of their dynamic interaction (Thelen & Smith, 1998: 575). Indeed, we can never have complete information about a system in that “[a] system is never optimally adapted to an environment since the process of evolution of the system will itself change the environment so that a new adaptation is needed, and so on” (Heylighen, 1989: 2).

### **7. Discouraging Comparisons with Monolinguals**

An SLA perspective may not discourage comparisons with monolinguals. As I noted earlier, it is often the case that for research purposes L2 acquisition is measured by distance from a monolingual native speaker target. Bley-Vroman (1983) cautioned against this practice 30 years ago when he argued that it was important to look at the learner’s developing second language system in its own right. Nonetheless, the “comparative fallacy”, whereby learners’ language production is compared to that of monolingual speakers of the language, endures to this day. Others have also objected, using such concepts as “multicompetence” (Cook, 1991), which aims to counter a deficit view of language development. In other words, rather than seeing L2 learners as somehow defective compared with native speakers, Cook feels that they should be perceived as multicompetent individuals with knowledge of more than one language in the same mind.

When we speak about the multicompetence of a plurilingual person, we are not just talking about someone who can use more than one language; we are also adopting a different image, one in which several languages and several cultures interact to create a global, complex competence — a competence, which includes the L1, or L1s, and other known languages. This competence changes and evolves as the person goes through new linguistic and cultural experiences. It is fluid, not static.

In her plenary address at the American Association for Applied Linguistics Conference last year, Ortega proposed that monolingualism should not be the starting point or endpoint or the normal point of comparison for SLA, although it usually is. Elaborating on this ideological position, Ortega (2010) stated that when SLA researchers eliminate “... bilinguals’ other languages from analysis, the bilinguals’ repertoires

are made to look like ‘less’ instead of ‘more’”. In contrast, insights into bilingualism “counter the myth of immutable, fixed, inalienable privileges of the language(s) owned by birth ...”. I think that conceiving of the process as developmental rather than acquisitional is more likely to discourage comparisons with monolingual performance.

## 8. Recognizing the Sensitivity of a Complex Dynamic System

Complex systems are dependent on their initial conditions, a phenomenon known in CT as the BUTTERFLY EFFECT. What this means is that complex systems are highly sensitive: even a small difference at one point in a developmental trajectory can make a big difference as it proceeds. This is because as a learner’s system develops, it “functions as a resource for its own further development” (Larsen-Freeman & Cameron, 2008: 158). In other words, language is autopoietic; it contains the seeds for its own development. Learners learn a new language by referring to what they already know, and what they already know constantly changes with meaningful language use.

Speaking in biological terms,

Taking a [complex] systems perspective on developmental processes means, among other things, attending to the ways in which the developing organism functions as a resource for its own further development. The organism helps determine which other resources will contribute to that development, as well as the impact they will have. The roles played by the vast and heterogeneous assembly of interactants that contribute to a life-course are system-dependent and change over time. (Oyama, Griffiths, & Gray, 2001: 5)

## 9. Acknowledging Variation

There is no one target language. Even if one claimed that the target was a standard form of language, it would be inadequate. For one thing, standard languages differ depending on their geographic location. Standard British English is different from Standard North American English, for instance. Furthermore, there is a great deal of variation in language use, that is, even within a dialect there is little homogeneity. This is certainly the case in the current historical period, where people “shuttle rapidly between communities and communicative contexts, in both virtual and physical space” (Canagarajah, 2006: 25). However, variation in language use is not only symptomatic of postmodern globalization.

Walker (2010) asserts that variation is an entirely natural phenomenon and a basic fact of language life. Indeed, without variation, languages would be unable to serve speakers' needs: "Heterogeneity is ... necessary to satisfy the linguistic demands of everyday life." (Labov, 1982: 17) Walker goes on to point out the ways in which variation originates, not only through the evolution prompted by geographical distance and accompanying isolation, but also through social contact, creativity, and deliberate self-renewal as languages adapt in order to meet the needs of generations of speakers. He offers the growing use of English as a Lingua Franca (ELF) as a case in point.

Thus, as we have seen already, a language is not a single homogeneous construct to be acquired. Rather, a complex systems view sees any stability in language arising from use. Such a view "foregrounds the centrality of variation among different speakers and their developing awareness of the choice they have in how they use patterns within a social context" (Larsen-Freeman & Cameron, 2008: 116). This awareness fits much better with a developmental perspective, I believe.

## **10. Acquiring a Language Is Not a Homogeneous Activity Either**

What does it mean to say that one has acquired another language? Caspi (2010), for example, discusses the "receptive-productive" vocabulary gap and finds evidence for a continuum of development from a learner's perception/recognition of new words to their (spontaneous) production. In other words, in the learning of vocabulary words alone, we cannot speak of acquisition as a completed process because different facets of development proceed at different paces. Caspi explains that this unevenness is due to the interactions between levels of vocabulary knowledge and to the limited resources of the developing system.

A highly successful language learner, Elka Todeva (2009: 68), adds to this her subjective experience:

One of the questions that I always find difficult to answer is "How many languages do you speak?" Often asked this question, I find myself prefacing my answer with "Well, I have formally studied quite a few languages and have a high level of comprehension in still more". Then, as a rule, I explain that English and Russian are perhaps the only languages I speak fluently, in addition to my L<sub>1</sub>, of course. I often wish people would ask instead "How many languages can you read in?" or "In how many languages do you have decent listening comprehension?"

The point is, when we speak of acquisition, we must remain mindful that, just as with language itself, development is not homogeneous.

### 11. Recognizing the Bi-directionality of Transfer

Transfer of the patterns of one language to another by learners is not unidirectional. Indeed, McWhorter (2002) shows that English was adopted by Scandinavian invaders of the British Isles, but that it was also altered by them. Acquisition in SLA has always implied directionality from an L1 to an L2, but there is research to support the fact that interactions in the L2 can influence the L1 as well (Cenoz, Hufeisen, & Jessner, 2001; Cook, 2003).

Pavlenko and Jarvis (2002), for instance, found evidence of what they called “bidirectional transfer”. The English spoken by the Russian L2 learners in their study was influenced by their native Russian, and the same L2 learners’ English in turn influenced their Russian. Grosjean’s claim that the nature of multicompetence is dynamic and flexible, and that bilinguals are not two monolinguals in one (Grosjean, 1992), further supports this observation. As Pavlenko and Jarvis write “the evidence of bidirectional transfer underscores the unstable nature of ‘native-speakerness’” (2002: 210).

Kroll, Gerfen, and Dussias (2008: 109) observe that most of the evidence suggests that lexical access is nonselective in that alternatives in both languages appear to be activated in parallel in bilinguals when words are processed. Others, too, have found evidence of the influence of the L2 on the L1 in the areas of phonology (Flege, 1987), rhetorical preferences (Kubota, 1998), and expression of motion (Brown & Gullberg, 2008); for further discussion, see Ortega (2010). In fact, this phenomenon is not limited to incipient bilinguals. Reverse interactions happen even at intermediate proficiency levels (Jarvis & Pavlenko, 2008).

### 12. Remembering the Learner

Acquisition is applied to language; development is, too, but development can also apply to the learner.

van Geert and Fischer (2009: 313–314) tell us that:

Etymologically, the term “development” means unwrapping, that is taking something out of its original wraps, thus uncovering something that is present at the beginning but concealed. As a verb *develop* appears in a transitive as well as an intransitive, more precisely reflexive, form. For instance, you can develop a photo (people used to do these things before the digital camera) or develop a real estate project. However, it is a bit odd to say that a parent develops a

child. One can say that the child develops grasping, or that the child develops. In the latter case, *develop* is used as a reflexive verb, that is, a verb where the agent and the patient are the same ... Thus, development is an internally driven process of growing that is in some way potentially present from the beginning. This is not, in any way, a form of nativism, claiming that the end state (or at least some essential core of it) is present from the beginning. *Potential* is derived from the Latin word for *power*, thus meaning that something at the beginning has the power of developing into some particular final state through transformations that unwrap the potential by making it actual.

Although I would take exception to their use of “final state”, I think that van Geert and Fischer’s way of looking at development, a way that involves the learner in the developmental process, is a much more accurate portrayal of the learner’s involvement than the use of the term “acquisition”. The learner develops his/her language resources, and in so doing, the learner develops. This way of putting it seems to me to be much more respectful of the learner’s agency.

## CONCLUSION

As I said at the outset of this talk, I do not really expect professional discourse to change. SLA is a well-established acronym for the field, and is likely to remain so. However, there is value to entertaining a different term and therefore a different way of thinking, one that centers on learning and learners.

One implication, for instance, is that researchers must always remember to look at what a learner is doing from the learner’s point of view. The learner may not be thinking in terms of linguists’ units or linguists’ descriptions. It would also mean that, seeing development as a continuous process of change over time, we could ask questions such as “How do the moment-to-moment aspects of language learning map onto the longer timescales of development?” (Elman, 2003); “Where do novel language behaviors come from?”; “What are the motors of change?” (Thelen & Corbetta, 2002)

Furthermore, the process of development cannot truly be understood if we confine ourselves to looking at the SLA process in the usual way, which is through investigating associations between variables across populations. Nor can we solely calculate group means and believe that we are getting the full picture. Looking only at averages obscures the



individual differences between learners and makes us overlook statistical “outliers”, whose behavior may be interesting and relevant.

Another implication is that assessment would take on an entirely different character. If we are not comparing the learners’ performance to that of native speakers of the language, then, according to Ortega (2010),

As much as possible, we would analyze complete repertoires of bilinguals across languages, so as to always search for “more” rather than “less” in bilinguality and so as to keep in sight that neither L2 nor L1 are immutable or fixed.

Further,

We would conduct non-normative comparisons with multilingual natives and other diverse multiple-language learning profiles over the life span.

To these calls, I add we would maintain an empirical focus on experience over time, looking for periods of increased variability in a learner’s production as a sign that a phase transition is about to take place. We would also look for expressions of creativity, likely identifiable more readily from a retrodictive examination (Larsen-Freeman & Cameron, 2008).

From a teaching perspective, we would come to understand that in multilingual language development, it is most important to know what the learner is entertaining about the language that is developing. After all, we don’t only teach language, we teach learners. And teaching a language does not involve the transmission of a closed system of knowledge. Learners are not engaged in simply learning fixed forms or sentences, but rather in learning to adapt their behavior to an increasingly complex environment.

Furthermore, learners learn to use language, like the steps in a dance, through repeated activity in slightly different situations. Learning is not a linear, additive process, but an iterative one. Linguistic structures do not only symbolize reality; they are used to actively construct reality in interaction with others (Kramsch & Whiteside, 2008).

We would also need to teach language as the meaning-making resource it is, teaching reasons as much as rules (Larsen-Freeman, 2003). If students understand why something functions the way that it does in a language — the reason behind the form — they are much more empowered to go beyond the given to create something anew.

Finally, and most appropriately for AILA 2011, the term **SECOND LANGUAGE DEVELOPMENT** fits well with the theme of our congress —

harmony in diversity — because it recognizes that there is no common endpoint at which all learners arrive. It is in the variation that strength resides. This variation is a sign of our uniqueness, but is also a stimulus for growth. For after all, as I said earlier, learners/users of a language actively transform their linguistic world; they do not merely conform to it. And this, we do together.

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## **Notes**

1. As I am the co-author of an 800-page book on English grammar for teachers, it would be hypocritical of me to suggest otherwise.
2. This is not to suggest that frequency is the sole explanation for the emergence of new constructions in learner language.
3. Thanks to Nick Ellis for alerting me to the website.

## **References**

- Agar, M. (1995). *Language Shock: Understanding the Culture of Conversation*. New York: WilliamMorrow.
- Bley-Vroman, R. (1983). The comparative fallacy in interlanguage studies: The case of systematicity. *Language Learning*, 33: 1–17.
- Brown, A. & M. Gullberg. (2008). Bidirectional crosslinguistic influence in L1–L2 encoding of manner in speech and gesture: A study of Japanese speakers of English. *Studies in Second Language Acquisition*, 30: 225–251.
- Canagarajah, A. S. (2006). Globalization of English and changing pedagogical priorities: The postmodern turn. In B. Beaven (Ed.), *IATEFL 2005 Cardiff Conference Selections* (pp.15–25). Canterbury, UK: IATEFL.
- Caspi, T. (2010). A dynamic perspective on second language development. Unpublished doctoral dissertation, University of Groningen.

- Cazden, C., H. Cancino, E. Rosansky & J. Schumann. (1975). *Second Language Acquisition Sequences in Children, Adolescents, and Adults*. Cambridge, MA: Harvard University Graduate School of Education.
- Cenoz, J., B. Hufeisen & U. Jessner. (2001). *Cross-Linguistic Influence in Third Language Acquisition: Psycholinguistic Perspectives*. Clevedon, UK: Multilingual Matters.
- Cook, V. (1969). The analogy between first and second language learning. *IRAL*, VII (3): 207–216.
- Cook, V. (1991). The poverty-of-the-stimulus argument and multicompetence. *Second Language Research*, 7: 103–117.
- Cook, V. (Ed.). (2003). *Effects of the Second Language on the First*. Clevedon, UK: Multilingual Matters.
- Corder, S. P. (1967). The significance of learners' errors. *International Review of Applied Linguistics*, 5: 161–170.
- de Bot, K., W. Lowie & M. Verspoor. (2005). *Second Language Acquisition: An Advanced Resource Book*. London: Routledge.
- de Bot, K., W. Lowie & M. Verspoor. (2007). A dynamic systems theory approach to second language acquisition. *Bilingualism, Language and Cognition*, 10 (1): 7–21.
- de Bot, K. & D. Larsen-Freeman. (2011). Researching second language development from a dynamic systems theory perspective. In M. Verspoor, K. de Bot & W. Lowie (Eds.), *A Dynamic Approach to Second Language Development: Methods and Techniques* (pp.5–24). Amsterdam: Benjamins.
- Dewey, M. (2009). English as a lingua franca: Heightened variability and theoretical implications. *English as a Lingua Franca: Studies and Findings* (pp.60–83). Newcastle upon Tyne: Cambridge Scholars Publishing.
- Ellis, N. C. & D. Larsen-Freeman. (2006). Language emergence: Implications for applied linguistics. Introduction to the special issue. *Applied Linguistics*, 27 (4): 558–589.
- Elman, J. (2003). Development: It's about time. *Developmental Science*, 6: 430–433.
- Fitch, W. T. (2011). "Deep homology" in the biology and evolution of language. In A. M. Di Sciullo & C. Boeckx (Eds.), *The Biolinguistic Enterprise: New Perspectives on the Evolution and Nature of the Human Language Faculty* (pp.135–166). Oxford: Oxford University Press.
- Flège, J. (1987). The production of "new" and "similar" phones in a foreign language: Evidence for the effect of equivalence classification. *Journal of Phonetics*, 15: 47–65.
- Grosjean, F. (1992). Another view of bilingualism. In R. Harris (Ed.), *Cognitive Processing in Bilinguals* (pp.91–103). Amsterdam: North-Holland.
- Hakuta, K. (1974). A preliminary report on the development of grammatical morphemes in a Japanese girl learning English as a second language. *Working Papers on Bilingualism*, 3: 18–43.
- Harris, R. (1996). *Signs, Language, and Communication*. London: Routledge.
- Hebb, D. (1949). *The Organization of Behavior*. New York: Wiley.
- Herdina, P. & U. Jessner. (2002). *A Dynamic Model of Multilingualism*. Clevedon, UK:

## Multilingual Matters.

- Heylighen, F. (1989). Self-organization, emergence and the architecture of complexity. *Proceedings of the 1<sup>st</sup> European Conference on System Science, AFCET, Paris*, 23–32.
- Jarvis, S. & A. Pavlenko. (2008). *Crosslinguistic Influence in Language and Cognition*. Mahwah, NJ: Erlbaum.
- Kramsch, C. (Ed.). (2002). *Language Acquisition and Language Socialization: Ecological Perspectives*. London: Continuum.
- Kramsch, C. & A. Whiteside. (2008). Language ecology in multilingual settings: Towards a theory of symbolic competence. *Applied Linguistics*, 29 (4): 645–671.
- Krashen, S. D. (1982). *Principles and Practice in Second Language Acquisition*. Oxford: Pergamon.
- Kroll, J. F., C. Gerfen & P. E. Dussias (2008). Laboratory designs and paradigms: Words, sounds, and sentences. In L. Wei & M. Moyer (Eds.), *The Blackwell Guide to Research Methods in Bilingualism and Multilingualism* (pp.108–131). Cambridge, MA: Blackwell.
- Kubota, R. (1998). An investigation of L1–L2 transfer in writing among Japanese university students: Implications for contrastive rhetoric. *Journal of Second Language Writing*, 7: 69–100.
- Labov, W. (1982). Building on empirical foundations. In W. P. Lehman & Y. Malkiel (Eds.), *Perspectives on Historical Linguistics* (pp.17–92). Amsterdam: Benjamins.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18 (2): 141–165.
- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Grammaticing*. Boston, MA: Heinle/Thomson.
- Larsen-Freeman, D. (2006a). Second language acquisition and the issue of fossilization: There is no end, and there is no state. In Z.-H. Han & T. Odlin (Eds.), *Studies of Fossilization in Second Language Acquisition* (pp.189–200). Clevedon, UK: Multilingual Matters.
- Larsen-Freeman, D. (2006b). On the need for a new understanding of language and its development. *Journal of Applied Linguistics*, 31 (3): 281–304.
- Larsen-Freeman, D. (2010). Having and doing: Learning from a complexity theory perspective. In P. Seedhouse, S. Walsh & C. Jenks. (Eds.), *Conceptualising Learning in Applied Linguistics* (pp.52–68). Basingstoke, UK: Palgrave Macmillan.
- Larsen-Freeman, D. & L. Cameron. (2008). *Complex Systems in Applied Linguistics*. Oxford: Oxford University Press.
- Long, M. H. (2009). Methodological principles for language teaching. In M. H. Long & C. J. Doughty (Eds.), *Handbook of Language Teaching* (pp.373–394). Oxford: Blackwell, 373–394.
- McWhorter, J. (2002). *The Power of Babel: A Natural History of Language*. London: Heinemann.
- Milroy, J. & L. Milroy. (1999). *Authority in Language* (3<sup>rd</sup> edn.). New York: Routledge.
- Ortega, L. (2010). The bilingual turn in SLA. Plenary address delivered at the Annual

- Conference of the American Association for Applied Linguistics. Atlanta, Georgia, March 6–9.
- Oyama, S., P. Griffiths & R. Gray (Eds.). (2001). *Cycles of Contingency, Development Systems and Evolution*. Cambridge, MA: MIT Press.
- Pavlenko, A. & S. Jarvis. (2002). Bidirectional transfer. *Applied Linguistics*, 23: 190–214.
- Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics*, 10 (3): 209–231.
- Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, 27: 4–13.
- Shanker, S. & B. King. (2002). The emergence of a new paradigm in ape language research: Target article. *Behavioral & Brain Sciences*, 25: 605–626.
- Thelen, E. & L. Smith. (1998). Dynamic systems theories. In W. Damon & R. Lerner (Eds.), *Handbook of Child Psychology Volume 1: Theoretical Models of Human Development* (5<sup>th</sup> edn., pp.563–634). New York: Wiley.
- Thelen, E. & D. Corbetta. (2002). Microdevelopment and dynamic systems: Applications to infant motor development. In N. Granott & J. Parziale (Eds.), *Microdevelopment* (pp.59–79). Cambridge: Cambridge University Press.
- Thelen, E. & E. Bates. (2003). Connectionism and dynamic systems: Are they really different? *Developmental Science*, 6: 378–391.
- Todeva, E. (2009). Multilingualism as a kaleidoscopic experience: The mini-universes within. In E. Todeva & J. Cenoz (Eds.), *The Multiple Realities of Multilingualism* (pp.53–74). Berlin: Mouton De Gruyter.
- van Geert, P. & H. Steenbeek. (2005). Explaining after by before: Basic aspects of a dynamic systems approach to the study of development. *Developmental Review*, 25: 408–442.
- van Geert, P. & F. W. Fischer. (2009). Dynamic systems and the quest for individual-based models of change and development. In J. P. Spencer, M. S. C. Thomas & J. McClelland (Eds.), *Toward a New Grand Theory of Development? Connectionism and Dynamic Systems Theory Reconsidered* (pp.313–336). Oxford: Oxford University Press.
- Walker, R. (2010). *Teaching the Pronunciation of English as a Lingua Franca*. Oxford: Oxford University Press.

## Comment after Chapter 17

I am not certain that the field will adopt “second language development” as a replacement for “second language acquisition”. However, I do see growing use of the term “second language development” by researchers, and I now teach at graduate course at the University of Pennsylvania that bears that name.

Let me now provide a little background to the next chapter. In March 2015, Professors Zhaohong Han of Columbia University and Lourdes Ortega of Georgetown University organized a colloquium on Complexity Theory for the American Association for Applied Linguistics Conference in Toronto. The paper I gave there was later compiled with other contributions into a book to acknowledge my oeuvre with Complexity Theory (Ortega & Han, 2017).

Of course, this is a great honor for me, and I am grateful to Professors Ortega and Han. Writing an expanded version of the paper that I presented in Toronto also gave me an opportunity to explain how Complexity Theory had offered me a new way to think. Honestly, I never really know where to begin when I write about Complexity Theory. I do not want to assume that my readers know the theory; on the other hand, I do not want to use readers' time to tell them something that they already know. I decided for the occasion, therefore, only to give a brief synopsis of the theory. Then, I called attention to work that has been done by others from a CT perspective, and I summarized the new thinking in the form of 30 aphorisms about language, language learners/users, language learning, and language teaching. I next illustrated how I keep learning from CT by discussing three "lessons": on non-dualistic thinking, segregating a system from its environment, and generalizability. In particular, with regard to generalizability, I return to the importance of case study research in SLA, a point that I made in the Introduction to this book. There I wrote that case study research can act as a "corrective" to our findings. In the chapter that follows, I single out the example of a case study that calls into question the well-established development sequence of English negation, thus acting as a check on the generalizability of previous reports.

I expect that in the future there will be even more lessons I can learn from CT because a good theory can inspire ideas, can generate questions, and can continue to stimulate growth. In this way, for me at least, my teaching, research, and theorizing will never become stale.

## **References**

- Ortega, L. & Z.-H. Han. (Eds.). (2017). *Complexity Theory and Language Development: In Celebration of Diane Larsen-Freeman*. Amsterdam and Philadelphia: John Benjamins.

# Chapter 18

## Complexity Theory: The Lessons Continue

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### INTRODUCTION

The world is undeniably a complex place. Evidence of complexity is everywhere around us: in the natural world in the disasters brought about by the vagaries of a changing climate, for instance, and in the human one, where long-simmering conflicts suddenly erupt violently, swelling the ranks of the displaced. Complexity is not always associated with tragic events, however. For example, it characterizes the cloud patterns that arise from the collaboration of temperature, fluid velocity, and humidity. The interconnectivity and topological complexity of neural networks in brains are also complex phenomena.

It is easy to imagine why complex phenomena do not give themselves up to facile exposition. And, it is also not hard to comprehend that language and its development are among them. The purpose of this chapter is to illustrate how a theory can be useful in guiding one's thinking about complex phenomena such as language and its development. The theory in focus is Complexity Theory, or Dynamic Systems Theory, or as it is sometimes known in applied linguistics circles these days, Complex Dynamic Systems Theory. Complexity Theory has challenged me to think differently.

Language and its development have traditionally occupied different disciplinary niches with distinct theories. In the case of language, it has been linguistics and property theories, often focusing on static competence. In the case of language learning, it has often been psychology/psycholinguistics and transition theories, focusing on dynamic process and performance. Complexity Theory/Dynamic Systems Theory/theories of emergence usefully conflate the two (Ellis & Larsen-Freeman, 2006:

558). Complexity Theory is a systems theory. It is fundamentally a theory of change. It offers a conceptual framework to inform “the way in which we investigate and understand nature and the world we live in”, including “what Bruno Latour (1993) calls the ‘hybrid networks’ of social systems in which we find ourselves enmeshed” (Cilliers & Preiser, 2010: 277).

For me, the use of Complexity Theory involves “thinking about the social world and its intersections with the natural world as involving dynamic open systems with emergent properties that have the potential for qualitative transformation” (Byrne, 2005: 98). The transformation is not an isolated occurrence, however, because “complex systems are constantly negotiating a fine line between being robustly structured whilst at the same time being open to the constant possibility of change and adaptation” (Human, 2015: 7). In addition, Complexity Theory is rich enough so that I continue to learn from it, as exemplified in the three lessons with which I conclude this chapter. Of course, I can but introduce the theory here, interested readers will find more extensive treatments in works to which I refer later in this chapter.

It is difficult to trace the origin of Complexity Theory to a single source; it has many antecedents. If you are a chemist you might point to Russian/Belgian Prigogine’s work on self-organization in non-equilibrium or dissipative systems, for which he won a Nobel prize, or, if a meteorologist, to American Lorenz’s discovery of the importance of a nonlinear system’s sensitivity (its initial state dependence), which became popularly known as the butterfly effect of Chaos Theory. If you are a physicist, you might point to German Haken’s synergetics, or if a biologist, you might nominate Austrian von Bertalanffy’s general system theory or Chilean biologists Maturana and Varela’s autopoietic enactivism. If you are a mathematician, you might propose French mathematician Poincaré’s discovery of chaotic deterministic systems, or French mathematician Thom’s catastrophe theory, or Polish-born geometer Mandelbrot’s fractals. Not surprisingly, as I compiled this list, I was well aware that I would be leaving out significant contributors, such as physicist Gell-Mann, theoretical biologist Kaufmann, neuroscientist Kelso, and computer scientist Holland, among others.

Although it can be seen that the language of complexity originates in the physical sciences, the social sciences have contributed to and benefitted from similar theoretical perspectives of their own. For instance, a communication scientist might point to Weaver and Shannon’s information



theory, and Ashby, von Foerster, McCulloch, and Wiener's cybernetics. If you are sociologist, Luhmann is important for his use of systems theory in sociology, as are sociologists Urry and Byrne and network science's Barabási. Anthropologists might connect Complexity Theory with the ideas of Bateson. If you are a psychologist, you could cite J. J. Gibson's concept of affordances or Bronfenbrenner's bioecological model, or Thelen and Smith's dynamic systems theory, or Overton's relational dynamic theory, or Spivey's continuity psychology or Rosch's prototype theory. There are many other important figures, such as biological anthropologist Deacon and cognitive scientists Elman, Bates, MacWhinney, Port, and van Gelder. Of course, linguists Halliday, Lightfoot, Mohanan, Langacker, Cooper, Kretzschmar, Mufwene, and others, such as biosemiotician Hoffmeyer, have also explicitly laid claim to or have ideas consonant with its theoretical insights. Then, too, while not explicitly drawing on Complexity Theory, Labov should be credited with challenging the formalist concept of languages as bounded and enclosed categorical systems, although still seeing dialects, *contra* Complexity Theory, as essentially homogeneous (Kretzschmar, 2015).

There are early progenitors in philosophy, too. One could go back to the Greeks: Certainly there are seeds of the theory in the works of Aristotle and in the dynamics of Heraclitus. Contemporary philosopher, Evan Thompson (2007: ix), drawing on autopoietic enactivism, makes a convincing case that "the self-organizing features of mind are an enriched version of the self-organizing features of life". In between antiquity and modernity, there are many others. It is difficult to find one philosopher whose work is a source for the entirety of Complexity Theory (CT), but certainly there are themes over the centuries that have predated, but have resonance with, it. Here I can mention but a few: Spinoza's ontological holism, Leibniz's self-similarity, Hegel's dialectics, Husserl's and Heidegger's, and Merleau-Ponty's phenomenology, Kant's notion of reciprocal causality, Bergson's theory of change, Wittgenstein's contention that the meaning of words is determined by their use, and of course, more recently, in post-structuralism and post-modernism, and the contemporary philosophers they have influenced, such as Cilliers and Morin.

Indeed, in common with CT is post-structuralists' departure from the cornerstone of modernism, that of the goal of depicting an accurately reducible world. CT shares with post-structuralism a rejection of reductionism, and with it, recognizes that our understandings can only be

partial and provisional. As Derrida (1978: 270) proposes, “There are forces at play which we can never completely predict or control”. Moreover, also in keeping with a CT perspective, the temporal nature of Derrida’s *différance* implies that what we regard as noise in our findings today may prove to be significant in fostering new interpretations tomorrow (Human & Cilliers, 2013).

Then, too, Cameron and I (Larsen-Freeman & Cameron, 2008a), along with Kramsch and Whiteside (2008: 659–660), take Bakhtin’s dialogism as something quite compatible with Complexity Theory and post-modern sociolinguistics. In particular, the latter list five features they have in common: (1) relativity of self and other; (2) timescales; (3) emergentism; (4) unfinalizability; (5) fractals.

However, while both CT and post-modernism/post-structuralism reject the notion of a static universe describable by nomothetic, universally deterministic laws, CT attempts to go beyond this vision of science, but does not claim that the scientific enterprise is flawed, as postmodernist Foucault would have it. Furthermore, it is important to note from a CT vantage point that while ideologies may powerfully influence our experience, not all knowledge is seen to be politically and ideologically relative. In CT, “there is a there there”, as one of my students put it. Price (1997: 14) succinctly sums up the difference: “Postmodernists want to deconstruct science; complexity theorists want to reconstruct it.”

There are two other points to add to this abbreviated discussion of postmodernism and CT: Firstly, it is worth noting that the influence of post-modernism on the sciences is not unidirectional or exclusive. Human (2015: 10) observes:

Philosophers such as Jacques Derrida were inspired by the works of the biologist Jacques Monod and the systems theorist Gregory Bateson (Thrift, 1999: 54). Gilles Deleuze is well known to have looked to science for metaphors, including the work of Prigogine and Stengers (Thrift, 1999: 55). Michel Serres equally looked to biology, systems theory and thermodynamics (Thrift, 1999: 55). The scope of enrichment runs in both directions but does not lead to unification or a single explanatory approach.

Secondly, complexity theorists themselves make a distinction between restricted complexity and general complexity (Morin, 2007). The former involves a strict mathematical application of complexity, one that advances formalization and modeling, but one that remains within the

epistemology of classical science. In contrast, general complexity has operated ontologically and epistemologically differently, largely inspired by the complex means through which nature regenerates and maintains order under constantly changing conditions (Human, 2015). The result is a new transdisciplinary theory (Larsen-Freeman, 2012a). CT is transdisciplinary in two senses of the term. First, “Complexity theory represents an important challenge to the disciplinary silos of the twentieth-first-century academy” (Byrne & Callaghan, 2014: 3). Second, besides transcending disciplines, it introduces new cross-cutting intellectual themes of the same magnitude and import as other such themes from the past, e.g. structuralism and evolution (Halliday & Burns, 2006).

This chapter deals with second language acquisition (or, inspired by CT, what I prefer to call “second language development”, SLD) (Larsen-Freeman, 2015a), and it approaches it for the most part from the vantage point of general complexity. While some of the strands and themes I have thus far identified could be attributed to various sources, it is its constellation of characteristics and tenets that makes general complexity theory attractive for shedding new light on matters of concern to applied linguists.

## **COMPLEXITY THEORY: WHAT IS IT?**

In Complexity Theory, I felt that I had found the theoretical lens and tools that the field was missing, ones that would allow SLD researchers to trace and to describe emerging patterns in dynamic systems in order to explain change and growth in language and language development, not an exclusive pursuit of researchers, but certainly an ordinary one (Han & Tarone, 2014; Larsen-Freeman, 2014). In this section of this chapter, I will draw on the treatment of CT in Larsen-Freeman (2015b) to highlight some of the basic, relevant characteristics of complex systems. Although I introduce them one by one, as I have indicated, it is their combination that is the signature of a complex system.

Perhaps no construct in CT is as important as the founding concept of emergence (Holland, 1998), “the spontaneous occurrence of something new” (van Geert, 2008: 182) that arises from the interaction of the components of the system while interacting with its environment. A simple example offered to illustrate emergence is that of a bird flock — a new, higher order pattern created from the interaction of individual birds

in interaction with their environment. Thus, instead of assuming that every phenomenon can be explained in terms of simpler components, CT shifts the search to understanding how patterns emerge “bottom up” from components interacting within the ecology in which they operate (van Lier, 2000: 246). Furthermore, these patterns are said to self-organize “without direction from external factors and without a plan of the order embedded in any individual component” (Mitchell, 2003: 6). Emergent patterns entrain those that arise subsequently, in a mutually constitutive process that Cameron and I referred to as “reciprocal causality”<sup>1</sup>, and what others have called “circular causality” (Witherington, 2011: 66):

Taking emergence seriously entails a strong commitment to circular causality and the reciprocal nature of structure–function relations through the adoption of a pluralistic model of causality, one that recognizes both local-to-global processes of construction and global-to-local processes of constraint.

Emergent patterns can also form attractors upon which the old patterns converge (Herdina, 2017). It may be obvious, then, that complex systems are perpetually dynamic. They can undergo periods of relative stability, but even during these periods, there is no stasis, and the system has the potential to undergo radical change at any time. Dynamic systems are represented topographically as trajectories in state space (de Bot, 2008). A radical change is termed a phase transition, in which one more or less stable state or attractor gives rise to another, often accompanied by a great deal of variability.

Complex dynamic systems are open: They take in and expend energy, matter, or information, depending on the type of system, all the while showing the emergence of order (self-organization). A good way to think of this property is to imagine an eddy in a mountain stream (Thelen & Smith, 2007). The water molecules that comprise it are constantly flowing through it because the stream is an open, dynamic system. However, the whorl remains a more or less constant emergent pattern in the flux, a creation of its spatial and temporal context.<sup>2</sup>

Complex systems are adaptive; they can “learn” as a result of experience. An adaptive system changes in response to changes in its environment. Successful adaptive behavior entails the ability to respond to novelty. For example, a human being’s adaptive immune system lacks centralized control and does not settle into a permanent, fixed structure. Because of this adaptability, it can mount a defense against novel threats.

Many multicomponential systems are “merely” complicated. What makes a system complex is that its components (elements or agents) are both interconnected and spatially/temporally context dependent (Juarrero, 2000: 26). Context in human systems also includes the intentional or inter-subjective space between users (Larsen-Freeman & Freeman, 2008: 161). Complex systems can operate at different nested levels of scale (e.g. from molecules to whole ecologies) and across different timescales (from nanoseconds to supereons, or in the case of humans, across a lifespan).

Complex dynamic systems also exhibit nonlinearity. Byrne and Callaghan (2014: 18) state that “Linearity is foundational to ‘Newtonian’ science by which we mean scientific accounts in which we can describe a current state in terms of values of parameters ... and have a universal specification [or law], which describes how that state will change if values in the parameters change”. By way of contrast, in a nonlinear system, a small change in one parameter can have huge implications downstream, when a “tipping point” is reached, so predictability is compromised. This nonlinearity is often portrayed as “the butterfly effect”, which “describes how a variation in the specification of an initial parameter which is as tiny in magnitude as the force of a butterfly’s wing flap can across time ... produce very different outcome states” (p.19). As a result, one might have expectations about a future state or experience, based on the experience of past tendencies, but precise predictions are unreliable because nonlinear systems are sensitive and can change unexpectedly. In addition, there are multiple pathways by which the system can evolve and “the same ‘cause’ can, in specific circumstances, produce different effects” (Urry, 2005: 4).

## MY CONNECTION

In 1994, I presented a paper on Chaos/Complexity Theory at the Second Language Research Forum (SLRF) at McGill University in Montreal (later published as Larsen-Freeman, 1997). A short while earlier, I had read James Gleick’s book, *Chaos: Making a New Science* (1987). Gleick’s book did not deal directly with issues of concern to applied linguists, yet I found that his descriptions of complex, nonlinear, dynamic systems inspired me to think about language in a new way. On page 24 of the book, I came across a statement that set this thinking in motion: “Nonlinearity means the act of playing the game has a way of changing the rules.” This sentence (and much of the book thereafter) challenged what I had been taught about language,

which was that it was a bounded rule-governed system. I knew that the subfield of diachronic linguistics dealt with language change over time, and also that the subfield of linguistic processing was concerned with sentence processing in real time, but the nexus between over-time change and real-time processing, what I came to call “organic dynamism”, struck me as being of special interest to second language development (SLD) researchers. Of course, sociolinguists had been studying this phenomenon (i.e. language change through use), but the focus of their research was on how linguistic change becomes generalized to the speech community as a whole; it did not extend to second language learners. Furthermore, it seemed to me that conceiving of language as a complex system did away with the need for researchers to posit an innate LAD, a competence-performance distinction, and an appeal to preformationism (“the assumption that in order to build a complex structure you need to begin with a detailed plan or template” (Deacon, 2012: 50)).

Patterns in language arise from individuals interacting, adapting their language resources to a changing environment. They are not due to immanent properties of the units (Herdina, 2017). Every meaningful use of language changes the resources of the language learner/user, and the changed resources are then potentially available for the next speech event (Larsen-Freeman, 2010b). Thus, what is perceived is initial state dependent — emically controlled. Each of us will perceive and categorize, even if only unconsciously, certain things while ignoring others. Furthermore, individuals’ perceptions are continually being updated, so initial state dependence is always being recalibrated.

It is undeniable that the field has derived considerable benefit from the use of linguistic corpora for research purposes. However, because they are typically a compilation of attested utterances or written exemplars gathered from the language community, we need to appreciate their limitations in attempting to account for an individual learner’s language resources. We know, for example, that contemporaneous frequency counts can be inflated by priming (or the way a complexity theorist would word it, by the synchronization through which order emerges (Strogatz, 2003)). In other words, we need to establish affordances for learning from a second language learner’s emic viewpoint (Larsen-Freeman, 2017a), bearing in mind that learners may well have experience with multiple languages, and they may be learning in an environment that is not monolingual. As Larsen-Freeman and Cameron (2008a: 79) observe, “language [in use]

cannot be usefully segregated from its ecology". I have also found the view of language as a complex adaptive system (Ellis & Larsen-Freeman, 2009) to be felicitous because it counters the tendency to portray learner language as being an incomplete and deficient version of the target language. Indeed, implicit in this understanding of language as a self-modifying, emerging system is that "[learner] language is the way it is because of the way it has been used, its emergent stabilities arising out of interaction" (Larsen-Freeman & Cameron, 2008a: 115).

But more than this, CT made a great deal of sense to me in terms of giving me a holistic view of second language development as well.<sup>3</sup> CT's systems perspective challenged the notion that we could come to understand SLD in a piecemeal, atomized way. It suggested that even if we could identify important independent variables in the SLD process, we could not determine their influence in any absolute sense because what was relevant was how they related to each other in context. Besides, complexity theorists assert that the contribution of any one of the variables changes over time. In fact, they went further and called into question any decontextualized experiment, which sought to identify the causal factor in SLD. Such approaches often practiced Gaussian (distribution) statistics, which treated populations as a whole and too readily dismissed variability as noise or measurement error or attributed it to "outliers", thus failing to capture the individual's agentive role in the process. The use of regression analysis and multivariate statistics to measure the effects of multiple independent variable are also predicated on linear modeling, and any linear regression model is not likely to be a model of change (van Geert, 2011). A model of change that can account for nonlinearity in SLD, such as the U-shaped learning curve,<sup>4</sup> is necessary. Then, too, quantitative experimental research studies treated context as a backdrop, removed from the main action. In addition, they perpetuated the practice of dichotomizing: form versus meaning or social versus cognitive, for instance, instead of practicing a convergent heuristic, looking for what connects as well as what distinguishes (Morin, 2007).

Since my early awareness, I have come even more to appreciate the value of adopting a view of language as a complex adaptive system or CAS (Ellis & Larsen-Freeman, 2009). Indeed, if applied linguists were to do so, we would not be alone. Byrne and Callaghan's (2014: 2) search of the Web of Science from 2006 — 2011 found articles that demonstrated a serious engagement with CT in more than 80 social science journals, many of

which had special issues devoted precisely to the application of CT to a particular discipline or field. This is also true of our field, as I will illustrate below, and it has led a leading applied linguist to address why “everyone is so excited about complexity theory” (Kramsch, 2012).

Before I proceed, however, I should address several contentious issues regarding the appropriation of a theory from the physical sciences to elucidate human activity. First, given that it originated in the physical sciences, a question has been raised concerning its relevance in accounting for human agency (see Al-Hoorie, 2015 for discussion). Some might find CT’s origin disqualifies it for application to the study of humans. Admittedly, there is a suggestion of determinism or inevitability in a term such as “self-organization”, which calls into question “free will”. This is not the place where I can go into the protracted discussion that this question deserves. However, there are several brief responses that I can offer to this concern. First, Cameron and I tried to answer this question in our book by citing Osberg’s (2008) distinction between the logic of freedom underlying CT as contrasted with the enlightenment’s logic of determinism. The former insists that the course of action of a complex system is not foreordained — is always open to change — and therefore can be influenced by agents, for better or for worse.<sup>5</sup> Of course, there is also always the question of just how much free will humans actually have, given social and historical constraints, and with regards to language, given the “invisible hand” of language change, in which human actions are only unintentionally transformative (Keller, 1985: 211).

Second, in several associated object theories, human agency is central. For instance, in enactivism, change is seen to be enacted by living embodied agents (De Jesus, 2016), and in relational developmental systems theory, living organisms are conceptualized as

*active agents*, that is, as relational, spontaneously active, complex adaptive systems, that are *self-creating* (i.e. enactive; autopoietic), *self-organizing* (i.e. process according to which higher level system organization arises solely from the co-action of lower-level components of the system), and *self-regulating*. (Overton, 2013: 102)

Continuing, Overton highlights the embodiment central to relational dynamics theory: “It is the claim that perception, thinking, feeling, desires — *the way we behave, experience, and live the world* — is contextualized by our being active agents with this particular kind of body.” (Overton, 2013: 103)<sup>6</sup>



Third, CT has something to contribute to the typical construal of agency (Mercer, 2011). CT adds the sense of agency's being contingent. Writing about the temporality of learner agency from a CT perspective, Mercer (2012: 57) adds: "Viewing agency holistically also implies considering it as temporally situated connecting together the dynamics of a person's ongoing life history including their past and present experiences as well as their future goals, expectations and imaginations."

This is a good time to note that unlike a theory of cognitivism that sees cognition as the acquisition and manipulation of abstract mental representations, an enactivist position

explicitly rejects traditional cognitivist notions of mental representations and the passive computational input — output conceptions of cognitive processing so prevalent in cognitive science

instead, portraying

cognition as essentially the spatial-temporal and extended self-organising activity of embodied situated living organisms. Activities ... are fundamentally dynamic, non-linear and grounded on the interactions between the organism and its inherently meaningful environment. (De Jesus, 2016: 267)

With mention of a "meaningful environment", I should also point out that a CT-inspired view of language could neglect the fact that language is, unlike a physical system, a semiotic one (Herdina p.c.). This potential limitation must be acknowledged and always borne in mind. Furthermore, while fully committed to viewing language as a CAS, Mufwene et al. (2017: 11) make the important point that in the case of a flock, the birds are part of the system; "whereas a speaker or signer realigns their linguistic productions and uses these modifications to situate themselves socially or professionally but not in the linguistic system itself".

So, while there may have to be concessions, or at least adjustments, regarding the linking of CT with human affairs, many humanists, such as post-modern literary critic, N. Katherine Hayles (1990, 1991), and social scientists have found the thinking it inspires transformative, at least at a metaphorical level. And, after all, as geneticist Richard Lewontin has written (2001: 3), "It is not possible to do the work of science without using a language that is filled with metaphors".

It wasn't until years after my first presentation on CT that I came to understand that CT was really a metatheory (Overton, 2007: 154):

A metatheory is a coherent set of interlocking principles that both describes and prescribes what is meaningful and meaningless, acceptable and unacceptable, central and peripheral, as theory — the means of conceptual exploration — and as method — the means of observational exploration — the context in which theoretical and methodological concepts are constructed. Theories and methods refer directly to the empirical world, while metatheories refer to the theories and methods themselves.<sup>7</sup>

Overton (2015: 166) elaborates:

I rely on the notion of the “metatheoretical” to capture concepts whose scope is broader than any particular theory, and which form the essential conceptual core within which scientific theory and observation function.

Discussing the potential benefits of cultivating a metatheoretical perspective, Wallis (2010: 75) opines:

First, by developing new metatheory, we gain the ability to become more effective in the application of theory for the alleviation of social ills and the optimization of the human condition. Second, and closely related, by working from a metatheoretical perspective, we gain the opportunity to understand and integrate theories across disciplinary boundaries.

Metatheories are ubiquitous, affecting every aspect of our investigations, although their influence is not always recognized. They apply to a number of domains, and major metatheories have the power to shift paradigms.

## WHAT PARADIGM IS CT ATTEMPTING TO SHIFT?

For centuries scientists have been pursuing answers to their questions using reductionism. Reductionists assume that a system is a sum of its parts; thus, their approach seeks to understand phenomena by taking them apart — indeed down to the smallest possible component. Reductionism has enjoyed spectacular success. We can only look to the Large Hadron Collider in its successful search for the Higgs Boson particle <<http://home.cern/topics/higgs-boson>>.

Not only does reductionism focus narrowly on one part of a system at a time, reductionists also search for simple linear causal links between the parts. The measure of success in reductionism is to be able to make simple causal statements, attributing a consequence to a single cause. Such simple cause-effect statements have important consequences for human welfare.

To cite one mundane example, it is important to know that influenza is caused by a virus. So it is not so much that “law-focused Newtonian science is wrong, but rather that it is limited in its rightness. For some things it works very well but it cannot stand as an approach to the whole of reality” (Byrne & Callaghan, 2014: 19).

Even with regard to the “rightness” of reductionism, there remain several problems with simple-causal links. Traditional science has always aimed at achieving certainty by limiting complexity. While we know that influenza is caused by a virus, we do not know from year to year precisely which viruses to vaccinate against. Reducing the complexity comes at a cost.

There is a second problem with simple-causal links: They ignore the interconnections in a system. For example, this way of thinking gives rise to simple dietary advice, which is later rescinded (e.g. the recent study demonstrating that a peanut allergy can be prevented by having children consume small amounts of peanuts over a period of time, rather than what was recommended previously, i.e. avoiding them entirely) (Toit et al., 2015; Gruchalla & Sampson, 2015). Reasons for the capricious advice may include the failure to consider the human body as an interconnected system or the failure to take timescales and individual differences into account.

There is a third problem, which is the assumption that the universe is deterministic. Ever since Galileo, and later Newton, the search has been on to discover the unifying principles governing the universe (cf. Laplace’s vision of a clockwork universe). The pursuit of these principles still influences our conception of science in the modern tradition. However, since the discovery of quantum mechanics, chaos theory, and Heisenberg’s indeterminacy principle (Heisenberg, 1927), a challenge to this vision of nature has taken place: both nature, and therefore the truth about nature, are essentially indeterminable (Popper, 1982). As I have already mentioned, no amount of knowledge will allow us to determine long-term future outcomes in any precise way as the underlying processes are not linear.

Complexity Theory claims that natural systems are complex, and that there is therefore no single algorithm that can be used to explain the phenomena of nature. CT shows us a way beyond the clockwork conception of nature and allows us to assume that the processes of nature leave room for freedom and creativity, and the emergence of new and unpredictable patterns. This makes CT relevant for the social sciences and an understanding of human phenomena. However, a big question concerns the methodologies needed to study complex social systems.

How are we to resolve their inherent indeterminacy? How are we to draw boundaries around the object of concern when everything is connected to everything else? How are we to undertake the research enterprise in a way that honors the wholeness without becoming awash in holism? Is it truly possible to generate replicable findings? Further, given context dependency, is it possible to generalize our findings beyond a given study? Despite progress in these areas, these questions still present a challenge (Bastardas-Boada, 2014).

But before I attempt to answer some of these questions, I should point out that because CT is a metatheory, object theories concerning the phenomena observed — for present purposes, a theory of language and its development — are still needed. Object theories need to be aligned with the principles of the metatheory. Candidate object theories in keeping with some aspects of CT for language are cognitive, corpus, integrationist, probabilistic, and systemic-functional linguistics, construction grammar, emergent grammar, and conversation analysis. For object theories of language learning, we could turn to usage-based, connectionism, dynamic systems, constructivism, enactivism, relational developmental systems, network analysis, and emergentism. It is clear that while the members in these two categories share certain theoretical tenets (and that arguably certain of them belong to both categories), they differ as well. Nevertheless, it is also clear that they and CT as a transdisciplinary metatheory have contributed to new thinking about language and its development.

At this point, I should make a further observation. There are many contributors to the new thinking in our field. Here is a short, selective list of some of them:

- L1 acquisition — Bates & MacWhinney (1987); MacWhinney (1999); Tomasello (2003); van Geert (2003, 2008); Goldberg (2006); Evans (2007); Ninio (2011)
- L2 acquisition/development — Ellis & Larsen-Freeman (2006); Larsen-Freeman (2006); de Bot, Verspoor, & Lowie (2007); de Bot (2008); Larsen-Freeman & Cameron (2008a); Ellis & Larsen-Freeman (2009); Verspoor, Lowie, & van Dijk (2008); Eskildsen (2012); Nelson (2013); Ortega (2014); Chan (2014)
- Developmental psychology — Thelen & Smith (1994); Overton (2006); van Geert (2011); Lerner & Benson (2013)
- Neurobiology — Loritz (1999); Schumann, Crowell, Jones, Lee, Schuchert, & Woods (2004); Schoenemann (2009, 2017)
- Cognitive science — Clark (1997); Érdi (2007); Spivey (2007)
- Language ecology — van Lier (2006); Kramsch & Whiteside (2008, 2016); Cowley (2011); Steffensen (2011); Thibault (2011); Atkinson (2011)

- Language origins — Kirby & Hurford (2002); Joaquin & Schumann (2013); Blythe & Scott-Phillips (2014)
- Language evolution — Ke & Holland (2006); Christiansen & Chater (2008, 2016); Lee, Mikesell, Joaquin, Mates, & Schumann (2009); Steels (2011); Mufwene (2008); Mufwene, Coupé, & Pellegrino (2017)
- Language attrition — Jessner (2003); Opitz (2011, 2017); Schmid, Köpke, & de Bot (2013); Köpke (2017)
- Language change — Cooper (1999); Kretzschmar (2009, 2015)
- Bilingualism/multilingualism — Herdina & Jessner (2002); Todeva (2009); Jessner, Allgäuer-Hackl, & Hofer (2016)
- Motivation — Dörnyei (2009, 2017); Dörnyei & Ushioda (2013); Dörnyei, MacIntyre, & Henry (2015); MacIntyre et al. (2017)
- L2 anxiety — Gregersen, MacIntyre, & Meza (2014); Mahmoodzadeh & Gkonou (2015); MacIntyre et al. (2017)
- Willingness to communicate — MacIntyre & Legatto (2011)
- Transfer of learning — Larsen-Freeman (2013)
- Social theory — Sealey & Carter (2004); Walby (2007); Byrne & Callaghan (2014)
- Usage-based/emergentist models of language — Hopper (1998); Langacker (1988); Barlow & Kemmer (2000); Tomasello (2003); Bybee (2006, 2010)
- Language teacher cognition — Feryok (2010)
- Language awareness — Svalberg (2012)
- Discourse analysis — Gibbs & Cameron (2008)
- L2 writing — MacQueen (2012); Verspoor, Schmid, & Xu (2012); Baba & Nitta (2014); Byrnes (2014)
- Language policy and planning — Hult (2010a); Hogan-Brun & Hogan (2013); Larsen-Freeman (2018)
- Educational linguistics — Hult (2010b)
- CALL—Thorne, Fischer, & Lu (2012); Schulze & Scholz (2016)
- English as a lingua franca — Baird, Baker, & Kitazawa (2014); Larsen-Freeman (2016a)
- Sociolinguistics — Schneider (1997); Bastardas-Boada (2013); Blommaert (2014)
- L2 teaching — Larsen-Freeman (2003, 2012b, 2017a, 2017b); Larsen-Freeman & Freeman (2008); Burns & Knox (2011); Menezes (2013); Mercer (2013, 2016); Larsen-Freeman & Tedick (2016)
- Teacher education — Opfer & Pedder (2011); Davis & Sumara (2012); Cochran-Smith, Ell, Ludlow, Grudnoff, & Aitken (2014)
- General education — Doll (2005); Horn (2008); Lemke & Sabelli (2008); Osberg & Biesta (2010); Ricca (2012); Clarke & QuinnWilliams (forthcoming)
- Learner agency — Mercer (2012); Tasker (2013)
- Conversation Analysis — Seedhouse (2010)

- World Englishes — Schneider (1997); De Costa & Bolton (2018)
- Complexity-informed research methods — Larsen-Freeman & Cameron (2008b); Verspoor, de Bot, & Lowie (2011); MacIntyre (2012); Molenaar & Nesselroade (2015); Moss & Haertel (2016); Hiver & Al-Hoorie (2016); MacIntyre et al. (2017)

Some of these references are to entire books/special issues of journals on methodologies and different applications of CT/Dynamic Systems Theory/emergentism to language, its use and development, so, in some ways, for some scholars, I think it is fair to say that the paradigm has shifted.

## TAKING STOCK

So what is the new thinking (which in some ways already seems not to be so very new)? Below is my summary in the form of 30 aphorisms, although there are three caveats to this list. First, I have not provided justification for all these aphorisms in this chapter, although they are supported in the CT-informed literature I have just cited. Second, not all contributors I have just named would agree with this entire list. Third, I have categorized the aphorisms to make the list more coherent and easier to process. However, drawing firm boundaries around the categories is not in keeping with CT, and the overlap among certain of the categories is plain to see.

### Language

1. Language is a complex adaptive system.
2. Language as it is used is dynamic, ever changing; its lexicogrammatical patterns emerge from interaction.
3. The genesis of language, its evolution, its use, its processing, and its development in learners all proceed from use. Changes over days, months, years, and moment-to-moment changes are produced by the same processes, differing only in their timescales.
4. Each meaningful adaptive experience in the “here-and-now” of a specific context contributes to stable, but mutable, attractor states emerging on a longer timescale.
5. Language is manifest at different levels, from neuronal activity in individual brains to discourse in communities.
6. Language is a fractal, self-similar at different levels of scale (e.g. Zipf’s law).
7. Language in use is both stable (with a certain degree of collocational predictability) to ensure comprehensibility and transmission and, at the same time, variable.

## Language Learners/Users

8. Language learners/users interact in a particular context, and when they do, they may gain access to frequent and reliably contingent form-meaning-use<sup>8</sup> constructions through a process of co-adaptation, an iterative and dialogic process, with each interlocutor adjusting to the other over and over again.
9. As learners/users adapt to the context, the context changes. Successful adaptive behavior entails the ability of learners/users to convey meaning and to position themselves in the way that they intend.
10. Learners/users "soft assemble" or cobble their utterances together, a kind of bricolage that involves exapting any and all "parts" of languages (including sound segments, prosody, and nonverbal behavior) that the learner has experienced or that have been primed in induced resonance in the immediacy of the interaction, which may or may not be consistent with the units described by linguists.
11. Learners build on what they know, including knowledge of other languages. But rather than thinking of it as transfer, it should be thought of as transformation. Transfer is never exact; what is being "transferred" is reworked to suit a new context.
12. Language use in a multilingual situation is not a matter of translation between totally discrete and distinct language systems.
13. Learners'/users' language resources are not simply a record of their past experience. Language learners/users have the capacity to create their own patterns and to expand the semiotic potential of a given language, not just to conform to a ready-made system.
14. There is also considerable intra- and inter-learner variability in development. Each developmental trajectory is unique. Therefore, we can make claims at the level of the group, but we cannot assume that they apply to individuals. (It may be possible, however, to develop different learner profiles at a remove from individual learners.)
15. Moreover, so-called individual differences are not stable and monolithic traits.

## Language Learning

16. Learning is not a matter of assembling an internal model of an external reality.
17. Patterns that emerge through interaction are subsequently entrained by what preceded them, in a process of reciprocal causality, i.e. one that recognizes both local-to-global processes of construction and global-to-

local processes of constraint.

18. L2 learning is a sociocognitive constructive process, in which learners make use of heuristics such as analogy, statistical preemption, abduction (inferencing beyond the data to which they have been exposed), recombination, relexification, co-adaptation, and alignment.
19. Learning is not climbing a developmental ladder; it is not unidirectional. It is nonlinear.
20. Language and its learning have no endpoints.<sup>9</sup> Both are unbounded.
21. A person's history of interactions with diverse interlocutors builds up collections of experiences that contribute to the language, cognitive, affective, and ideological resources that are available to be drawn on.
22. These resources include physical (e.g. the use of gestures) as well as symbolic and multimodal ones.
23. What is important in a complex system is the interdependent relationship of the factors that comprise it. Such a focus necessitates a rejection of single-entity notions of efficient causality.

## Language Teaching

24. Teaching grammar as the dynamic system it is ("grammaring") can ameliorate the inert knowledge problem.
25. From a target-language perspective, errors are evidence of learners' creativity and are not, in any linguistic sense, readily distinguishable from the linguistic innovations of language users.
26. Meaningful iteration is a more efficacious practice than repetition of forms.
27. It is not the input, but the learner's perception of the affordances in the ever-changing context that is fundamental to learning (a second order affordance is a relationship between the learner and the environment that a teacher can manage).
28. Learners' attentional resources need to be directed to the learning challenge; one way this can be accomplished is through explicit instruction.
29. Learners are helped by being taught how to adapt or mold their language resources to changing situations.
30. Learners benefit from seeing that they have options in how to express themselves. Every time they use language, they are making choices, and by so doing, negotiating their identities.

In many ways my 30 observations seem "the new normal". This is not surprising for they are in keeping with the *Zeitgeist*. "Complexity is an idea whose time has come" (Byrne, 2005: 98). Nevertheless, I submit that these 30 (and surely others I have not included) result from a profound shift in



the way we think about language and second language development, as compared with 20 years ago.

After I published my first paper on CT in 1997, I anticipated soon being joined by others who would be as enthusiastic as I was about the innovative thinking the theory inspired. And, some of the contributors to this volume saw its potential, too. I was, and still am, grateful for their intellectual company; we have learned from each other. Yet, as with change in complex systems themselves, it seems that any widespread change does not proceed in a linear fashion. Now, though, it seems as if a tipping point has been reached. I am not saying that all that I have reported was stimulated by CT, and certainly not that they were from my work alone; nevertheless, many applied linguists have now adopted a complex dynamic perspective on areas of interest to them.

However, CT as a metatheory gives us a new way to think, and even though my thinking is inchoate at this point, I offer three answers to questions I have had as examples of how the lessons from CT continue.

## THE LESSONS CONTINUE

### **Lesson 1. CT Invites Us to “Interrogate Dichotomies” (Morin, 2007). How Can We Do This and What Can We Learn from Doing So?**

Dichotomous thinking is pervasive not only in our field, but in human reasoning more generally, as it has been since antiquity. Of course, dichotomizing can be a useful heuristic. However, one of the lessons of a holistic metatheory is the need to account for the nonduality of phenomena, to see complementarities rather than dichotomies. Indeed, within a relational metatheory, such as CT, efforts should be directed towards identifying how distinct constituents of a whole relate to each other (Overton, 2006). At its core, CT challenges the notion that by perfectly understanding each component part of a system we will then understand the system as a whole.

One *and* one may well make two, but to really understand two we must know both about the nature of “one” and the meaning of “and”. (Sufi poet Rumi cited in Miller & Page, 2007: 3)

Such a statement underscores what I have already indicated is a fundamental quality of CT, i.e. that it is relational. It is from the components and their relationships that the system we are trying to understand emerges. If we

isolate components artificially, we lose the essence of the phenomena we are attempting to describe. Also, by removing the components from their temporal context, we overlook their initial state dependence.

We have already seen the rejection of the separation between learner and context. In its place, CT takes the “individual acting in context” as a unit worthy of study (Larsen-Freeman, 2016b) — an inseparable unit in which it is impossible to isolate the behavioral and developmental states of the individual from external influences (Spencer, Perone, & Buss, 2011: 261), including interaction with other individuals. As Johnson (1987: 207) observes “... our structured experience is an organism–environment interaction in which both poles are altered and transformed through an ongoing historical process”.

Another example from CT is the acknowledgement that development consists of both qualitative and quantitative changes. A new attractor is a sign of a qualitative change in the system (Hiver, 2015), sometimes the result of feedback (in the cybernetic use of the term). Although qualitative change can be special — it can reflect the emergence of something new that was not there before — it is not in opposition to quantitative change. Rather, quantitative changes over time can give rise to qualitatively new behaviors at any time. This is one example where a classic dichotomy withers away in the face of a formal, systems viewpoint (Spencer, Perone, & Buss, 2011: 261).

Going beyond these examples, I will discuss six courses of action for dealing with the nonduality of phenomena. The first four are familiar; they are logical possibilities.

When faced with dichotomies, we have several alternate courses of action. Let’s take an important one in our field as an example — cognitive/social approaches to second language development. A common course of action is to privilege one member of the pair and to challenge the legitimacy of its counterpart. This, too, we have witnessed in our field — the *either/or* approach. SLA is a branch of cognitive science (Doughty & Long, 2003: 4), or “[t]hinking is a social process rather than an internal essence” (Wertsch, 1991, cited in Thompson, 2012: 90).

A second course of action when faced with dichotomies is to reject both. I presume that an innatist approach to SLA would maintain that SLA is *neither* a cognitive (in the sense of “how information is processed and learned by the human mind” (Ortega, 2009: 82) *nor* a social process, but would instead favor an innate modular, encapsulated acquisition device.

A third logical alternative (the *both ... and*) is to include both:

sociocognitive. However, simply combining two options by itself is not intellectually compelling since it fails to specify how the two relate (Larsen-Freeman, 2007). Besides, in an attempt to be inclusive, there is always the risk of a category error, of combining things that do not go together.

A variation of the *both ... and* position that seems more consistent with CT for its explicit attention to interactivity is Kelso and Engström's (2006). Their coordination dynamics' framework of complementary pairs calls for reciprocal interplay of wholes and parts, an ontological emergence view. As with the *both ... and* position, complementary pairs are coexistent, yet distinguishable, interacting and mutually dependent with neither member of the pair considered more fundamental than the other, and with both needed to adequately capture the nonlinear dynamics of SLD (see for example, Ellis & Larsen-Freeman, 2006; Larsen-Freeman, 2010a).

A fourth course of action is to use Hegelian logic, at least as it is commonly understood, where one can bridge the gap between a thesis and antithesis by uniting them at a higher level of abstraction through synthesis (van Geert & Fischer, 2009). A problem with synthesis, however, is that a premature unification can prevent the opening up a space of potential meaning (Merleau-Ponty, 1968, as cited in Thompson, 2012: 92). According to Wegerif (2008, as reported in Thompson, 2012: 92), "an ontology of difference, unlike the hidden unifying Hegelian hand of the dialectic, is capable of opening up an infinite space of potential meaning through dialogue and it is this, which constitutes the ground of creative emergence".

The comment about dialogue allowing for creative emergence may sound fanciful, but it does allow me to make the case for the first of two courses of action, which I believe are more aligned with CT as a metatheory. The two are thirdness and paradox.

A fifth way to deal with dichotomies, then, is to posit a third space (Kramsch, 2009). Theories of Thirdness have been used to question the traditional dichotomies between native speaker/non-native speaker in language learning and others — L1/L2; self/other; us/them. Kramsch (2009: 238) writes:

Thirdness does not propose to eliminate these dichotomies, but suggests focusing on the relation itself and on the heteroglossia within each of the poles. It is a symbolic place that is by no means unitary, stable, permanent and homogeneous.

Focusing on the relation between the two members of a dichotomous pair, and carving out a symbolic space of the sort Kramsch describes is very

much in keeping with CT. Kramersch concurs. She observes that Complexity Theory fosters an ecological perspective: Rather than seeking a dialectical unity, it recognizes open-endedness and unfinalizability (p.247).

Closely related to this fifth course of action is a sixth, which relates to CT, not so much in the creative emergence of thirdness, nor in the dynamic interplay of coordination dynamics, but rather in its indeterminacy. It does not seek to reconcile the two members of a binary pair. This course of “action” concerns paradox, and therefore by definition the dichotomy is not resolvable. Paradoxes allow both members of a pair to be true, even when that seems to be impossible. They are not fused, but logically contradictory, just as light is simultaneously both particle and wave. It seems to me that there are paradoxes in second language development that are in keeping with the indeterminacy of complex dynamic systems. Here are two:

- Frequency in the input leads to preservation (entrenchment); at the same time, it leads to change (e.g. semantic bleaching) (Herdina, 2017).<sup>10</sup>
- Language learning is systematic, yet it is also a process of bricolage.

I believe that we need to appreciate the nonduality of phenomena — the complementarity in language and its learning — of dynamicity and stability, telicity and non-telicity, internalism and externalism in cognition, contextual particularity and decontextual generalization. At the same time, on the epistemology side of things, we must also recognize the role of both linearity and nonlinearity, individual and aggregated performances, and etic and emic perspectives.

Perhaps future investigations in which we earnestly take up the matter of focal timescales (e.g. de Bot, 2015) will help us understand that these are not real paradoxes, just present enigmas. In the meantime, I think we can derive comfort from complexity theorist and French philosopher Edgar Morin’s (2005, cited in Freire, 2013) dialogical principle,<sup>10</sup> which affirms that complexity can be found where it is not possible to overcome a contradiction. The dialogical principle allows us to “maintain the duality at the heart of unity” (Cilliers & Preiser, 2010: 273). It brings together two terms which are at one and the same time complementary and contradictory (Morin, 2005: 74), and it provides fertile ground for creative emergence.

## **Lesson 2. If Everything Is Connected to Everything Else, How Can You Distinguish a System from Its Environment?**

In the past, I have called this challenge “the boundary problem” —

where to draw the boundary around the system of interest.

To become an object of scientific investigation it is necessary that that object be delimited and have boundaries imposed upon it, but with such regulation comes the danger of partialism, of ignoring the holistic picture (albeit out of practical necessity) in favour of something more manageable. (Seargeant, 2010: 1, cited in Baird, Baker, & Kitazawa, 2014)

The late philosopher Paul Cilliers made the dilemma clear: “Because everything is always interacting and interfacing with others and the environment organically, the notions of ‘inside’ a system and ‘outside’ a system are never simple or uncontested.” (Cilliers, 2001: 142) Of course, it is humanly impossible to study everything at once. As Cilliers later observed, “Boundaries are still required if we want to talk about complex systems in a meaningful way — they are in fact necessary ...” (Cilliers, 2005: 612)

In my previous discussion of the boundary problem (Larsen-Freeman, 2011), I fretted about where to draw the line due to the strategic considerations at stake. I appealed then to:

- Bateson (1972: 465): “The way to delineate the system is to draw the limiting line in such a way that you do not cut any of these pathways in ways which leave things inexplicable.”
- Atkinson, Churchill, Nishino, and Okada (2007: 169): “We seek to view mind, body, and world relationally and integratively — as constituting a single ecological circuit.”
- Lewontin (1998: 81–82): “Before we can recognise meaningful parts we must define the functional whole of which they are the constituents. We will then recognise quite different ways of breaking up the organism depending on what we are trying to explain. The hand is the appropriate unit for investigation if we are concerned with the physical act of holding, but the hand and eye together are an irreducible unit for understanding how we come to seize the object that is held.”

I still believe that seeking to identify a system by thinking along such lines makes sense. However, upon further reflection, another possibility is that the issue will take care of itself by letting the complex system that is of focal interest define itself. Let me explain.

Language development is described as an autopoietic process (Herdina & Larsen-Freeman, in preparation). Autopoiesis was first used by the Chilean biologists Maturana and Varela to describe a living system. As Witherington (2011: 79) writes: “As autopoietic systems, living systems construct

themselves by generating the very boundary conditions necessary for the creation and maintenance of their *self*-organization.”

Sometimes the construction results in an entity with a clear, although porous, boundary, such as a cell membrane where the living cell, described as an autopoietic system, produces its own boundary. At other times, the system does not have an obvious physical boundary. Such is the case with an example I gave earlier: that of the immune system. “The immune system is not spatially fixed, it’s best understood as an emergent network.” (Varela, 1995: 213)

In this sense, *the “boundary” exists only in the languaging domain*: it is the “observer’s point of view”, allowing him or her to talk about the existence of an observable composite unit, seen as clearly “distinguishable” from its environment and showing a possible autopoietic behavior in the considered observational domain ... Nevertheless, when the observed phenomenology allows us to describe the *emergence of spontaneously generated structures of components involved in distinguishable mutual interactions* — distinguishable from the interactions with other dynamical objects — we can say that it is the phenomenon of emergence itself that “defines” the boundary (for an observer). (Urrestarazu, 2011: 312)

Of course, language is not a living system in any nonmetaphorical use of living. Nonetheless, the fact that an autopoietic system constructs itself as a result of its own endogenous dynamics (Juarrero, 2009: 92) provides another way of thinking about how boundaries get set. Beginning with a particular point of entry into a complex system and continuing to watch as it evolves, as it modifies itself functionally through use by agents, while always revisiting the question of where the boundary lies for the system of interest and being aware of the “methodological rich points”<sup>11</sup> seems to me a lot like conducting a good ethnography (Ybema et al., 2010) or a design experiment (Cobb et al., 2003), methodologies compatible with CT (Varela, 1999: 13).

Horn (2008: 143) applies this understanding about boundaries to educational research in this way:

In order to understand schools and classrooms as the complex environments that they are capable of becoming, we must first allow them to be so. This will require ... methodologies that do not reduce the phenomena studied to fit within the prevailing research repertoire ...

As an announcement of the 1st International Workshop on Complexity and Real World Applications in Southampton, England, July 21–23, 2010, reads:

Life is defined by where we draw the lines. The fact that defining these boundaries is so difficult is part of what makes life interesting. All boundaries are no more than temporary patterns resulting from a filtering process ... As such, they are to some degree arbitrary ... and require ongoing review to understand how they shape our context of interest — and how our context of interest shapes them.

Deciding where to draw the lines to define a focal system of interest always involves “an element of choice which cannot be justified objectively” (Preiser, 2016). And, because this is so, it is important to note that ethics and politics come into play because line-drawing always circumscribes what is in and what is out.

### **Lesson 3. If We Reject Simple Linear Causality, Do We Have to Give up on Generalizability?**

What research studies do not conclude with “more research is needed”? Now, more research is a good thing. Findings should always be seen to be provisional. And, of course, from a CT perspective, one has but only to change the context/situation (even only the researcher-interlocutor (Gurzynski-Weiss & Baralt, 2014)), and there may be contradictory, or at least different, results. Not much about language development yields to a simple linear causal explanation (Vallacher, van Geert, & Nowak, 2015). Language use and development is contingent. For this reason, some have suggested that we should be more concerned with particularization (“the ability to judge the relevance of one scientific activity in the context of another” (van Lier, 2006: 202)) than generalization. I am sympathetic to the argument, but it seems to me that contingency does not preclude generalizing. For one thing, generalizable statements can be made, as I have been doing in this chapter, at the level of system dynamics.

This, too, is what conversation analysts seek to do. Their goals are universalist (i.e. to describe the basic architecture of human sociality), but their evidence is local, emic, and particularistic. For example, Waring (2012), in her study of teacher questions, notes that even findings from a research approach as emic as conversation analysis can be generalizable — not generalizable as descriptions of what all teachers and learners in a classroom do, but generalizable as potential — as to “what any other teacher or learner in an adult ESL class *can* do, given that he or she has the same array of interactional competencies as the participants in this study” (p.746).

There is much to be learned from a single case study in terms of

learners' language development and how it is contingent on interactional environments. For instance, Eskildsen (2012) found that one of his case study participants did not adhere to established sequences of development in the acquisition of English negation. The departure was a consequence of the learner's trying to achieve a particular interactional objective. Significantly, Eskildsen called into question the existence of common developmental sequences as a whole, the existence of which has long been held by SLD researchers.

In keeping with this point, van Geert (2011: 276) explains that a single case study can be generalizable, depending on how it links to a particular theory. He goes a step further, arguing that theories should be able to describe individual developmental trajectories.

For students of language development, single case studies have a direct bearing on the underlying theory, and only an indirect one on the population of language learners. In summary, a truly general theory of developmental processes is one that can be "individualized" — it can generate theory-based descriptions of individual trajectories in a nontrivial sense.

As Duff (2006: 88) puts it, "the generalizability is not to populations but to theoretical models ... which also take into account the complexity of second language learning and the multiple possible outcomes that exist".

Yin (2014: 21) makes a similar point, invoking "analytic generalizations" from case studies.

Case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes. In this sense, the case study, like the experiment, does not represent a "sample", and in doing case study research, your goal will be to expand and generalize theories (analytic generalizations) and not to extrapolate probabilities (statistical generalizations).

Of course, there may be a legitimate reason to conduct sample-based research in order to make statistical generalizations about groups. Patterns can be perceived at various levels of scale in a complex system. For example, Kozaki and Ross (2011) investigated the hypothesis that learning context exerts an influence on the dynamics of individual differences in language learning. In a longitudinal design that tested the proficiency gains of 1,682 learners over a two-year foreign language program, they found "corroborating evidence in support of the assertion that individual differences in motivation are dynamic and malleable and can be either enhanced or diminished, depending on the



immediate context of the foreign language classroom” (p.1348).

A CT perspective would endorse methodological pluralism, and the methods which are available are far more multifarious (Moss & Haertel, 2016) than have been carried out in the young field of SLD to date. However, to put it simply for present purposes:

If we are interested in grand sweep effects that may be generalizable to large populations of learners, we will have to carry out group studies with representative samples that can be analyzed using Gaussian statistics based on the normal distribution. But if we are interested in how an individual learner progresses over time as a result of changing variables in a changing context, we will have to conduct longitudinal studies and use nonlinear methods of analysis. (Lowie & Verspoor, 2015: 63)

To illustrate their position, DST researchers Lowie and Verspoor (2015) remark, “Although stages of development ... are commonly observed as a grand sweep effect at the group level, these stages may be meaningless at the level of the individual language learner”.

Importantly, then, one cannot infer the latter from the former (although given certain conditions, inter-individual variability may be accounted for by patterns of intra-individual variability (van Geert & Steenbeek, 2014)). While allowing generalizations at the level of the group, sample-based research does not tell us about individuals (see Rose, Rouhani & Fischer, 2013). van Geert (2011: 275) warns:

... models based on aggregated data from individuals have no logical bearing on models of individual processes. Molenaar (2008) calls this the ergodicity principle. He and his collaborators have shown that the implicit step, so common in the behavioral sciences, from sample-based research to individual process statements is often demonstrably incorrect.

Along similar lines, Schumann (2015) challenges the assumption that researchers of motivation need to study inter-individual variability among large numbers of subjects. Instead, in the foreword to Dörnyei, MacIntyre, and Henry’s book, *Motivational Dynamics in Language Learning*, Schumann (2015: xvi) has written:

Dynamic Systems Theory (DST) allows researchers in L2 motivation to simultaneously abandon the notion of single and linear causality and frees them from the implicit demand in conventional research for large subject studies. As seen in this volume, DST provides a way to see motivation from the perspective of

a general theory that applies to many phenomena. The individual is the entity of concern, and case studies become recognized as the appropriate level of granularity for understanding motivation trajectories in SLA.

In addition to the concern about not making inferences about individuals from aggregated data, another caution is in order. A study recently examined 100 replications in psychology (Open Science Collaborative, 2015) and found that replication effects were weaker, on the order of half the magnitude of the original effects.<sup>12</sup> Many explanations have been proffered subsequently; however, in general, from a CT perspective, the Collaborative's finding should not be unexpected, considering the context-bound nature of research (Larsen-Freeman, 2012a).

Then, too, psychologists have recently been questioning such widespread and conventional practices as null hypothesis statistical testing (Cumming, 2014). Cumming quotes Ioannidis (2005) as claiming that the imperative to achieve statistical significance encourages the adoption of particular practices, overshadows others, and leaves uninterpreted a great deal of data. Certainly a major problem from a CT point of view is that much social science research is oriented towards testing the null hypothesis, using Gaussian statistics, which assumes that all the values are sampled from a population that follows a normal distribution, such as human beings' heights. But this assumption is ungrounded when it comes to many phenomena of interest to applied linguists, such as the frequency of word use, which is Zipfian in distribution as Paretian statistics reveals (Andriani & McKelvey, 2007).

A related lesson from Paretian statistics is illustrated in Blommaert's (2014: 16) CT-inspired observation:

As for quantitative methods (now including "big data" mining techniques), the stochastic nature of sociolinguistic systems ought to sensitize us to the fact that statistical frequencies or averages might not be the key to understanding a sociolinguistic environment: the really relevant elements — triggers of large-scale change for instance — can be exceptional, deviant, and statistically insignificant.

When it comes to experiments designed to test the efficacy of a particular intervention, Moss and Haertel note (2016) that it is not the intervention alone that can be considered a generalizable cause. "What matters is how the intervention works in relation to all existing components of the system and to other systems and their sub-systems that intersect with the system

of interest” (Byrne, 2013: 219).

Moss and Haertel (2016: 208) counsel researchers not to lose sight of the fact that, as I have already indicated, in a complex system:

[t]he same outcome may be generated in more than one way, so any theory needs to account not just for complex causes, but also for multiple complex causes. Further, similar mechanisms may lead to different outcomes as they interact with different features of the context. Central to these contextual features are the understandings, choices, actions and interactions of the people involved. “Human agency informed by meaning is absolutely part of the causal nexus.” (Byrne, 2013: 221) These are shaped by their past histories and relationships within and across contexts as well as the social structures and institutions within which they live and work. (Byrne, 2013: 221)

Byrne’s words bring forth thoughts of the other dimensions of human agency, which I have not addressed in this chapter. Indeed, as I mentioned at the outset, this chapter has only touched upon SLD-relevant factors, and certainly not dealt with all of them, e.g. identity, emotion, ideology, power, historicity, neurobiology, cognition, affiliative bonds, multimodality, embodiment, physiology, education, and sociocultural factors (see the Douglas Fir Group, 2016 for elaboration). In short, second language development is complex.

## CONCLUSION

Complexity Theory encourages the search for ways to access the relational nature of dynamic phenomena, a search that is not the same as the pursuit of an exhaustive taxonomy of factors that might account for behavior of any given phenomenon. Focusing on emergence, rather than design, and focusing on the relations among components of a system, rather than the components of the system itself, contribute a new perspective on development (Witherington, 2007). Linear cause and effect is of lesser interest, and reductionism does not produce satisfying explanations that are respectful of the interconnectedness of the many nested levels and timescales of a complex dynamic system. In addition, the tendency to dichotomize, which is central to the hypothetico-deductive method of modern science, moving forward when it rejects alternatives (Kelso & Tognoli, 2009: 104), has made tremendous progress, but it will never entirely succeed because it ignores change, and the fertile ground of “in-between-ness”. CT accentuates change, insists on the importance of

context, and respects variability.

Complexity Theory is transdisciplinary in informing many different disciplines and in the Hallidayan sense of introducing new cross-cutting themes into scholarly thinking (Halliday & Burns, 2006). It should be understood as a metatheory. As a metatheory it defines the nature of the object and the methodology that is to be employed to investigate the object; it informs object theories, which in turn have specific foci, in our case having to do with the nature of language and its development. CT has the power to stimulate our thinking in new directions and to teach us new lessons.

The universe conceived by Isaac Newton, in which events have single causes, time flows uniformly in one direction, and understandings are sought by reducing complicated situations to their component parts, has been superseded by complexity theory, which posits a world of contingencies rather than causes, time is viewed as an artifact of human perception, and explanations of phenomena are sought in ever-expanding contexts. (Clarke & QuinnWilliams, forthcoming)

My intention in writing about a theory or research finding has never been to proselytize. It has been to share with others that which I have found of value. A metatheory such as CT affords a conceptual framework, one that 20 years ago gave me a different way of thinking, and one that has continued to inspire me ever since.

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## **Notes**

1. My position is thus aligned with ontological emergentism (see Witherington, 2011) and its move beyond efficient causality.
2. I use these images from nature because I think that they help to understand the concept. I am not suggesting that language is as simple as an eddy in a

stream or a flock of birds. It is a semiotic system, so that these images are helpful, but not definitional.

3. CT promotes a holistic perspective with the caveat that Taylor (2001: 155, cited in Baird, Baker, & Kitazawa, 2014) notes: “Emergent self-organizing systems do act as a whole, yet do not totalize.”
4. For a way U-shaped phenomena can be accommodated in Dynamic Systems Theory, see Gershkoff-Stowe and Thelen (2004). They make the important point that true regression is not possible because behavior exists continuously in time (p.11). This claim links with the idea that the state of the system depends on its history (“initial state dependence”). In place of Gaussian statistics, which views the distribution of events/characteristics along a normal curve (such as the height for a given population), dynamic systems theorists find Bayesian and Paretian statistics more appropriate for their epistemology, as I discuss later.
5. Note that I am using “agents” here to mean an organism that has the power to act intentionally, which is different from the way agents are construed in agent-based modeling as employed in restricted complexity.
6. DST researchers Byrge, Sporns, and Smith (2014) discuss the interplay between brain and body development.
7. By methodology, Overton (2014: 19) means something broader than methods. He explains: “[I]f your methodology assumes that the linear organism is a linear input-output machine with strictly decomposable parts, then you will be prone to exclusively develop and use linear additive methods such as the analysis of variance (ANOVA) and regression models. If, on the other hand, your methodology assumes that the living organism is a nonlinear self-organizing dynamic system you will be prone to employ consistent methods, such as, for example, ... nonlinear dynamics systems models with bifurcation ...”
8. I acknowledge that most language researchers think two dimensionally, in terms of form and meaning. However, it is not enough to know the meaning of a form. One must also know the pragmatic principles governing its usage, i.e. when to use it — when, for example, to choose one form over the other in a given context (Larsen-Freeman, 2003).
9. I am speaking of potential. We know that languages can “die” if there are not enough speakers to keep them alive, and we know that there are learners like Schmidt’s (1983) Wes whose language resources may have stabilized from a target-language perspective. There is also research on fossilization that suggests that some features of a learner’s language (but never all) stabilize for long periods of time (e.g. Han, 2004, but see Long, 2003).
10. On a somewhat related note, recent research conducted by Weber et al. (2016), using fMRIs with adult learners acquiring syntactic structures and words from a miniature artificial language, demonstrated that there was a repetition

suppression effect with familiar structures, whereas repetition of unfamiliar structure and novel words led to repetition enhancement. See also Bisson et al. (2014) for the differential effect of repetition.

11. “Methodological rich points are those times when researchers learn that their assumptions about the way research works and the conceptual tools they have for doing research are inadequate to understand the worlds they are researching.” (Hornberger, 2013: 102)
12. I am grateful to Nick Ellis for calling this article to my attention. Since then, it has received a great deal of attention in the media. I also think it is important to point out that SLA researchers Gass and Valmori (2015) do not call for exact replication, but rather systematically expanding the original studies so as to increase the generalizability of their findings.

## References

- Al-Hoorie, A. H. (2015). Human agency: Does the beach ball have free will? In Z. Dörnyei, P. D. MacIntyre & A. Henry (Eds.), *Motivational Dynamics in Language Learning* (pp.55–72). Bristol, UK: Multilingual Matters.
- Andriani, P. & B. McKelvey. (2007). Beyond Gaussian averages: Redirecting international business and management research toward extreme events and power laws. *Journal of International Business Studies*, 38: 1212–1230.
- Atkinson, D. (Ed.). (2011). *Alternative Approaches to Second Language Acquisition*. London: Routledge.
- Atkinson, D., E. Churchill, T. Nishino & H. Okada. (2007). Alignment and interaction in a sociocognitive approach to second language acquisition. *Modern Language Journal*, 91: 169–188.
- Baba, K. & R. Nitta. (2014). Phase transitions in development of writing fluency from a complex dynamic systems perspective. *Language Learning*, 64: 1–35.
- Baird, R., W. Baker & M. Kitazawa. (2014). The complexity of ELF. *Journal of English as a Lingua Franca*, 3(1): 171–196.
- Barlow, M. & S. Kemmer. (Eds.). (2000). *Usage Based Models of Language*. Chicago, IL: University of Chicago Press.
- Bastardas-Boada, A. (2013). Language policy and planning as an interdisciplinary field: Towards a complexity approach. *Current Issues in Language Planning*, 14(3–4): 363–381.
- Bastardas-Boada, A. (2014). Towards a complex-figurational socio-linguistics: Some contributions from physics, ecology and the sciences of complexity. *History of the Human Sciences*, 27(3): 55–75.
- Bates, E. & B. MacWhinney. (1987). Competition, variation, and language learning. In B. MacWhinney (Ed.), *Mechanisms of Language Acquisition* (pp.157–193). Hillsdale, NJ:

Lawrence Erlbaum Associates.

- Bateson, G. (1972). *Steps to an Ecology of Mind*. Chicago, IL: University of Chicago Press.
- Bisson, M. J., W. J. B. van Heuven, K. Conklin & R. J. Tunney. (2014). The role of repeated exposure to multimodal input in incidental acquisition of foreign language vocabulary. *Language Learning*, 64(4): 855–877.
- Blommaert, J. (2014). From mobility to complexity in sociolinguistic theory and method. *Tilburg Papers in Culture Studies*, Paper 103.
- Blythe, R. A. & T. C. Scott-Phillips. (2014). Simulating the real origins of communication. *PLoS ONE*, 9(11): e113636.
- Burns, A. & J. A. Knox. (2011). Classrooms as complex adaptive systems: A relational model. *TESL EJ*, 15(1): 1–25.
- Bybee, J. (2006). From usage to grammar: The mind's response to repetition. *Language*, 82(4): 711–733.
- Bybee, J. (2010). *Language, Usage and Cognition*. Cambridge, UK: Cambridge University Press.
- Byrge, L., O. Sporns & L. Smith. (2014). Developmental process emerges from extended brain-body-behavior networks. *Trends in Cognitive Science*, 18(8): 395–403.
- Byrne, D. (2005). Complexity, configuration and cases. *Theory, Culture & Society*, 22(5): 95–111.
- Byrne, D. (2013). Evaluating complex social interventions in a complex world. *Evaluation*, 19(3): 217–228.
- Byrne, D. & G. Callaghan. (2014). *Complexity Theory and the Social Sciences: The State of the Art*. Oxon: Routledge.
- Byrnes, H. (2014). Theorizing language development at the intersection of “task” and L2 writing: Reconsidering complexity. In H. Byrnes & R. M. Manchón (Eds.), *Task-based Language Learning: Insights from and for L2 Writing* (pp.79–103). Amsterdam: John Benjamins.
- Chan, H.-P. (2014). A dynamic approach to the development of lexicon and syntax in a second language. Unpublished doctoral dissertation, University of Groningen.
- Christiansen, M. H. & N. Chater. (2008). Language as shaped by the brain. *Behavioral and Brain Sciences*, 31: 449–558.
- Christiansen, M. H. & N. Chater. (2016). The now-or-never bottleneck: A fundamental constraint on language. *Behavioral and Brain Sciences*, 39: 1–72.
- Cilliers, P. (2001). Boundaries, hierarchies and networks in complex systems. *International Journal of Innovation Management*, 5(2): 135–147.
- Cilliers, P. (2005). Knowledge, limits and boundaries. *Futures*, 37: 605–613.
- Cilliers, P. & R. Preiser. (Eds.). (2010). *Complexity, Difference and Identity: An Ethical Perspective*. Dordrecht: Springer.
- Clark, A. (1997). *Being There: Putting Brain, Body, and World Together Again*. Cambridge, MA: The MIT Press.
- Clarke, M. A. & J. QuinnWilliams. (forthcoming). *Changing Schools: Identity, Transformation,*

- and *Educational Innovation*. Ann Arbor, MI: University of Michigan Press.
- Cobb, P., J. Confrey, A. diSessa, R. Lehrer & L. Schauble. (2003). Design experiments in educational research. *Educational Researcher*, 32(1): 9–13.
- Cochran-Smith, M., F. Ell, L. Ludlow, L. Grudnoff & G. Aitken. (2014). The challenge and promise of complexity theory for teacher education research. *Teachers College Record*, 116(5): 1–38.
- Cooper, D. (1999). *Linguistic Attractors: The Cognitive Dynamics of Language Acquisition and Change*. Amsterdam: John Benjamins.
- Cowley, S. J. (Ed.). (2011). *Distributed Language*. Amsterdam: John Benjamins.
- Cumming, G. (2014). The new statistics: Why and how. *Psychological Science*, 25(1): 7–29.
- Davis, B. & D. Sumara. (2012). Fitting teacher education in/to/for an increasingly complex world. *Complicity: An International Journal of Complexity and Education*, 9(1): 30–40.
- Deacon, T. (2012). *Incomplete Nature*. New York, NY: W. W. Norton & Company.
- de Bot, K. (2008). Introduction: Second language development as a dynamic process. *Modern Language Journal*, 92: 166–178.
- de Bot, K. (2015). Rates of change: Timescales in second language development. In Z. Dörnyei, P. D. MacIntyre & A. Henry (Eds.), *Motivational Dynamics in Language Learning* (pp.29–37). Bristol, UK: Multilingual Matters.
- de Bot, K., M. Verspoor & W. Lowie. (2007). A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and Cognition*, 10(1): 7–21.
- De Costa, P. & K. Bolton. (2018). World Englishes and second language acquisition. *World Englishes*, Special Issue, 37(1).
- De Jesus, P. (2016). Autopoietic enactivism, phenomenology and the deep continuity between life and mind. *Phenomenology and the Cognitive Sciences*, 15: 265–289.
- Derrida, J. (1978). *Writing and Difference*. (Trans. Alan Bass). Chicago, IL: University of Chicago Press.
- Doll, W. E., Jr. (Ed.). (2005). *Chaos, Complexity, Curriculum and Culture: A Conversation*. New York, NY: Peter Lang.
- Dörnyei, Z. (2009). Individual differences: Interplay of learner characteristics and learning environment. *Language Learning*, 59: 230–248.
- Dörnyei, Z. (2017). Conceptualizing learner characteristics in a complex, dynamic world. In L. Ortega & Z.-H. Han (Eds.), *Complexity Theory and Second Language Development: In Celebration of Diane Larsen-Freeman* (pp.79–96). Amsterdam: John Benjamins.
- Dörnyei, Z. & E. Ushioda. (2013). *Teaching and Researching Motivation* (2<sup>nd</sup> edn.). London: Routledge.
- Dörnyei, Z., P. D. MacIntyre & A. Henry. (Eds.). (2015). *Motivational Dynamics in Language Learning*. Bristol, UK: Multilingual Matters.
- Doughty, C. J. & M. H. Long. (2003). The scope of inquiry and goals of SLA. In C. J. Doughty & M. H. Long (Eds.), *Handbook of Second Language Acquisition* (pp.3–16). Malden, MA: Blackwell.
- Douglas Fir Group (2016). A transdisciplinary framework for SLA in a multilingual world.



- Modern Language Journal*, 100–S: 19–47.
- Duff, P. (2006). Beyond generalizability: Contextualization, complexity and credibility in applied linguistics research. In M. M. Chalhoub-Deville, C. Chapelle & P. Duff (Eds.), *Inference and Generalizability in Applied Linguistics: Multiple Research Perspectives* (pp.65–95). Amsterdam: John Benjamins.
- Ellis, N. C. & D. Larsen-Freeman. (2006). Language emergence: Implications for applied linguistics — Introduction to the special issue. *Applied Linguistics*, 27(4): 558–589.
- Ellis, N. C. & D. Larsen-Freeman. (Eds.). (2009). *Language as a Complex Adaptive System*. Boston, MA: Wiley-Blackwell.
- Érdi, P. (2007). *Complexity Explained*. New York, NY: Springer.
- Eskildsen, S. (2012). L2 negation constructions at work. *Language Learning*, 62(2): 335–372.
- Evans, J. (2007). The emergence of language: A dynamical systems account. In E. Hoff & M. Shatz (Eds.), *Blackwell Handbook of Language Development* (pp.128–148). Malden, MA: Blackwell.
- Feryok, A. (2010). Language teacher cognitions: Complex adaptive systems? *System*, 38(2): 272–279.
- Freire, M. M. (2013). Complex educational design: A course design model based on complexity. *Campus-Wide Information Systems*, 30(3): 174–185.
- Gass, S. & L. Valmori. (2015). Replication in interaction and working memory research: Révész (2012) and Goo (2012). *Language Teaching*, 48(4): 545–555.
- Gershkoff-Stowe, L. & E. Thelen, E. (2004). U-shaped changes in behavior: A dynamic systems perspective. *Journal of Cognition and Development*, 5: 11–36.
- Gibbs, R. W. & L. Cameron. (2008). The social cognitive dynamics of metaphor performance. *Cognitive Systems Research*, 9(1–2): 64–75.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York, NY: Penguin Books.
- Goldberg, A. (2006). *Constructions at Work: The Nature of Generalization in Language*. Oxford, UK: Oxford University Press.
- Gregersen, T., P. MacIntyre & M. Meza. (2014). The motion of emotion: Idiodynamic case studies of learners' foreign language anxiety. *Modern Language Journal*, 98(2): 574–588.
- Gruchalla, R. S. & H. A. Sampson. (2015). Preventing peanut allergy through early consumption — ready for prime time? [Editorial]. *The New England Journal of Medicine*, 372: 875–877.
- Gruszynski-Weiss, L. & M. Baralt. (2014). Exploring learner perception and use of task-based interactional feedback in face-to-face and computer-mediated modes. *Studies in Second Language Acquisition*, 36(1): 1–37.
- Halliday, M. & A. Burns. (2006). Applied linguistics: Thematic pursuits or disciplinary moorings? *Journal of Applied Linguistics*, 3(1): 113–128.
- Han, Z.-H. (2004). *Fossilization in Adult Second Language Acquisition*. Clevedon: Multilingual Matters.

- Han, Z.-H. & E. Tarone. (Eds.). (2014). *Interlanguage. Forty Years Later*. Amsterdam: John Benjamins.
- Hayles, N. K. (1990). *Chaos Bound: Orderly Disorder in Contemporary Literature and Science*. Ithaca, NY: Cornell University Press.
- Hayles, N. K. (Ed.). (1991). *Chaos and Order: Complex Dynamics in Literature and Science*. Chicago, IL: The University of Chicago Press.
- Heisenberg, W. (1927). *Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik*. *Zeitschrift für Physik*, 43(3–4): 172–198.
- Herdina, P. (2017). Entrenchment, embeddedness, and entanglement: A dynamic complexity view. In H. J. Schmid (Ed.), *Entrenchment, Memory and Automaticity. The Psychology of Linguistic Knowledge and Language Learning* (pp.387–407). American Psychological Association and Walter de Gruyter.
- Herdina, P. & U. Jessner. (2002). *A Dynamic Model of Multilingualism*. Clevedon: Multilingual Matters.
- Herdina, P. & D. Larsen-Freeman. (In preparation). *Complexity Theory and Language*.
- Hiver, P. (2015). Attractor states. In Z. Dörnyei, P. D. MacIntyre & A. Henry (Eds.), *Motivational Dynamics in Language Learning* (pp.20–28). Bristol, UK: Multilingual Matters.
- Hiver, P. & A. H. Al-Hoorie. (2016). Putting complexity into practice. A dynamic ensemble for second language research. *Modern Language Journal*, 100(4): 741–756.
- Hogan-Brun, G. & J. Hogan. (2013). Language planning and complexity: A conversation. *Current Issues in Language Planning*, 14(3–4): 490–496.
- Holland, J. (1998). *Emergence: From Chaos to Complexity*. Reading, MA: Addison Wesley.
- Hopper, P. (1998). Emergent grammar. In M. Tomasello (Ed.), *The New Psychology of Language* (pp.155–175). Mahwah, NJ: Lawrence Erlbaum Associates.
- Horn, J. (2008). Human research and complexity theory. *Educational Philosophy and Theory*, 40(1): 130–143.
- Hornberger, N. (2013). Negotiating methodological rich points in the ethnography of language policy. *International Journal of the Sociology of Language*, 219: 101–122.
- Hult, F. M. (2010a). Analysis of language policy discourses across the scales of space and time. *International Journal of the Sociology of Language*, 202: 7–24.
- Hult, F. M. (2010b). The complexity turn in educational linguistics. *Language, Culture and Curriculum*, 23(3): 173–177.
- Human, O. (2015). Complexity: E-Special introduction. *Theory, Culture & Society* (E-Issue), 3: 1–20.
- Human, O. & P. Cilliers. (2013). Towards an economy of complexity: Derrida, Morin and Bataille. *Theory, Culture & Society*, 30(5): 24–44.
- Ioannidis, J. P. A. (2005). Why most published research findings are false. *PLoS Medicine*, 2(8): e124.
- Jessner, U. (2003). A dynamic approach to language attrition in multilingual systems. In V. Cook (Ed.), *Effects of the Second Language on the First* (pp.234–246). Clevedon:

## Multilingual Matters.

- Jessner, U., E. Allgauer-Hackl & B. Hofer. (2016). Emerging multilingual awareness in educational contexts: From theory to practice. *The Canadian Modern Language Review/La Revue canadienne des langues vivantes*, 72(2): 157–182.
- Joaquin, A. D. L. & J. H. Schumann. (Eds.). (2013). *Exploring the Interactional Instinct*. New York, NY: Oxford University Press.
- Johnson, M. (1987). *The Body and the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago, IL: University of Chicago Press.
- Juarrero, A. (2000). Dynamics in action: Intentional behavior as a complex system. *Emergence*, 2(2): 24–57.
- Juarrero, A. (2009). Top-down causation and autonomy in complex systems. In N. Murphy, G. F. R. Ellis & T. O'Connor (Eds.), *Downward Causation and the Neurobiology of Free Will* (pp.83–102). Berlin: Springer.
- Ke, J. & J. H. Holland. (2006). Language origin from an emergentist perspective. *Applied Linguistics*, 27(4): 691–716.
- Keller, R. (1985). Towards a theory of linguistic change. In T. Ballmer (Ed.), *Linguistic Dynamics: Discourses, Procedures and Evolution* (pp.212–237). Berlin: Mouton de Gruyter.
- Kelso, J. A. S. & D. Engstrom. (2006). *The Complementary Nature*. Cambridge, MA: The MIT Press.
- Kelso, J. A. S. & E. Tognoli. (2009). Toward a complementary neuroscience: Metastable coordination dynamics of the brain. In N. Murphy, G. F. R. Ellis & T. O'Connor (Eds.), *Downward Causation and the Neurobiology of Free Will* (pp.103–124). Berlin: Springer.
- Kirby, S. & J. R. Hurford. (2002). The emergence of linguistic structure: An overview of the iterated learning model. In A. Cangelosi & D. Parisi (Eds.), *Simulating the Evolution of Language* (pp.121–148). London: Springer.
- Köpke, B. (2017). A neurolinguistics approach to complexity: Bi/multilingual attrition and aphasia as destabilization. In L. Ortega & Z.-H. Han (Eds.), *Complexity Theory and Second Language Development: In Celebration of Diane Larsen-Freeman* (pp.191–208). Amsterdam: John Benjamins.
- Kozaki, Y. & S. J. Ross. (2011). Contextual dynamics in foreign language learning motivation. *Language Learning*, 61(4): 1328–1354.
- Kramsch, C. (2009). Third culture and language education. In V. Cook & L. Wei (Eds.), *Contemporary Applied Linguistics* (pp.233–254). London: Continuum.
- Kramsch, C. (2012). Why is everybody so excited about complexity theory in applied linguistics? *Mélanges CRAPEL* n° 33 (numéro spécial : Didactique des langues et complexité: En hommage à Richard Duda).
- Kramsch, C. & A. Whiteside. (2008). Language ecology in multilingual settings: Towards a theory of symbolic competence. *Applied Linguistics*, 29(4): 645–671.
- Kramsch, C. & A. Whiteside. (2016). Annotated bibliography on symbolic competence. A presentation at the University of Arizona, February 26.

- Kretzschmar, W. (2009). *The Linguistics of Speech*. Cambridge, UK: Cambridge University Press.
- Kretzschmar, W. (2015). *Language and Complex Systems*. Cambridge, UK: Cambridge University Press.
- Langacker, R. (1988). A usage-based model. In B. Rutzka-Ostyn (Ed.), *Topics in Cognitive Linguistics* (pp.127–161). Amsterdam: John Benjamins.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18: 141–165.
- Larsen-Freeman, D. (2003). *Teaching Language: From Grammar to Grammaring*. Boston, MA: Heinle/Cengage.
- Larsen-Freeman, D. (2006). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, 27: 590–619.
- Larsen-Freeman, D. (2007). Reflecting on the cognitive-social debate in second language acquisition. *Modern Language Journal*, 91 (focus volume): 773–787.
- Larsen-Freeman, D. (2010a). The dynamic co-adaptation of cognitive and social views: A chaos/complexity theory perspective. In R. Batstone (Ed.), *Sociocognitive Perspectives on Second Language Use/Learning* (pp.40–53). Oxford, UK: Oxford University Press.
- Larsen-Freeman, D. (2010b). Having and doing: Learning from a complexity theory perspective. In P. Seedhouse, S. Walsh & C. Jenks (Eds.), *Conceptualising Learning in Applied Linguistics* (pp.52–68). Houndmills: Palgrave Macmillan.
- Larsen-Freeman, D. (2011). A complexity theory approach to second language acquisition/development. In D. Atkinson (Ed.), *Alternative Approaches to Second Language Acquisition* (pp.48–72). Oxford, UK: Oxford University Press.
- Larsen-Freeman, D. (2012a). Complex, dynamic systems: A new transdisciplinary theme for applied linguistics? *Language Teaching*, 45(2): 202–214.
- Larsen-Freeman, D. (2012b). On the roles of repetition in language teaching and learning. *Applied Linguistics Review*, 3(2): 195–210.
- Larsen-Freeman, D. (2013). Transfer of learning transformed. *Language Learning*, 63(Suppl. 1): 107–129.
- Larsen-Freeman, D. (2014). Another step to be taken — Rethinking the end point of the interlanguage continuum. In Z.-H. Han & E. Tarone (Eds.), *Interlanguage. Forty Years Later* (pp.203–220). Amsterdam: John Benjamins.
- Larsen-Freeman, D. (2015a). Saying what we mean: Making a case for “language acquisition” to become “language development”. A plenary address delivered at the 16<sup>th</sup> AILA World Congress, Beijing, August 2011. *Language Teaching*, 48(4): 491–505.
- Larsen-Freeman, D. (2015b). Complexity theory. In B. VanPatten & J. Williams (Eds.), *Theories in Second Language Acquisition: An Introduction* (2<sup>nd</sup> edn., pp.227–244). New York, NY: Routledge.
- Larsen-Freeman, D. (2016a). A successful union: Linking ELF with CAS. In L. Lopriore & E. Grazi (Eds.), *Intercultural Communication: New Perspectives from ELF* (pp.15–29).

Rome: Roma Tres Press.

- Larsen-Freeman, D. (2016b). The psychology of language learning and “the science of the individual”. A paper presented at the Individual in Context. Psychology of Language Learning 2 conference. University of Jyväskylä, Finland.
- Larsen-Freeman, D. (2017a). Shifting metaphors: From computer input to ecological affordances to adaptation. In *Proceedings from the IATEFL 50<sup>th</sup> Anniversary Conference*, Birmingham.
- Larsen-Freeman, D. (2017b). The fractal shape of language. Paper presented at ALLA, Rio de Janeiro.
- Larsen-Freeman, D. (2018). Resonances: Second language development and language planning and policy from a complexity theory perspective. In F. Hult, T. Kupisch & M. Siiner (Eds.), *Bridging Language Acquisition and Language Policy* (pp.203–217). Dordrecht: Springer.
- Larsen-Freeman, D. & D. Freeman. (2008). Language moves: The place of “foreign” language — In classroom teaching and learning. *Review of Research in Education*, 32(1): 147–186. Washington, DC: American Educational Research Association.
- Larsen-Freeman, D. & L. Cameron. (2008a). *Complex Systems and Applied Linguistics*. Oxford, UK: Oxford University Press.
- Larsen-Freeman, D. & L. Cameron. (2008b). Research methodology on language development from a complex systems perspective. *Modern Language Journal*, 92: 200–213.
- Larsen-Freeman, D. & D. J. Tedick. (2016). Teaching world languages: Thinking differently. In D. Gitomer & C. Bell (Eds.), *Handbook of Research on Teaching* (5<sup>th</sup> edn., pp.1335–1388). Washington, DC: American Educational Research Association.
- Lee, N., L. Mikesell, A. D. L. Joaquin, A. W. Mates & J. H. Schumann. (2009). *The Interactional Instinct: The Evolution and Acquisition of Language*. Oxford, UK: Oxford University Press.
- Lemke, J. L. & N. H. Sabelli. (2008). Complex systems and educational change: Towards a new research agenda. *Educational Philosophy and Theory*, 40(1): 118–129.
- Lerner, R. M. & J. B. Benson. (2013). Introduction: Embodiment and epigenesis: A view of the issues. *Advances in Child Development and Behavior*, 44: 1–19.
- Lewontin, R. (1998). The evolution of cognition: Questions we will never answer. In D. Scarborough & S. Sternberg (Eds.), *An Invitation to Cognitive Science, Volume 4: Methods, Models and Conceptual Issues* (pp.107–132). Cambridge, MA: The MIT Press.
- Lewontin, R. (2001). *The Triple Helix: Gene, Organism, and Environment*. Cambridge, MA: Harvard University Press.
- Long, M. (2003). Stabilization and fossilization in interlanguage development. In C. J. Doughty & M. H. Long (Eds.), *Handbook of Second Language Acquisition* (pp.487–536). Malden, MA: Blackwell.
- Loritz, D. (1999). *How the Brain Evolved Language*. New York, NY: Oxford University Press.
- Lowie, W. & M. Verspoor. (2015). Variability and variation in second language acquisition

- orders. A dynamic reevaluation. *Language Learning*, 65(1): 63–88.
- MacIntyre, P. D. (2012). The idiodynamic method: A closer look at the dynamics of communication traits. *Communication Research Reports*, 29(4): 361–367.
- MacIntyre, P. D. & J. J. Legatto. (2011). A dynamic system approach to willingness to communicate: Developing an idiodynamic method to capture rapidly changing affect. *Applied Linguistics*, 32(2): 149–171.
- MacIntyre, P. D., E. Mackay, J. Ross & E. Abel. (2017). The emerging need for methods appropriate to study dynamic systems: Individual differences in motivational dynamics. In L. Ortega & Z.-H. Han (Eds.), *Complexity Theory and Second Language Development: In Celebration of Diane Larsen-Freeman* (pp.97–122). Amsterdam: John Benjamins.
- Macqueen, S. (2012). *The Emergence of Patterns in Second Language Writing: A Sociocognitive Exploration of Lexical Trails*. Bern: Peter Lang.
- MacWhinney, B. (Ed.). (1999). *The Emergence of Language*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Mahmoodzadeh, M. & C. Gkonou. (2015). A complex dynamic systems perspective on foreign language anxiety. *Konin Language Studies*, 3(1): 89–108.
- Menezes, V. (Ed.). (2013). *Complexity Studies in Applied Linguistics. Special issue of Revista Brasileira de Linguística Aplicada*, 13(2).
- Mercer, S. (2011). Understanding learner agency as a complex dynamic system. *System*, 39(4): 427–436.
- Mercer, S. (2012). The complexity of learner agency. *Apples — Journal of Applied Language Studies*, 6(2): 41–59.
- Mercer, S. (2013). Towards a complexity-informed pedagogy for language learning. *Revista Brasileira de Linguística Aplicada*, 13(2): 375–309.
- Mercer, S. (2016). Complexity, language learning and the language classroom. In G. Hall (Ed.), *The Routledge Handbook of English Language Teaching* (pp.473–485). Abingdon: Routledge.
- Merleau-Ponty, M. (1968). *The Visible and the Invisible* (Ed. C. Lefort and Trans. A. Lingis). Evanston, IL: Northwestern University Press.
- Miller, J. H. & S. E. Page. (2007). *Complex Adaptive Systems: An Introduction to Computational Models of Social Life*. Princeton, NJ: Princeton University Press.
- Mitchell, S. D. (2003). *Biological Complexity and Integrative Pluralism*. Cambridge, UK: Cambridge University Press.
- Molenaar, P. C. M. & J. R. Nesselroade. (2015). Systems methods for developmental research. In W. F. Overton & P. C. M. Molenaar (Eds.), *Handbook of Child Psychology and Developmental Science, Volume 1, Theory and Method* (7<sup>th</sup> edn., pp.652–682). Hoboken, NJ: Wiley.
- Morin, E. (2005). *Introducao ao pensamento complexo (Introduction to Complex Thinking)*. Lisboa: Editora Sulina.
- Morin, E. (2007). *On Complexity*. Cresskill, NJ: Hampton Press.

- Moss, P. & E. Haertel. (2016). Engaging methodological pluralism. In D. Gitomer & C. Bell (Eds.), *Handbook of Research on Teaching* (5<sup>th</sup> edn., pp.127–248). Washington, DC: American Educational Research Association.
- Mufwene, S. S. (2008). *Language Evolution: Contact, Competition and Change*. London: Continuum.
- Mufwene, S. S., C. Coupe, C. & F. Pellegrino. (2017). Complexity in language: A multifaceted phenomenon. In S. S. Mufwene, C. Coupe & F. Pellegrino (Eds.), *Complexity in Language: Developmental and Evolutionary Perspectives* (pp.1–29). Cambridge, UK: Cambridge University Press.
- Nelson, R. (2013). Expanding the role of connectionism in SLA theory. *Language Learning*, 63(1): 1–33.
- Ninio, A. (2011). *Syntactic Development, Its Input and Output*. Oxford, UK: Oxford University Press.
- Open Science Collaborative. (2015). Estimating the reproducibility of psychological science. *Science*, 349(6251): 943–952.
- Opfer, V. D. & D. Pedder. (2011). Conceptualizing teacher professional learning. *Review of Educational Research*, 81(3): 376–407.
- Opitz, C. (2011). First language attrition and second language acquisition in a second language environment. Unpublished doctoral dissertation, Trinity College Dublin.
- Opitz, C. (2017). Language destabilization and (re-)learning from a Complexity Theory perspective. Timescales and patterns across four studies. In L. Ortega & Z.-H. Han (Eds.), *Complexity Theory and Second Language Development: In Celebration of Diane Larsen-Freeman* (pp.163–189). Amsterdam: John Benjamins.
- Ortega, L. (2009). *Understanding Second Language Acquisition*. London: Hodder.
- Ortega, L. (2014). Trying out theories on interlanguage. In Z.-H. Han & E. Tarone (Eds.), *Interlanguage. Forty Years Later* (pp.173–202). Amsterdam: John Benjamins.
- Osberg, D. (2008). The logic of emergence: An alternative conceptual space for theorizing critical education. *Journal of the Canadian Association for Curriculum Studies*, 6(1): 133–161.
- Osberg, D. & G. Biesta. (Eds.). (2010). *Complexity Theory and the Politics of Education*. Rotterdam: Sense Publishers.
- Overton, W. F. (2006). Developmental psychology: Philosophy, concepts, and methodology. In R. M. Lerner (Ed.), *Handbook of Child Psychology, Volume 1: Theoretical Models of Human Development* (pp.18–88). New York, NY: Wiley.
- Overton, W. F. (2007). A coherent metatheory for dynamic systems: Relational organicism-contextualism. *Human Development*, 50: 154–159.
- Overton, W. F. (2013). A new paradigm for developmental science: Relationism and relational-developmental systems. *Applied Developmental Science*, 17(2): 94–107.
- Overton, W. F. (2014). Relational developmental systems and developmental science. A focus on methodology. In P. C. M. Molenaar, R. M. Lerner & K. Newell (Eds.), *Handbook of Developmental Systems: Theory and Methodology* (pp.19–65). New York,

NY: The Guilford Press.

- Overton, W. F. (2015). Taking conceptual analyses seriously. *Research in Human Development*, 12(3–4): 163–171.
- Popper, K. (1982). *The Open Universe: An Argument for Indeterminism*. New York, NY: Routledge.
- Preiser, R. (Ed.). (2016). *Paul Cillier's Critical Complexity*. Berlin: Walter de Gruyter.
- Price, B. (1997). The myth of postmodern science. In R. A. Eve, S. Horsfall & M. E. Lee (Eds.), *Chaos, Complexity, and Sociology; Myths, Model, and Theories* (pp.3–14). Thousand Oaks, CA: Sage.
- Ricca, B. (2012). Beyond teaching methods: A complexity approach. *Complicity: An International Journal of Complexity and Education*, 9(2): 31–51.
- Rose, L. T., P. Rouhani & K. W. Fischer. (2013). The science of the individual. *Mind, Brain, and Education*, 7(3): 152–158.
- Schmid, M. S., B. Kopke & K. de Bot. (2013). Language attrition as complex, non-linear development. *International Journal of Bilingualism*, 17(6): 675–683.
- Schmidt, R. (1983). Interaction, acculturation, and the acquisition of communicative competence. In N. Wolfson & E. Judd (Eds.), *Sociolinguistics and Language Acquisition* (pp.137–174). Rowley, MA: Newbury House.
- Schneider, E. W. (1997). Chaos theory as a model for dialect variability and change? In A. R. Thomas (Ed.), *Issues and Methods in Dialectology* (pp.22–36). Bangor: Department of Linguistics, University of Wales.
- Schoenemann, P. T. (2009). Evolution of brain and language. In N. C. Ellis & D. Larsen-Freeman (Eds.), *Language as a complex adaptive system*. *Language Learning*, Special issue: 162–186.
- Schoenemann, P. T. (2017). A complex-adaptive-systems approach to the evolution of language and the brain. In S. Mufwene, C. Coupe & F. Pellegrino (Eds.), *Complexity in Language: Developmental and Evolutionary Perspectives* (pp.67–100). Cambridge, UK: Cambridge University Press.
- Schulze, M. & K. Scholz. (2016). CALL theory: Complex adaptive systems. In C. Caws & M.-J. Hamel (Eds.), *Learner-computer Interactions: New Insights on CALL Theories and Applications* (pp.65–87). Amsterdam: John Benjamins.
- Schumann, J. H. (2015). Foreword. In Z. Dornyei, P. D. MacIntyre & A. Henry (Eds.), *Motivational Dynamics in Language Learning* (pp.xv–xix). Bristol, UK: Multilingual Matters.
- Schumann, J. H., S. E. Crowell, N. E. Jones, N. Lee, S. A. Schuchert & L. A. Woods. (Eds.). (2004). *The Neurobiology of Language. Perspectives from Second Language Acquisition*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Sealey, A. & B. Carter. (2004). *Applied Linguistics as Social Science*. London: Continuum.
- Seargeant, P. (2010). The historical ontology of language. *Language Sciences*, 32(1): 1–13.
- Seedhouse, P. (2010). Locusts, snowflakes, and recasts: Complexity theory and spoken interaction. *Classroom Discourse*, 1: 4–24.



- Spencer, J. P., S. Perone & A. T. Buss. (2011). Twenty years and going strong: A dynamic systems revolution in motor and cognitive development. *Child Development Perspectives*, 5(4): 260–266.
- Spivey, M. (2007). *The Continuity of Mind*. Oxford, UK: Oxford University Press.
- Steels, L. (2011). Modeling the cultural evolution of language. *Physics of Life Reviews*, 8: 339–356.
- Steffensen, S. V. (2011). Beyond mind: An extended psychology of languaging. In S. J. Cowley (Ed.), *Distributed Language* (pp.185–209). Amsterdam: John Benjamins.
- Strogatz, S. (2003). *Sync. How Order Emerges from Chaos in the Universe, Nature and Daily Life*. New York, NY: Hyperion.
- Svalberg, A. M.-L. (2012). Language awareness in language learning and teaching: A research agenda. *Language Teaching*, 45(3): 376–388.
- Tasker (2013). The dynamics of Chinese learning journeys: A longitudinal study of adult learners of Mandarin in Australia. Unpublished doctoral dissertation, University of New England.
- Taylor, M. C. (2001). *The Moment of Complexity: Emerging Network Culture*. Chicago, IL: University of Chicago Press.
- Thelen, E. & L. B. Smith. (1994). *A Dynamic Systems Approach to the Development of Cognition and Action*. Cambridge, MA: The MIT Press.
- Thelen, E. & L. B. Smith. (2007). Dynamic systems theories. Theoretical models of human development. In E. Thelen & L. B. Smith (Eds.), *Handbook of Child Psychology 1* (pp.258–312). Hoboken, NJ: Wiley.
- Thibault, P. J. (2011). First order languaging dynamics and second-order language: The distributed language view. *Ecological Psychology*, 23(3): 210–245.
- Thompson, E. (2007). *Mind in Life*. Cambridge, MA: Harvard University Press.
- Thompson, P. (2012). Both dialogic and dialectic. Translation at the crossroads. *Learning, Culture, and Social Interaction*, 1: 90–101.
- Thorne, S. L., I. Fischer & X. Lu. (2012). The semiotic ecology and linguistic complexity of an online game world. *ReCALL*, null: 279–301.
- Todeva, E. (2009). Multilingualism as a kaleidoscopic experience: The mini-universes within. In E. Todeva & J. Cenoz (Eds.), *The Multiple Realities of Multilingualism* (pp.53–74). Berlin: Mouton de Gruyter.
- Toit, G. D., G. Roberts, P. H. Sayre, H. T. Bahnson, S. Radulovic, A. F. Santos, et al. (2015). Randomized trial of peanut consumption in infants at risk for peanut allergy. *The New England Journal of Medicine*, 372: 803–813.
- Tomasello, M. (2003). *Constructing a Language: A Usage-based Theory of Language Acquisition*. Cambridge, MA: Harvard University Press.
- Urrestarazu, H. (2011). Autopoietic systems. A generalized explanatory approach. *Constructivist Foundations*, Vienna. <[www.univie.ac.at/constructivism/journal/6/3/307.urrestazu](http://www.univie.ac.at/constructivism/journal/6/3/307.urrestazu)>
- Urry, J. (2005). The complexity turn. *Theory, Culture & Society*, 22(5): 1–14.

- Vallacher, R. R., P. van Geert & A. Nowak. (2015). The intrinsic dynamics of psychological process. *Current Directions in Psychological Science*, 24(1): 58–64.
- van Geert, P. (2003). Dynamic systems approaches and modeling of developmental processes. In J. Valsiner & K. J. Connolly (Eds.), *Handbook of Developmental Psychology* (pp.640–672). London: Sage.
- van Geert, P. (2008). The dynamic systems approach in the study of L1 and L2 acquisition: An introduction. *Modern Language Journal*, 92(2): 179–199.
- van Geert, P. (2011). The contribution of complex dynamic systems to development. *Child Development Perspectives*, 5(4): 273–278.
- van Geert, P. & K. W. Fischer. (2009). Dynamic systems and the quest for individual-based models of change and development. In J. P. Spencer, M. S. C. Thomas & J. L. McClelland (Eds.), *Toward a Unified Theory of Development* (pp.313–336). Oxford, UK: Oxford University Press.
- van Geert, P. & H. Steenbeek, H. (2014). The good, the bad, and the ugly? The dynamic interplay between educational practice, policy, and research. *Complicity: An International Journal of Complexity and Education*, 11(2): 22–39.
- van Lier, L. (2000). From input to affordance: Social-interactive learning from an ecological perspective. In J. Lantolf (Ed.), *Sociocultural Theory and Second Language Learning* (pp.245–259). Oxford, UK: Oxford University Press.
- van Lier, L. (2006). *The Ecology and Semiotics of Language Learning: A Sociocultural Perspective*. Dordrecht: Kluwer.
- Varela, F. (1995). The emergent self. In J. Brockman (Ed.), *The Third Culture: Beyond the Scientific Revolution* (pp.209–222). New York, NY: Simon & Schuster.
- Varela, F. (1999). *Ethical Know-how: Action, Wisdom, and Cognition*. Stanford University Press.
- Verspoor, M. (2015). Initial conditions. In Z. Dörnyei, P. D. MacIntyre & A. Henry (Eds.), *Motivational Dynamics in Language Learning* (pp.38–46). Bristol, UK: Multilingual Matters.
- Verspoor, M., W. Lowie & M. van Dijk. (2008). Variability in L2 development from a dynamic systems perspective. *Modern Language Journal*, 92(2): 214–231.
- Verspoor, M., K. de Bot & W. Lowie. (Eds.). (2011). *A Dynamic Approach to Second Language Development: Methods and Techniques*. Amsterdam: John Benjamins.
- Verspoor, M., M. S. Schmid & X. Xu. (2012). A dynamic usage based perspective on L2 writing. *Journal of Second Language Writing*, 21(3): 239–263.
- Walby, S. (2007). Complexity theory, systems theory and multiple intersecting social inequalities. *Philosophy of the Social Sciences*, 37(4): 449–470.
- Wallis, S. E. (2010). Toward a science of metatheory. *Integral Review*, 6(3): 73–120.
- Waring, H. Z. (2012). "Any questions?": Investigating the nature of understanding-checks in the language classroom. *TESOL Quarterly*, 46(4): 722–755.
- Weber, K., M. H. Christiansen, K. M. Petersson, P. Indefrey & P. Hagoort. (2016). fMRI syntactic and lexical repetition effects reveal the initial stages of learning a new

- language. *The Journal of Neuroscience*, 36(26): 6872–6880.
- Wegerif, R. B. (2008). Dialogic or dialectic? The significance of ontological assumptions in research on educational dialogue. *British Educational Research Journal*, 34(3): 347–361.
- Wertsch, J. V. (1991). *Voices of the Mind*. New York, NY: Harvester.
- Witherington, D. C. (2007). The dynamic systems approach as metatheory for developmental psychology. *Human Development*, 50: 127–153.
- Witherington, D. C. (2011). Taking emergence seriously: The centrality of circular causality for dynamic systems approaches to development. *Human Development*, 54: 66–92.
- Ybema, S., D. Yanow, H. Wels & F. Kamsteeg. (2010). Ethnography. In A. Mills, G. Durepos & E. Wiebe (Eds.), *Encyclopedia of Case Study Research* (pp.348–352). Thousand Oaks, CA: Sage.
- Yin, R. K. (2014). *Case Study Research. Design and Methods* (5<sup>th</sup> edn.). Thousand Oaks, CA: Sage.



# Chapter 19

## Conclusion

As I draw this book to a close, let me once again state my gratitude for the opportunity to re-read and reflect on some of the work I have published over the years. It has been interesting to look back and to try to make sense of all I have learned. I also want to thank the readers of this book for taking the time to accompany me vicariously on my odyssey.

Of course, that is the point, isn't it? This retrospective view is my journey — a personal interpretation of the evolution of the SLD field. Not everyone has experienced it the way that I have or that I recall that I have (which may not be the same). And, of course, a retrospective view always seems more coherent than a contemporaneous one. However, to recapitulate as a way of concluding this book, my experience has been that the study of second language development was born of the cognitive revolution in the late 1960s and early 1970s. I have seen it really take off with the adoption of such theoretical constructs as interlanguage. In the 1980s, the need to explain not only linguistic competence, but also communicative competence, became apparent. Still later, especially toward the end of the 1990s, I have witnessed many in the field initially resist, and then some ultimately accept or even champion, the need to recognize SLD as a highly social process. Most recently, I have become aware of a further expansion in its taking on more political tones, issues of power which were likely always present, but which have raised my consciousness and which have become more prominent in the SLA literature. I am thinking of issues such as the question of why the endpoint of the interlanguage continuum should be defined in terms of native speaker competence (which can contribute to a deficit view of learners), or how ideologies influence policies concerning which languages are taught (e.g. often not indigenous languages), or the realization that learners have their own agendas for learning, and they may not always be the one that ministries of education or school districts adopt.

Another ideology that is shifting these days is one where monolingualism is seen as the natural state to one where multilingualism is. Accompanying this shift is the realization that translanguaging or communicating using multiple languages from one's communicative repertoire is very natural, and may

facilitate acquisition as well. Also, there is increased recognition of the diversity that mobile populations bring to communities and to language classrooms and to the role of emotion and non-verbal behavior in SLD. These developments, in concert with acknowledgement of the power of technology to enhance acquisition, forecasts continued expansion of the scope of our inquiry into second language development in the future, I expect. (See the Douglas Fir Group article, 2016, for an elaboration on these themes.)

Again, I should underscore the point that not all researchers would agree with this portrayal of the progression of the field. For instance, I have already mentioned that from the inception of the present-day study of SLA, some researchers were encouraging us to look at SLA as primarily a social process. Still others, have committed to a theory at one of what I have depicted as evolutionary stages. Thus, there are researchers who have made the study of UG and SLA their central focus, others have continued the study of input and interaction for what it can tell us about SLA, and still others have adopted a critical stance. It also has occurred to me that my perception of the ever-expanding field of SLD may also be due to the academic homes in which I have been privileged to reside. For instance, having retired from the University of Michigan, I am now teaching at the University of Pennsylvania, in a division known for its sociopolitical views towards language learning and teaching. No doubt these views have been influential in the development of my own thinking.

Nonetheless, it should be clear to readers by now that what I have perceived as an expanding scope of the field has created in me the desire for a more comprehensive, dynamic, multifarious, yet holistic, account of SLD. Moreover, in an article that I have not included in this collection, I have proposed that seeing language and its learning as complex is liberating for the way that we view learners, too (Larsen-Freeman, 2012).

Of course, CT has proven to be more than a container. It has given me a new way to think. Indeed, Deborah Osberg has contrasted what she called the logic of freedom, informed by CT, with a more deterministic philosophy. Deterministic processes follow immutable laws. Since outcomes are fully determined, there is no room for anything else to happen. As Osberg says, in such processes freedom simply does not exist. However, in a logic associated with complex dynamic or emergent processes, what Osberg terms “a logic of freedom”, the system has the freedom to develop along alternative trajectories. As Osberg (2007) notes, “since emergent processes are not fully determined, they contain within

themselves the possibility of freedom” (p.10).

I have found the theory that Osberg writes about, i.e. Complexity Theory, inspiring. Learners (and teachers and researchers alike) have been given a certain freedom, a freedom from viewing language acquisition as the process of acquiring a closed system of linguistic structures. Instead, language development is a creative act. There is no fixed code and no endpoint to learning. To the extent that they wish to and to best of their ability, learners continually use their language resources, however minimal, to communicate meaningfully and appropriately. As they do so, their language resources change. The change does not take place through conditioning or through acquiring rules. It takes place when learners engage and use the language in the linguistic world in which they are enmeshed. Constructions which are used with some frequency and which are noticed and remembered by the learner form the basis of their language resources. These achieve a certain level of stability and generalizability, while still remaining open to change as learners adapt to an ever-changing environment. In reconceptualizing language as an open, complex, dynamic system, the creativity of all language users, including language learners, is respected.

Having said this, I have been immersed in the field long enough to learn to say “never say never”, i.e. to rule out alternative approaches to learning a language. Therefore, I should note that I have witnessed many of my students who approach the learning of language on their own terms, which might include rote memorization or studying and applying rules. Nevertheless, it is the challenge of curious researchers, like me, to keep searching for new insights. In the same spirit, we language educators will likely never come up with a perfect language teaching methodology, but it is incumbent upon us to try to discover one.

In keeping with this thought, I often end my talks on Complexity Theory with the following quote from like-minded theorists, one that I have found inspirational: “Knowing how to negotiate our way through a world that is not fixed and pregiven but that is continually shaped by the types of actions in which we engage” (Varela, Thompson, & Rosch, 1991: 144) is a challenge of being human.

## **References**

Douglas Fir Group. (2016). A transdisciplinary framework for SLA in a multilingual world.

*The Modern Language Journal*, 100(S1): 19–47.

Larsen-Freeman, D. (2012). The emancipation of the language learner. *Studies in Second Language Learning and Teaching*, 2(3): 297–309.

Osberg, D. (2007). Emergence: A complexity-based critical logic for education? Paper presented at the Complex Criticality in Educational Research Colloquium of the American Educational Research Association, Chicago, April.

Varela, F., E. Thompson & E. Rosch. (1991). *The embodied mind: Cognitive science and human experience*. Cambridge, MA: The MIT Press.



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