

Second Language Acquisition: Reconciling Theories

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ABSTRACT

This article argues that previous attempts to explain SLA should not be disregarded. Instead, when they are put together, they provide a broader and deeper view of the acquisition process. There is evidence to support the claim that second language acquisition (SLA) is a complex adaptive system due to its inherent ability to adapt to different conditions present in both internal and external environments. Based on this understanding, widely discussed second language theories, including behaviorism, will be treated as explanations of parts of a whole, since each captures a different aspect of SLA. In order to justify this assumption, excerpts from some English language learning histories are provided to exemplify how learners describe their learning processes. The final claim is that SLA should be seen as a chaotic/complex system.

Keywords: Second Language Acquisition; Complex Systems; Chaos; Language Learning Histories

1. Introduction

Larsen-Freeman and Long [1] state that “at least forty ‘theories’ of SLA have been proposed” (p. 227) and it is my contention that none of these attempts to explain SLA present a thorough explanation for the phenomenon. Like any other type of learning, language learning is not a linear process, and therefore cannot be deemed as predictable as many models of SLA have hypothesized it to be. Countless theories have been developed to explain SLA, but most such theories focus merely on the acquisition of syntactic structures and ignore other important aspects.

In the next section, I present a brief review of the main SLA theories and then move to the current tendency to see SLA as an emergent phenomenon.

2. Second Language Acquisition Theories

Although there is a huge number of SLA theories and hypotheses, I will briefly summarize only eight of them: behaviorism, acculturation, universal grammar hypothesis, comprehension hypothesis, interaction hypothesis, output hypothesis, sociocultural theory and connectionism. I consider that those are the ones which have caused more impact in the field.

2.1. Behaviorism

Behaviorism gave birth to a stimulus-response (S-R) theory which understands language as a set of structures and acquisition as a matter of habit formation. Ignoring any internal mechanisms, it takes into account the linguistic environment and the stimuli it produces. Learning is an observable behavior which is automatically acquired by means of stimulus and response in the form of mechanical repetition. Thus to acquire a language is to acquire automatic linguistic habits. According to Johnson [2], “Behaviorism undermined the role of mental processes and viewed learning as the ability to inductively discover patterns of rule-governed behavior from the examples provided to the learner by his or her environment (p. 18)”. Larsen-Freeman and Long [1] consider that S-R models offer “little promises as explanations of SLA, except for perhaps pronunciation and the rote-memorization of formulae (p. 266)”.

This view of language learning gave birth to research on contrastive analysis, especially error analysis having as the main focus the interference of first language on the target language. It also gave birth to interlanguage studies, as the simple comparison between first and second language did not explain neither describe the language produced by SL learners. Interlanguage studies are pre-

sent in other SLA perspectives as the concern of the area has been mainly on the acquisition of grammatical morphemes or specific language structures.

2.2. Acculturation

Another environmental-oriented theory is proposed by Schumann [3]. In his famous longitudinal investigation of some syntactic aspects with six learners (2 children, 2 adolescents, 2 adults), Schumann [3] used questionnaires, observed spontaneous conversation during ten months, and applied a quantitative treatment to the data. He found out that “the subject who acquired the least amount of English was the one who was the most socially and psychologically distant from the TL group” (p. 34).

In his view, SLA is the result of acculturation which he defines as “the social and psychological integration of the learner with the target language (TL) group” (p. 29). The acculturation model argues that learners will be successful in SLA if there are fewer social and psychological distances between them and the speakers of the second language.

2.3. Universal Grammar Hypothesis

As a counterpoint to the environmental perspective, Chomsky’s followers try to understand SLA in the light of his universal grammar (UG) theory, a human innate endowment. Chomsky [4] is interested in the nature of language and sees language as a mirror of the mind. Although he is not concerned with SLA, his work has been influencing studies in our area. According to his theory, every human being is biologically endowed with a language faculty, the language acquisition device, which is responsible for the initial state of language development. The UG theory considers that the input from the environment is insufficient to account for language acquisition. In the same perspective, White [5] says that “if it turns out that the L2 learner acquires abstract properties that could not have been induced from the input, this is strongly indicative that principles of UG constrain interlanguage grammars, parallel to the situation of L1 acquisition” (p. 22). As Mitchel and Myles [6] remind us, “The universal Grammar approach is only interested in the learner as a processor of a mind that contains language” (p. 94) and not as a social being.

The research supported by UG theory works mainly with experiments in the form of grammaticality and acceptability judgments.

2.4. Comprehension Hypothesis

Influenced by Chomsky’s assumptions on language as an innate faculty, Krashen [7], developed an influential proposal with emphasis on the contrast between learning and

acquisition to explain SLA. First, he named it as monitor model, then he called it input hypothesis [8], focusing on the data which feed acquisition, and more recently, comprehension hypothesis emphasizing the mental process as responsible for acquisition. According to Krashen [9],

The Comprehension Hypothesis is closely related to other hypotheses. The Comprehension Hypothesis refers to subconscious acquisition, not conscious learning. The result of providing acquirers with comprehensible input is the emergence of grammatical structure in a predictable order. A strong affective filter (e.g. high anxiety) will prevent input from reaching those parts of the brain that do language acquisition. (p. 1)

Krashen’s model views acquisition in a linear perspective which not only establishes a cause and effect relation between input and acquisition but also states that the grammatical structure is acquired in a predictable order. In addition to that, as in the other theories discussed so far, his theory does not go beyond the acquisition of grammatical structures.

Krashen’s model lacks research evidence. As Cook [10] points out “it makes sense in its own terms but is not verifiable” (pp. 65-66).

The next three theories can be named Interactionist SLA theories as all of them conceive language and language learning as social practices.

2.5. Interaction Hypothesis

Other attempts to explain SLA are the different versions of the interaction hypothesis defended by Hatch [11] and by Long [12,13], to name but two who did not accept Krashen’s Input Hypothesis. Both Hatch [11] and Long [12,13] consider that input alone is not sufficient to explain SLA. Hatch [11] disagrees that learners first learn structures and then use them in discourse. She considers the reverse possibility. “One learns how to do conversation, one learns how to interact verbally, and out of this interaction syntactic structures are developed” (p. 404).

Based on an empirical study, Long [12] observed that in conversations between native and non-native speakers, there are more modifications in interaction than in the input provided by the native speakers. He does not reject the positive role of modified input, but claims that modifications in interactions are consistently found in successful SLA. Long [13] suggests that

negotiation for meaning, especially negotiation work that triggers interactional adjustments by the NS or more competent interlocutor, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways. (pp. 451-452)

Larsen-Freeman and Long [1] argue that the interactionist views are more powerful than other theories “because they invoke both innate and environmental factors to explain language learning” (p. 266). I would add that they are the first to view language not only as a matter of syntactic structures but also as a matter of discourse.

The interactionist research uses data recorded from free conversation or controlled conversation tasks.

2.6. Output Hypothesis or Lingualization

Swain [14,15] also goes against Krashen’s radical position towards the role of input and argues in favor of the output hypothesis, later named as lingualization [16]. She claims that practicing the language helps learners observe their own production, which is essential to SLA. It is her contention that “output may stimulate learners to move from the semantic, open-ended non-deterministic, strategic processing prevalent in comprehension to the complete grammatical processing needed for accurate production (p. 128)” [15]. She explains that “learners may notice a gap between what they want to say and what they can say, leading them to recognize what they do not know, or know only partially” (p. 126) [15]. She highlights that “noticing” is essential to SLA and also hypothesizes that output has other two functions: to test hypothesis and to trigger reflection, a metalinguistic function. She explains that learners “may output just to see what works and what does not” (p. 132) [15] and that they reflect upon the language they produce when negotiating meaning because the content of negotiation is the relation between the meaning they are trying to express and the language form.

As far as research is concerned, the investigations in this perspective have been using experiments with control groups, pre-tests and post-tests. Think-aloud was also used in Swain and Lapkin [17] to see the impact of output upon the learners’ thought processes.

2.7. Sociocultural Theory

The sociocultural theory (SCT), based on Vygotskian thoughts, claims that language learning is a socially mediated process. Mediation is a fundamental principle and language is a cultural artifact that mediates social and psychological activities. As highlighted by Mitchell and Myles [6], “from a social-cultural perspective, children’s early language learning arises from processes of meaning-making in collaborative activity with other members of a given culture” (p. 200). Lantolf and Thorne [18] defend that the principles of the SCT can also apply to SLA. They explain that “SCT is grounded in a perspective that does not separate the individual from the social and in fact argues that the individual emerges from social interaction and as such is always fundamentally a social

being” (p. 217-218). It is in the social world that the language learners observe others using language and imitate them. It is also with the collaboration of other social actors that learners move from one stage to another.

One of the main concepts borrowed from Vygotsky is “scaffolding”, understood as the assistance one learner gets from another person (e.g. teachers, relatives, classmates) and which enables him or her to perform a learning task. This phenomenon has been in the agenda of collaborative learning research and the data has been mainly collected by means of audio and video recordings of classes and peer interaction. Recall protocols and interviews are also used.

2.8. Connectionism

Connectionism seeks to explain SLA in terms of mental representations and information processing while rejecting the innate endowment hypothesis. Elman *et al.* [19] agree that there are universal behaviors, but that does not mean that they are directly contained in our genes. Any learning is understood as a matter of neural networks. The networks learn in a Parallel Distributed Processing [20] where connections are strengthened or weakened. Language learning is understood as the processing of experience and the repetition of experiences causing the strengthening of the connections. Ellis [21] explains that “our neural apparatus is highly plastic in its initial state” (p. 82), but “the initial state of SLA is no longer a plastic system; it is one that is already tuned and committed to the L1” (p. 83). He adds that “in the L2 situation, forms of low salience may be blocked by prior L1 experience, and all the extra input in the world may not result in advancement” (p. 84).

In contrast with the linearity of behaviorism, connectionism presupposes that some mental processes can occur in a parallel or simultaneous way and that knowledge is distributed among the various interconnections. Thus, learning does not occur in sequenced stages, but rather in parallel, *i.e.*, in different parts of the brain simultaneously.

Connectionism, along with other attempts to explain SLA, can be situated in the philosophical and scientific tradition known as emergentism, whose studies are inspired in the studies of the complex systems. Ellis [22] explains emergentism as language representations which emerge “from interactions at all levels from brain to society” (p. 631). He adds 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 social environment, suffice to drive the emergence of complex language representations”.

Connectionism studies have been employing computer

technology either by simulating neural networks in computers or by resorting to computerized corpora. In the first case, researchers create artificial networks, feed them with linguistic input and then compare their output to human output. Corpora, such as CHILDES, an electronic corpus of child language that is freely available on the internet (<http://www.cnts.ua.ac.be/childes/>), have also been used in the study of the acquisition of lexical items.

In the next section, I present my own interpretation of SLA acquisition as an emergent phenomenon, namely as a chaotic/complex system.

3. Second Language Acquisition as a Chaotic/Complex System

Despite all the research, we still do not know how languages are learned. It is difficult to reject any of the aforementioned theories as all of them seem reasonable, but they also seem incomplete, as they do not describe the whole SLA phenomenon, but just parts of it.

Language learning, like any other type of learning, is not a linear process and therefore cannot be deemed as predictable as some of these models of acquisition have hypothesized it to be. Minimal differences in initial conditions can cause very different results. Nevertheless, I consider that the previous attempts to explain SLA should not be disregarded because when they are put together they provide a broader view of the phenomenon. In this new perspective, a SLA model should be considered as a set of connections within a dynamic system that moves in the direction of the “edge of chaos” considered as a zone of creativity with the maximum potential for learning.

Chaos theory and the studies on complexity have been influencing many different research fields, including Applied Linguistics. Larsen-Freeman [23], in her inaugural work in this new perspective, sees “many striking similarities between the science of chaos/complexity and language and SLA” (p. 141). She presents several arguments for the understanding of language and SLA as complex, non-linear dynamic phenomenon, dynamic meaning growth and change. Larsen-Freeman [24] sees complexity as “a metaphorical lens through which diverse perspectives can be accommodated, indeed integrated” (p. 173).

Thornbury [25] also argues that language and language learning share some features with other complex systems. It is dynamic and non-linear; adaptive and feedback sensitive; self-organizing; and emergent. He observes that

(...) the learner’s grammar restructures itself as it responds to incoming data. There seems to be periods of little change alternating with periods of a great deal of flux and variability, and even some backsliding. In this way, process grammars are not unlike other complex systems which fluctuate be-

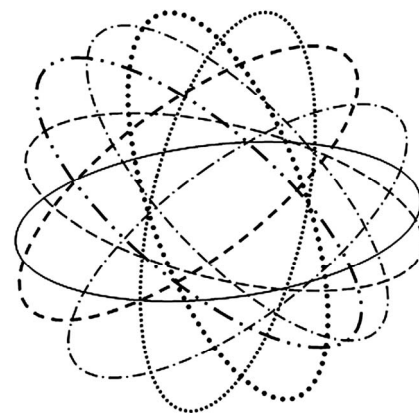
tween chaotic states and states of relative stability. (p. 48)

There is evidence to support the claim that SLA is a complex adaptive system due to its inherent ability to adapt to different conditions present in both internal and external environments. As pointed out by van Lier [26],

we can neither claim that learning is caused by environmental stimuli (the behaviourist position) nor that it is genetically determined (the innatist position). Rather, learning is the result of complex (and contingent) interactions between individual and environment (p. 170).

A complex model can accommodate apparently opposed elements in an effort to explain SLA. **Figure 1** partially describes the way I see SLA. I say partially because it does not show the dynamic interaction among the elements and neither shows the changes. Besides that, many other factors (e.g. motivation, learning strategies, political constraints, etc.) are in interaction in a SLA system and they are not represented in **Figure 1**.

At the same time a complex model can admit the existence of innate mental structures and sustain that part of the language is acquired by means of repetition and the creation of automatic linguistic habits. It can acknowledge the importance of language affiliation¹ understood



Innate mental structures
Automatic habits	-----
Affiliation	-----
Input	-. - . - . -
Interaction	-----
Output
Neural Connections	-. - . - . -
Sociocultural mediation	- . . - . .

Figure 1. Second Language acquisition as a complex system.

¹I prefer affiliation due to the derogatory meaning of acculturation.

as the level of relationship between the learner and the second language. Cultural or personal affiliations with the second language work as a potent fuel to move the SLA system. In addition, in such a model, input, interaction and output are also considered of paramount importance for language acquisition as they trigger both neural and sociocultural connections. Each component works as a subsystem embedded in the SLA system.

In this perspective, language must be understood as a non-linear dynamic system, made up of interrelated biocognitive, sociocultural, historical and political elements, which enable us to think and act in society. Language is not a static object, but a system in constant movement. Its interacting elements influence and are influenced by each other. As language is in evolution, so too is SLA and any change in a subsystem can affect other elements in the network. It develops through dynamic and constant interaction among the subsystems, alternating moments of stability with moments of turbulence. As complex systems are in constant movement, after chaos, understood here as the optimal moment for learning, a new order arises, not as a final static product, but as a process, *i.e.*, something in constant evolution.

Human beings are different, their contexts are different and so are SLA processes which are mediated by different human agents and cultural artifacts. As a consequence, unequal learning experiences may occur in very similar situations. When we turn our observation to language teaching practices, we see that no matter how much teachers plan and develop their classes, students will react in different ways and unforeseen events will inevitably be part of their learning experiences. The seemingly orderly world of acquisition is in fact chaotic and chaos seems to be fundamental in such a process.

Out of chaos emerges a new language which is a product of all the elements involved in the process and which can be placed in a cline which has first and second language as two opposing poles (energies or forces), the first language being the initial condition for SLA. First and second languages are both live complex systems which change over time. As Larsen-Freeman and Cameron [27] explain, "We change a language by using it" (p. 96).

The first and second languages work as attractors. An attractor is "a region of a system into which the system tends to move" (p. 50) [27] and language development swings between these two poles. The language learner is attracted or repelled by one of these poles and out of this cycle of attraction and repelling emerges a third, namely, interlanguage. Interlanguage works as a strange attractor, highly sensitive to initial conditions. Small changes in the initial conditions result in unpredictable shifts in language development. Each interlanguage phase yields similar but never identical patterns or strange attractors.

SLA consists of a dynamic interaction among different individual and social factors put into movement by inner and social processes. The random interaction among all the elements of the acquisition system yields the changes responsible for acquisition. The rate of change is not predictable and varies according to the nature of the interactions among all the elements of the system. A live acquisition system is always in movement and never reaches equilibrium, although it undergoes periods of more or less stability.

In the next section, I will provide some empirical evidence for acquisition as a chaotic/complex system. In order to do that, I will resort to a corpus of English language learning histories (LLHs)

(see <http://www.veramenezes.com/amfale.htm>) collected by researchers in Brazil, Japan and Finland.

4. Language Learning Histories and SLA Theories

As pointed out by Larsen-Freeman [24] language learners have been seen from an etic perspective. By choosing to work with language learning histories (LLHs) and listening to language learners, we aim at changing the etic perspective into an emic approach. In doing that, we try to make a shift from objectivism/subjectivism to experientialism as we can count on learners' experiences to understand how languages are learned.

I will present some LLHs to show some evidence for different SLA theories. Different reports highlight different aspects of SLA, reinforcing my hypothesis that the theories explain only a certain aspect of a much more complex process.

Behaviorism is present in the LLHs of Japanese (1), Finnish (2) and Brazilian (3) students:

(1) I memorized even complex sentences. Though it was very hard, it was worth doing it. I could improve my English.

(2) The grammar and the most basic and important words I've learned repeating them again and again. It was a good way to learn new language when I was a bit younger and schoolbooks were easier.

(3) (...) my father was always bringing me back tapes from the American MTV, which I watched one right after the other every day. I ended up memorizing most of them and I repeated the lines along with the hosts. My mother thought I was going crazy, but that trained my ears and improved my fluency.

These three students seem aware that repetition and memorization were important for their SLA. A different perspective can be inferred from narrative (4).

(4) I am still learning English, from the books I read, from the music I listen to, from the movies and TV

series I watch (and I try to watch them without subtitles), and from all the unconscious (more than conscious) input I receive. (Brazilian student)

Example (4) leads us to Input Hypothesis and to UG as well. This Brazilian student is aware of the importance of input and of the mental processes which transform input into intake. The importance of input is also reported in (5) by a Finnish student who has the chance to listen to different accents, but what is more salient in the narrative is her awareness of the importance of speaking in SLA. In (6) we can find a similar report by a Brazilian student and both (5) and (6) seem to confirm the interactionist theories.

(5) I am very eager to speak English every time I have an opportunity to do so. In my job in the Old Market Hall I meet a lot of tourists from all over the world. Naturally, most of them speak English. That is why I also hear lots of different accents when having conversations with people for instance from Ireland, Canada and Australia. (...)The other goal is to have courage to speak and do it properly. That I can gain only by using the language as much as possible in different situations. (Finnish student)

(6)The first place I remember fully using my little knowledge of English language was in Ouro Preto, this gorgeous historical city close to Belo, famous for its history and lots of foreign tourists, so whenever I went there I tried to dig a chance to speak. I wanted real life experiences, real usage of the language I loved to speak... (Brazilian student)

Connectionism can be exemplified by Brazilian students in (7) and (8).

(7) I developed a system to learn vocabulary. I looked for all the words with the same roots and learned them together, like this: employ, employment, unemployment, employer, employee, etc. I compared the words in both Portuguese and English dictionaries to understand their meanings.

(8) I started learning from my direct contact with the United States culture, mainly comics and movies. By making free association with cognates and by looking up words in the dictionary, I learned words and expressions. Later, the frequent use of videogames forced me to learn more in order to play them adequately.

The narrators in (7) and (8) refer to mental connections, but they also acknowledge the importance of the mediation of cultural artifacts (comic, cinema, and videogames) that leads us not only to the input hypothesis, but also to the sociocultural theory.

Affiliations to the language and to the United States or

England are found in different narratives. Example (9) presents an excerpt from the LLH of a very successful English teacher who identifies himself with the United States and rejects his Brazilian identity.

(9) My objective, however, was very clear as a child: I wanted to be American. I used to think to myself since I couldn't actually be American, cause I was born in the "wrong" place, I wanted to be as close to that as I could be.

The LLHs reveal that neither the theories nor the LLHs can explain the whole SLA process, but they make us aware that SLA is not a homogeneous process and that unpredictability is an important factor underlying it as we will see in the next section.

5. The Edge of Chaos

Order and chaos coexist in a dynamic tension. According to Ockerman [28], the system is capable of remarkable things when operating in the narrow zone between order and chaos which is called "edge of chaos". Ockerman [28] explains that

The edge of chaos is a paradoxical state, a spiral chance between order and chaos, a humming oscillation between the two extremes, characterized by risk, exploration, experimentation. Here is where the system operates at its highest level of functioning, where the information processing takes place, where risks are taken and new behavior is tried out. And when new behavior emerges that is somehow beneficial to the system, where the system's primary task and operating rules are modified in such a way that the system's overall levels of "fitness" is improved relative to other systems, we say that the change is innovative; the system has learned or evolved. (p. 222)

Ockerman [28] adds that

There are five factors, or control parameters, that determine whether a system can move into the edge of chaos (or beyond into disintegration): the rate of information flow, the degree of diversity, the richness of connectivity, the level of contained anxiety, and the degree of power differentials. In human systems, these factors combine into a kind of creative tension where people are linked to others in paradoxical relationships of cooperation/competition, inspiration/anxiety, and compliance/individuality (group of initiative to illustrate the process) (p. 222)

In an attempt to apply those five factors to SLA, we might regard them as the rate of exposure to the target language, the diversity of authentic input, the richness of

interactions, the low level of anxiety, and the rate of autonomy or control of one's own learning.

In our corpus of LLHS, there is enough evidence to say that learners are led to the edge of chaos by factors which are not usually described as part of the educational context. One of our Brazilian narrators, for instance, reports how skateboard competitions offered him relevant experiences with the English language. I understand it was the passport for the edge of chaos. He says:

(10) My first contact with English happened in 1987, when I was eleven years old. It was an English course in my neighborhood. Actually it was just an introductory course, really focused on basic English. The classroom activities followed a traditional method, by using non authentic materials, and teacher centered all the time. Then I went to high school, where English classes are simply awful. Every year the same subjects were taught to us, such as verb to be, negative forms, interrogative forms etc. However, the sport I have been practicing from that period so far is full of English words and expressions, what made me more interested in English. In fact skateboard has been a "catapult" to my English learning process. It is common to meet native English speakers in skateboard contests, so I had to communicate with them in order comment the contest, or even about my turn in it, for instance. This first steps where then, related to communicative learning process, since real use of language was required in order to communicate. Slangs and jargons were used all the time, and I did not know what exactly they meant, but I could get their meaning through the context we were in. After that, my interest have increased in many aspects of English, such as music, art and sports, what is just the continuity of the process that I began with when I was a child.

Narrative (10) exemplifies a recurrent pattern in EFL learning in Brazil. Narrators usually portray language learning in high school as a dull experience which offers impoverished input and focuses mainly on grammar. Then they talk about other experiences beyond the classroom. Those experiences show the SLA system in its highest level of functioning as in the example reported in (10).

In spite of a recurrent claim that language learning in schools is a poor experience, our corpus also offers some positive examples. Some narrators describe rich experiences in school, as a Brazilian learner reports in (11).

(11) There were classes with 8 students, and 5 days a week, 3 hours a day. We used to talk in English all the time, even outside the class. On this course, writing skill was not very well explored. The professor was a kind of mediator, correcting mistakes and making conversation go on. We used to watch

videos with native speakers to learn accent and cultural environment, and every Friday we used to listen to music, fulfilling gaps, trying to understand the meanings by the context.

Different experiences can move the system towards SLA. In (10), the rate of exposure to the target language and the diversity of authentic input were augmented in skateboard competitions. The learner is in control of his own learning and rich interactions are provided by this new context. We can infer that anxiety is low as he seems to enjoy this kind of experience. This example proves that his acquisition system is open, *i.e.*, it is not predictable and new elements may enter the system and transform it. In (11), the school also offers a good amount of authentic and diverse input and it seems to be enough for that narrator. Kirshbaum [29] explains that

The unpredictability that is thus inherent in the natural evolution of complex systems then can yield results that are totally unpredictable based on knowledge of the original conditions. Such unpredictable results are called emergent properties. Emergent properties thus show how complex systems are inherently creative ones.

Unpredictability is found in many LLHs. One student registers that her SLA was all of a sudden augmented because she had to move to the USA to help a cousin take care of her baby. Another narrator considers that his SLA was triggered by a Brazilian TV program teaching English through songs, etc.

Self-organization is another characteristic of complex systems. Larsen-Freeman and Cameron [27] explain that

Sometimes self-organization leads to new phenomena on a different scale or level, a process called "emergence". What emerges as a result of phase shift is something different from before: a whole that is more than the sum of its parts and that cannot be explained reductively through the activity of the component parts. (p. 59)

The LLHs indicate that a phase shift is achieved when students look for experiences outside their schools in order to overcome the lack of the necessary conditions for SLA in school and a new order, or new interlanguage phase emerges. This new phase is more than the sum of school activities and experiences outside school. When reading those LLHs, one realizes that the rate of exposure to the language can be increased by means of the mediation of cultural artifacts—television, radio, computers, movies, magazines, newspapers, music, and online interaction—in addition to face-to-face interaction, mainly with proficient speakers. Some of these experiences are reported by Brazilians in (12) and (13) and we can conclude that the narrators are aware that a new level of in-

terlanguage organization, higher than the previous one, emerged from those linguistic social practices.

(12) The one thing that helped me through my learning experience and later on to improve my English were the books. The time I was learning there was no cable TV and no SAP on TV. So reading books and magazine in English were what kept me connected to the language outside the classroom.

(13) I just could improve my English, mainly my oral skills, by studying on my own, through songs, movies and cartoons.

The LLHs show that the edge of chaos will be reached if students can get rich input, interact with proficient speakers, and if they can use the second language for social purposes, dealing with different oral, written or digital genres in formal and informal contexts. There is enough evidence to say that learners are led to the edge of chaos by factors which are not usually described as part of the school context.

Some formal educational contexts try to keep equilibrium and limit perturbations in order to keep the established order, teaching not the language itself, but about the language. By doing that, they deny the students the path to the edge of chaos. As Gilstrap [30] points out, “control mechanisms are firmly in place to preserve order, oftentimes leading to strict policies, rigid hierarchies, resistance to change, and maintenance of the status quo” (p. 58). This lack of optimal conditions for language learning is overcome by the auto-organization of the SLA system. Teachers are not in control of their students’ acquisition processes and there will always be some space for autonomy which empowers students to overcome the boundaries posed by the context.

Autonomy or control of one’s own learning is manifested in decision making by the language learners and by their ability to overcome social, economic and political constraints which limit their learning experiences. The dynamicity responsible for interlanguage development is achieved by the mediation of the SL cultural production and by learners’ experiences abroad or interactions with proficient speakers. These experiences disturb the order and cause the necessary turbulences to put SLA into movement.

6. Conclusions

As already stated in Paiva [31], understanding SLA as a complex system theory can explain why a learner remains in equilibrium, for a certain amount of time and suddenly a fast change occurs, showing an advance in acquisition. That is, in learning we have periods of stability followed by “explosions” and change. It can also explain why the same teaching and learning strategies do

not have the same effects for all learners and that small stimuli can have unpredictable consequences, dramatically negative or positive. Thus, in formal contexts, the teacher can not only activate learning mechanisms, but also construct insurmountable barriers.

It is the role of the teacher to encourage constant contact of the student with as many forms of input as possible and to promote interactions among various speakers (learners, competent speakers and native speakers). Language learning is also a social process and depends on interactions among speakers. In this way, our role is to “disturb” a zone of stability and provoke the chaos that results in a zone of creativity (edge of chaos) where small changes can occur, creating significant effects on learning processes [31].

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REFERENCES

- [1] D. Larsen-Freeman and M. H. Long, “An Introduction to Second Language Acquisition Research,” Longman, New York, 1991.
- [2] M. Johnson, “A Philosophy of Second Language Acquisition,” Yale University Press, New Haven, 2004.
- [3] J. H. Schumann, “The Acculturation Model for Second Language Acquisition”, In: R. C. Gingras, Ed., *Second Language Acquisition and Foreign Language Teaching*, Center for Applied Linguistics, Washington, 1978, pp. 27-50.
- [4] N. A. Chomsky. “Reflections on Language,” Pantheon, New York, 1976.
- [5] L. White, “Second Language Acquisition and Universal Grammar,” Cambridge University Press, Cambridge, 2003. <http://dx.doi.org/10.1017/CBO9780511815065>
- [6] R. Mitchell and F. Myles, “Second Language Learning Theories,” 2nd Edition, Arnold, London, 2004.
- [7] S. D. Krashen, “The Monitor Model for Second Language Acquisition,” In: R. C. Gingras, Ed., *Second language acquisition & Foreign language teaching*, Center for Applied Linguistics, Washington, 1987, pp. 1-26.
- [8] S. D. Krashen, “The Input Hypothesis: Issues and Implications,” Longman, London, 1985.
- [9] S. D. Krashen, “Applying the Comprehension Hypothesis: Some Suggestions,” Paper Presented at 13th International Symposium and Book Fair on Language Teaching (English Teachers Association of the Republic of China), Taipei, 13 November 2004. http://www.sdkrashen.com/articles/eta_paper/index.html
- [10] V. Cook, “Linguistics and Second Language Acquisition,” St. Martin’s Press, New York, 1993.
- [11] E. M. Hatch, “Discourse Analysis and Language Acquisition,” In: E. M. Hatch, Ed., *Second Language Acquisition:*

- A Book of Readings*, Newbury House, Rowley, 1978, pp. 401-435.
- [12] M. H. Long, "Input, Interaction and Second Language Acquisition," In: H. Winitz, Ed., *Native Language and Foreign Language Acquisition Annals of the New York Academy of Sciences* 379, New York Academy of Sciences, New York, 1981, pp. 259-278.
- [13] M. H. Long, "The Role of the Linguistic Environment in Second Language Acquisition," In: W. Ritchie and T. Bhatia, Eds., *Handbook of Second Language Acquisition*, Academic Press, San Diego, 1996, pp. 413-468.
- [14] M. Swain, "Three Functions of Output in Second Language Learning," In: G. Cook and B. Seidlhofer, Eds., *Principle and Practice in Applied Linguistics Studies in Honour of H. G. Widdowson*, Oxford University Press, Oxford, 1995, pp. 125-44.
- [15] M. Swain, "Communicative Competence: Some Roles of Comprehensible Input and Comprehensible Output in Its Development," In: S. M. Gass and C. G. Madden, Eds., *Input in Second Language Acquisition*, Newbury House, Rowley, 1985, pp. 235-53.
- [16] M. Swain, "Languaging, Agency and Collaboration in Advanced Second Language Learning," In: H. Byrnes, Ed., *Advanced Language Learning: The Contributions of Halliday and Vygotsky*, Continuum, London, 2006. pp. 95-108.
- [17] M. Swain and M. Lapkin, "Problems in Output and the Cognitive Processes They Generate: A Step towards Second Language Learning," *Applied Linguistics*, Vol. 16, No. 3, 1995, pp. 371-391.
<http://dx.doi.org/10.1093/applin/16.3.371>
- [18] J. Lantolf and S. Thorne, "Sociocultural Theory and Second Language Learning," In: B. VanPatten and J. Williams, Eds., *Theories in Second Language Acquisition: An Introduction*, Lawrence Erlbaum, Mahwah, 2007, pp. 201-224.
- [19] J. L. Elman, *et al.*, "Rethinking Innateness: A Connectionist Perspective on Development," MIT Press, Cambridge, 1996.
- [20] D. E. Rumelhart, P. Smolensky, J. L. McClelland and G. E. Hinton, "Schemata and Sequential Thought Processes in PDP Models," In: D. E. Rumelhart, J. L. McClelland and the PDP Research Group, Eds., *Parallel Distributed Processing: Explorations in the Microstructure of Cognition, Vol. 2, Psychological and Biological Models*, MIT Press, Cambridge, 1986, pp. 8-57.
- [21] N. Ellis, "The Associative-Cognitive CREED," In: B. van Patten and J. Williams, Eds., *Theories in Second Language Acquisition: An Introduction*, Lawrence Erlbaum, Mahwah, 2007, pp. 77-95.
- [22] N. Ellis, "Emergentism, Connectionism and Language learning," *Language Learning*, Vol. 48, No. 4 1998, pp. 631-664. <http://dx.doi.org/10.1111/0023-8333.00063>
- [23] D. Larsen-Freeman, "Chaos/Complexity Science and Second Language Acquisition," *Applied Linguistics*, Vol. 18, No. 2, 1997, pp. 141-165.
<http://dx.doi.org/10.1093/applin/18.2.141>
- [24] D. Larsen-Freeman, "Second Language Acquisition and Applied Linguistics," *Annual Review of Applied Linguistics*, Vol. 20, 2000, pp. 165-181.
<http://dx.doi.org/10.1017/S026719050020010X>
- [25] S. Thornbury, "Uncovering Grammar," Macmillan Heinemann, London, 2011.
- [26] L. Van Lier, "Interaction in the Language Curriculum: Awareness, Autonomy, and Authenticity," Longman, London, 1996.
- [27] D. Larsen-Freeman and L. Cameron, "Complex Systems and Applied Linguistics," Oxford University Press, Oxford, 2008.
- [28] C. Ockerman, "Facilitating and Learning at the Edge of Chaos: Expanding the Context of Experiential Education," *Proceedings of the AEE International Conference*, 1997. <http://eric.ed.gov/?id=ED414142>
- [29] D. Kirshbaum, "Introduction to Complex System," 2002. <http://www.calresco.org/intro.htm#eme>
- [30] D. L. Gilstrap, "Strange Attractors and Human Interaction: Leading Complex Organizations through the Use of Metaphors," *Complicity*, Vol. 2, No. 1, 2005, pp. 55-69. <http://ejournals.library.ualberta.ca/index.php/complicity/article/view/8727>
- [31] V. L. M. O. Paiva, "Modelo Fractal de Aquisição de Línguas," In: F. C. Bruno, Ed., *Reflexão e Prática em Ensino/Aprendizagem de Língua Estrangeira*, Editora Clara Luz, São Paulo, 2005, pp. 23-36.