

Language Learning as Chaos/Complexity System: Evidence Based on Iranian EFL Learners' Backgrounds

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Abstract

Language learning process was traditionally investigated through the reductionist perspective as a fixed, linear, cause and effect phenomenon in addition to imposing three levels of reductionism including context reduction, data reduction, and complexity reduction on the field of Second Language Acquisition (SLA). With the emergence of Chaos/Complexity Theory (CC/T), language learning was considered as a nonlinear, complex, and dynamic system evolving, growing, and changing from the bottom-up in an organic and unpredictable manner through the dynamics of language. Considering language learning as a complex system, its complex behavior as a whole is influenced by a large number of factors, forces, and agents within or beyond its boundaries which is more than the behavior of its individual components. Despite the fact that C/CT provides new insights, understandings, and implications for researchers in the field of SLA, very few practical attempts are available which investigate the complexities of language learning. Accordingly, ten male/ female Iranian EFL learners participated in this narrative research based on purposive sampling. The researcher used semi- structured interview to elicit participants' histories and stories concerning their language learning process. After the transcription of the data, the participants' personal experiences and histories in terms of time and

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place were reorganized, analyzed, and shaped into a framework on the basis of a chronological sequence. In regard to the theoretical underpinnings and insights of C/CT, the derived meanings and themes showed the pieces of evidence to justify the complexities of Iranian EFL learners' language learning.

Keywords: *Chaos/Complexity Theory, reductionism, SLA, narrative research, language learning process*

Kaos/Karmaşıklık Sistemi Olarak Dil Öğrenme: İranlı EFL Öğrencilerinin Geçmişlerine Dayalı Kanıtlar

Öz

Dil öğrenme süreci; geleneksel olarak, İkinci Dil Edinimi (SLA) alanında bağlam azaltma, veri azaltma ve karmaşıklık azaltma şeklinde üç aşamalı bir indirgemeyi empoze ederken indirgemeci bir bakış açısıyla sabit, doğrusal, sebep-sonuç ilişkili bir fenomen olarak incelenmiştir. Kaos/Karmaşıklık Teorisinin (CC/T) ortaya çıkmasıyla birlikte dil öğrenme, dilin dinamikleriyle aşağıdan yukarıya organik ve öngörülemeyen bir biçimde gelişen, büyüyen ve değişen doğrusal olmayan, karmaşık ve dinamik bir sistem olarak nitelendirilmiştir. Dil öğrenimi karmaşık bir sistem olarak düşünüldüğünde, bunun bir bütün olarak karmaşık davranışları, bireysel bileşenlerinin davranışlarından çok, sınırları içindeki veya dışındaki çok sayıda faktör, kuvvet ve aracı tarafından etkilenir. C/CT, SLA alanındaki araştırmacılar için yeni fikir, anlayış ve çıkarımlar sağlamasına karşın, dil öğreniminin karmaşıklığını incelemeye yönelik çok az sayıda pratik girişim bulunmaktadır. Bu doğrultuda, on erkek / kadın İranlı EFL öğrencisi amaçlı örneklemeyle dayalı bu anlatı araştırmasına katıldı. Araştırmacı, katılımcıların dil öğrenme süreciyle ilgili geçmişlerini ve öykülerini ortaya çıkarmak için yarı-yapılandırılmış görüşme kullandı. Verilerin transkripsiyonunun ardından katılımcıların zaman ve mekân bağlamındaki bireysel deneyimleri ve geçmişleri yeniden düzenlendi, incelendi ve kronolojik sıralanımına dayalı bir çerçeveye yerleştirildi. C/CT'nin teorik destek ve içgörülerini ışığında, elde edilen anlam ve temalar İranlı EFL öğrencilerinin dil öğrenimi karmaşıklığını gerekçelendirmek için kanıt parçaları sundular.

***Anahtar sözcükler:** Kaos/Karmaşıklık Teorisi, indirgemecilik, SLA, anlatısal araştırma, dil öğrenme süreci*

Introduction

Science as a dominant force appeared around the time of Renaissance with the works of Bacon, Galileo, Descartes, Newton, and other scientists (van Lier, 2004). For years, the hegemony of scientific method used in physical sciences also influenced the researches in branches of social sciences and SLA was not an exception. Scientific research methods assumed a logical, deterministic, sequential, and controllable view of all systems in the world (Harshbarger, 2007). Accordingly, the process of language learning was viewed as a fixed, linear process based on cause and effect relationships between different phenomena. The aim was to identify and study contributory influences and factors in isolation as in experimental sciences. It was believed that the objective inquiry of isolated elements would indicate the methods of effective and efficient teaching (Hadidi Tamjid, 2008).

Emergence of qualitative research methods led to a number of arguments against the application of scientific research methodologies in the realm of social and humanistic sciences. As van Lier (2004) puts it, scientific work includes three levels of reduction, as context reduction which simplifies and selects from the infinite variables existing in the real world; data reduction which includes the simplest explanations to justify the preferred data; and complexity reduction that breaks down the problems into their component elements and analyzes them one by one.

According to Finch (2002), the scientific method in physical sciences moved away from isolationist approach towards an alternative view, taking a holistic view of reality and considering the world and its elements as dynamic complex systems. Chaos/Complexity Theory (CCT) is a new paradigm which provides a new way for understanding systems (Harshbarger, 2007) such as language. This view is based on the connectivity/interactions which exist inside the system that determine its nature. It actually takes into account the synthesis of emergent wholes from investigating the interaction of individual elements. These unpredictable interactions lead to the emergence of larger structures which are much greater than sum of its components. Thus, in case a researcher wishes to study a subject, (s)he is obliged to consider the subject in its context looking at all interactions between the subject and context as a whole (Hadidi Tamjid, 2008).

Despite the fact that C/CT theory as nonlinear dynamic systems was originally embraced by researchers and theorists investigating the explanation of phenomena in scientific fields, this theory has currently drawn the attention of social scientists and educators studying complex phenomena such as language learning processes (van Greet, 2000). Drawing on C/CT, SLA recently views language as a non-linear dynamic system influenced by a number of factors and forces. It is not considered as a fixed phenomenon and subjected to conformity or uniformity (Larsen-Freeman, 1997, 2003), rather it is a dynamic process evolving, growing, and changing from bottom-up in an organic manner and in the dynamics of language use. The consideration of language as a homogenous, static system is nothing but a normative fiction (Klein, 1998).

This theory implies that learners are not expected to progress through consistent and stable stages. In fact, a great amount of variation is seen at one time in learners' performances and also vivid instability over time (Larsen-Freeman, 2006). Fluctuation and variation are the main features of dynamic systems (Thelen & Smith, 1994; van Geert & van Dijk, 2002) not taken as measurement error (Larsen-Freeman, 2006). The ever changing and consistent nature of complex systems (Percival, 1993) is related to the changing of an individual's use of language resources (Larsen-Freeman, 2006).

Looking into the process of language learning through the lens of C/CT theory, language researchers can now feasibly give an account of how learners pursue the periods of chaos and order as living systems. Larsen-Freeman (1997) believes that there exist a multitude of issues resolved by the C/CT such as a definition of learning, mechanisms of acquisition, stability or instability of interlanguage, impact of instruction, and differential success in language learning. In this regard, van Lier (1996) also states that language classroom is considered as a complex system in which an investigation of causal relations is futile. Thus, due to the potential contributions of C/CT to provide a plausible explanation for a complex system as language, researchers are required to do research in this area in order to shed further light on its interdependence with language learning. Accordingly, inspired by C/CT, this study firstly presents an examination of C/CT characteristics and their relationship to language learning. Then, it has a focus on Iranian EFL learners' backgrounds to show their language learning process.

A Review of Literature

Main features of Chaos/Complexity Theory

Larsen-Freeman (1997) refers to a number of describing features of C/CT such as *dynamic, complex, nonlinear, chaotic, unpredictable, open, self-organizing, sensitive to initial conditions, strange attractor, butterfly effect and adaptive*. Below, some distinctive characteristics are described in brief.

Dynamicity

C/CT is known as the science of process and becoming rather than of state and being (Gleick, 1987, as cited in Larsen-Freeman, 1997). It is concerned with *dynamic* systems that change over time through continuous interaction with cognitive, social, and environmental factors leading to the emergence of communicative behaviors (Seyyedrezae, 2014). Further, dynamism deals with sensitivity to feedback and adaptation (Larsen-Freeman & Cameron, 2008). With regard to the system of language, it should be said that it is a complex dynamic system that changes over time (Soleimani & Farokh Alaei, 2014). Larsen-Freeman (1997) believes that diachronically or synchronically, language is undeniably seen as dynamic. Ellis (2007) also states that a learner's language system with its sub-systems is in permanent change. The system as a whole in addition to its sub-systems shows a great amount of variation. The small differences between people at a given time might have a major effect and there is no end state for language learning. For instance, according to Hashamdar (2012), language learners during the process of learning grammar restructure the grammar system as they respond to the input including correction and feedback. In fact, C/CT attempts to investigate the reasons underlying the system's collective behavior that is due to the interaction of an individual's behaviors with environment (Larsen-Freeman & Cameron, 2008).

Nonlinearity

The traditional transmission models of language learning such as information processing was based on linear acquisition of language through which language was assumed to have an initial and an end states with prespecified stages of development that each individual should proceed in

order to acquire the language. However, a number of studies on language acquisition and attrition showed that the process of language learning is so intricate, complex, and unpredictable not justified by the linear view. In Larsen-Freeman's (1997, p. 143) sense, "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". This effect is called *camel's effect* which means a simple trigger that occurs all the time and in any occasion, might be sufficient to create a great convulsion in the system, or to throw the total system into a chaotic state (Seyyedrezae, 2014).

Strange attractor

While moving through time/space, dynamic systems pursue a path named as *attractor* which means a pattern or state to which a dynamic system is attracted (Larsen-Freeman, 2002). A complex nonlinear system shows a different attractor called *strange attractor*. In spite of the fact that the cycle of an attractor repeats, it does not follow the exact same path or overlaps with other circles. All the stranger attractors commonly possess *fractal shape* which looks like "geometric figure self-similar at different levels of scale" (Larsen-Freeman, 1992, p. 145). A tree is an example which vividly shows fractal shape. Although all trees in the world have different shapes, we are able to make a distinction between a tree and other objects. As such, when a strange attractor is added to a system, it is enabled to keep an *underlying* order while it still self-organizes in an infinite number of ways.

Attractor states are not fixed or permanent, but they depend on the force and energy of the attraction. Actually, a pattern globally emerges, but at the local level, it is not possible to predict what exactly the details include. For example, while the weather is constantly changing, it still remains within the boundaries of what is called climate. We can predict where the system cannot be or identify the states that the system is likely to be can be predicted, but we cannot say where the system will be (Mohan, 1992). In relation to language, De Bot, Lowie & Verspoor (2005) state that many subsystems for many language learners are stabilized before the target forms appear. Thus, fossilization is an example of an attractor state.

Complexity and Connectivity

C/CT has a focus on *complex systems*. For Larsen-Freeman (1997), the complexity of these systems is based on two reasons. First, complex systems consist of a large number of components or agents. For instance, human brain is comprised of billions of neurons. Second, the complex behavior of these systems is based on the fact that the behavior of complex systems is considered to be more than a product based on the behavior of the individual components. In complex systems, each agent or component “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, p. 145). That is, what emerges as the behavior of complex systems results from the interactions between constituting components. Moreover, the connections or interactions amongst the components or agents become the necessary building blocks of the unpredictable structures or behaviors occurring in the future.

With respect to the language system, it should be said that language is a complex system in which all the components interact with each other. According to Ahmadi (2011), first, language meets the criteria of complexity because it is comprised of many subsystems like phonology, morphology, lexicon, semantics, syntax, and pragmatics. Second, these subsystems have interdependent relationships so that a change in one of them leads to the change of the whole. In fact, the behavior of the whole emerges out of the interactions between the subsystems.

Openness

Complex systems obtain energy from their surrounding environments in order to reorganize themselves so that this process leads to their complexity (Larsen-Freeman, 2002). Based on the second law of thermodynamics, lack of order is inexorable because they move towards equilibrium. However, in the late part of the past century, it was discovered that living systems could evolve from disorder to order. In case a dynamic system is open and far from the equilibrium state, restructuring occurs at the global level. When the open systems go through the process of evolving, they amplify in complexity and order via taking in energy from the

environment. This energy flow makes system away from initial chaos and disorder towards complexity and order (Churchland, 1998, as cited in Larsen-Freeman, 1997).

Avalanche or Butterfly Effect

The *avalanche effect* is on the prediction that minor events have the potentiality to lead to outcomes that exceed their proportion. This in fact illuminates that we should understand the systems as a whole. Two examples used by Finch (2002) throw light on the matter. First, when a pebble is thrown onto a pile of pebbles on a mountain can create landslide. Second, when a butterfly's wings are flapped in South America, a hurricane can be initiated in Puerto Rico. These two cases show us that the prediction of events is globally possible but the exact moment of their occurrence at the local level is unpredictable. Hence, we are able to predict that for instance it will rain in a particular city of Iran, but we cannot say it will rain in a particular building because of a number of limitations. Actually, butterfly effects can be seen in language system, too. For example, the effect of phonemic difficulties is not limited to the areas of reading or writing, it extends to the processes of perception and production of language. In this regard, Larsen-Freeman (1997) states that a small change in initial conditions leads to huge implications for the future behavior.

Feedback sensitivity and adaptability

In Larsen-Freeman's (1997) words, another crucial feature of complex, nonlinear systems is feedback sensitivity and adaptability. The order exhibited by a self-organizing system is shaped because of feedback sensitivity. This feedback sensitivity can be perceived through the field of biology. In regard to Darwin's view, it is posited that a basic feedback mechanism is built into nature, namely, natural selection. Evolution is in fact the steady improvement of a species (Waldrop, 1992). As Briggs (1992, p. 117) puts it, "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.

C/CT and SLA

Drawing on a number of parallels between C/CT features and language learning, Larsen-Freeman (1997) articulates that languages proceed the periods of chaos and order resembling other living systems. C/CT in deed provides us with a lens to take a new look at language learning process based on an alternative perspective, as followers of C/CT might find language learning is a nonlinear, dynamic, complex, adaptive, feedback sensitive, open, self-organizing constrained by strange attractors. Thus, there is a need to challenge the conceptualization of language as a fixed, static, atomistic entity by one that is nonlinear, organic, and holistic. The new conceptualization of language suggested by C/CT helps us see SLA as a complex process because of a number of influences and interactions operating within this process. With respect to dynamic system theory, SLA reacts to the external input and as such its total organization is modified with new input; it constantly self-organizes to gain equilibrium, but at that time, there is no complete standstill (Herdina & Jessner, 2002, as cited in de Bot, 2005).

Accordingly, the dynamism of SLA is examined in the ever changing nature of learners' internal grammars, as Hadidi Tamjid (2007) states learning linguistic items is not a linear process. It means learners are not expected to pursue a linear trajectory or path learning one linguistic item then another. In other words, according to Mirzae and Ghanizadeh (2014), language learning is not a linear curve. All of us have had the experience of learning or teaching tenses. At first, we learn simple present, the present progressive, the simple past, and then the teacher introduces the present perfect tense. However, at this time, instead of making progress, our performance becomes deteriorated; the reason is that we have added a tense into the interlanguage system causing it to implode. Larsen-Freeman (1997) believes that periods of chaos are followed by orderly periods. For instance, in language classrooms when a new grammatical feature is introduced, students are expected to understand how it fits into the system, or modify their understanding in order to accommodate their new awareness. In Hadidi Tamjid's (2007) words, order can be restored through students' interactions with others. This does not mean what students have produced is target-like, but a new interlanguage stage has been achieved.

It is noteworthy to mention that an application of the concepts and notions of C/CT can change the way we look at language learning as a complex process. Finch (2001) believes that the educational context and particularly language classrooms are regarded as complex systems in which events do not take place in a linear causal manner, rather a multitude of forces interact in self-organizing complex ways generating changes that are partially predictable and partially unpredictable. According to van Lier (2004), a large number of influences are present within a complex system in a chaotic and unpredictable fashion which leads to a complex order among all these interactions. In van Lier's (2004) sense, a chaos/complex way of thinking presents a couple of consequences for language learning theory and practice. Drawing on the Larsen-Freeman's pioneering paper including a number of potential contributions of C/CT to language learning, van Lier (2004) added the pursuing interpretations based on his ecological perspective:

1. Focusing on the blurring of boundaries and dichotomies,
2. Warning against drawing premature conclusions and against discarding contrasting viewpoints,
3. Throwing a fresh light on language learning,
4. Shifting our attention towards emergent phenomena,
5. Discouraging cause and effect based theories,
6. Having a focus on the importance of detail,
7. Warning against reductionism by finding a focal unit which keeps the whole.

Brown (2000) also presents an outline summarizing what has been suggested by Larsen-Freeman (1997) on C/CT. This outline includes:

1. Be conscious of false dichotomies, and seek for inclusiveness, complementarities, and interface,
2. Be conscious of linear, causal perspectives to theorizing. SLA is considered as a complex process with a large number of interacting factors that cannot be justified based on a single cause,
3. Be conscious of overgeneralization, and focus on details; the smallest unimportant factor turns out to be very significant, and on the other hand, be conscious of reductionism in thinking.

Purpose and Significance of the Study

A number of theoretical studies regarding C/CT as a newly introduced theory in the realm of language learning and teaching (Ellis, 2007; Finch, 2001; Feryok, 2010; Hadidi Tamjid, 2007; Harshbarger, 2007; Hashamdar, 2012; Larsen-Freeman, 2002; Mahmoodzadeh, 2013; Mirzae & Ghanizadeh, 2014; Oekerman, 1997; Valle, 2000; Seyyedrezae, 2014; & Swan, 2004) try to explain and elaborate C/CT characteristics and the relation of this theory with SLA. However, as Ahmadi (2010) puts it, few studies have so far been conducted to present the application of C/CT to language acquisition in general as well as foreign language learning in particular. Actually, this qualitative study is significant and insightful as it contributes to the understanding of language development process from C/CT perspective.

Ahmadi (2010) in a quantitative research on C/CT and assessment shows the impact of sensitivity to initial conditions on test takers' performance through changing first item of the test. Menezes's (2013) qualitative research, on the other hand, applies narrative research in order to explore SLA as an emergent or chaotic system. However, due to the paucity of researches investigating the application of C/CT to language acquisition in language learning contexts, this qualitative study intends to present Iranian EFL learning process through the insights of C/CT. Hopefully, the findings of the study provide teachers and researchers with insights regarding the process of language learning.

Method

This qualitative study is a narrative research with a focus on the participants' narratives, stories, and histories about their lives. Narrative research is considered as the best qualitative approach to capture detailed stories of life experiences (Ary, Jacobs, & Sorenson, 2010). The purpose of this type of research is to make sense of the narrative which is in the form of oral or written discourse. According to Ary, Jacobs, and Sorenson (2010), narrative research gives an account of human experiences by gathering and analyzing individuals' stories of their lives based on the accounts of

events or actions which are chronologically connected. Hence, this study tries to derive the meanings of Iranian EFL learners' stories of language learning based on C/CT.

Participants

Based on purposive sampling, ten male/female Iranian EFL learners at the intermediate and advanced levels of English language proficiency were selected for this narrative research. Six participants who live in Iran got their B.A. and M.A. degrees in English Translation/ English Literature/ TEFL and had the chance of participation in English Language Institutes prior to their (under)graduate studies. Two out of other four participants who live in Kuwait have got diploma in Iranian schools and are studying fields other than English language in American university in Kuwait. Two other participants as a couple who migrated from Iran to Germany five years ago are Ph.D. students of other fields of science.

Table 1

Participants' backgrounds

Participants	Nationality	Gender	Current educational level	English Proficiency	Country of residence
# 1	Iranian	M	B.A. in English literature	Intermediate	Iran
# 2	Iranian	M	B.A. in English literature	Advanced	Iran
# 3	Iranian	F	M.A. in TEFL	Intermediate	Iran
# 4	Iranian	M	Ph.D. Student	Advanced	Germany
# 5	Iranian	F	Ph.D. Student	Advanced	Germany
# 6	Iranian	F	M.A. in TEFL	Intermediate	Iran
# 7	Iranian	F	Ph.D. Students	Advanced	Kuwait
# 8	Iranian	M	M.A. Student	Intermediate	Kuwait
# 9	Iranian	F	B.A. in English Translation	Advanced	Iran
# 10	Iranian	F	M.A. in TEFL	Advanced	Iran

Setting

The context of current research is EFL context of Iran where English is learned and taught as a foreign language. Although some of these participants live in other countries, most of their experiences with English have been shaped through their attendance in Iranian high schools and private language institutes in different cities of Iran.

Instruments

The researcher in this narratively based qualitative study used semi-structured interview (appendix) in order to elicit participants' collaboratively constructed narratives and stories, so the area of investigation and questions were specified prior to the research, but the interviewer was free to modify or elaborate questions during interview to obtain more in-depth knowledge about participants' experiences, events, and phenomena during their continuum of learning.

Procedure

First of all, the researcher explained the purpose of study to all participants and confirmed that their identities will not be revealed during and after the research. The researcher could collaboratively obtain the narrative data about participants' experiences of language learning continuum in a forty-five-minute oral interview with each individual, so they had fair enough chance of enthusiastically digging into their learning process and highlighting all what they found as informative based on the researcher's introduction on the themes of research. The interviewees were free to provide responses in English, Persian (Farsi) or both as they also had the chance of switching from English to Persian if they need to elaborate on the interview questions. It needs to be highlighted that while collaborating with each individual, the researcher kept in mind the crucial features of narratives focusing on the sequence, chronology, and the collaborative re-storying process for each narrative, so, all the interviews were tape-recorded for an accurate and reliable detailed analysis of data. The interview with those four participants living in Kuwait and Germany was also conducted through Viber App! for ultimate access to real feedback.

Data analysis

Participants' direct recollections comprise the source of data. The researcher analyzed the narratives through a biographical lens with a focus on individuals' stories in the chronology of their experiences to uncover the relevant themes of their lived experiences. According to Andrews, Squire, and Tamboukou (2008), there are a number of difficulties associated with conducting narrative research. One of these problems is that it does not lend itself to the thematic analysis and there are no clear rules for data analysis. So, the researcher's aim was to investigate different elements such as time, place, and plot. Hence, the collected data situated within the participants' personal experiences and history in terms of time and place were reorganized, analyzed, and shaped into a framework on the basis of a chronological sequence. And finally, all the important themes based on the research question were derived.

Findings

First Language as a Forceful Attractor in Initial Stages

First and second languages are considered as two live, complex, and dynamic systems saturated with energies and forces. The initial experience of language learning is associated with confusion, hesitation, and uncertainty as language system is completely messy and disorder at that time. According to Menezes (2013), first and second languages operate as attractors. Attractor is a region of system into which the system has a tendency to move (Larsen-Freeman, 2008). In initial stages of language learning, learners' language system is more attracted towards first language as a reliable system with more attraction and energy. As time passes, language system becomes more developed and attracted by the second language path so that learners' language system gradually takes away from first language.

However, the influence of first language is not totally interrupted as advanced learners of English have had this experience that sometimes resorting to the first language has been very helpful in learning. In fact, during the process of language learning, swinging between two contrasting

poles of first and second languages frequently occurs in the form of attracting and repelling. Menezes (2013) believes that out of the circle of attraction and repelling, language learner emerges as interlanguage working as strange attractors highly sensitive to initial conditions. It is worth noting that the stages or circles of stranger attractors are not the same as each other because they are complex nonlinear systems influenced by a multitude of interactions and factors. Thus, the states of different learners' interlanguage are different though fractal shape is the same. These are all strange attractors though there are a multitude of influence and interaction shaping and changing the circles. Participant #3 reported her experience as follows:

“My first experience with English goes back to the time when I was a student in junior high school. At that time, there were no institutes in our little town. The teacher came into the class and wrote some words on the board along with their meanings in Persian. She asked us to memorize those words. This memorization actually helped me a lot because it facilitated understanding of the sentences in the book. The system of teaching was based on grammar translation method. When I got diploma, I was accepted in entrance exam for universities to study as a student teacher in TEFL. But when I attended in university classes, I didn't understand anything because I hadn't heard even a sentence orally up to that time. When the professor uttered a sentence, I couldn't understand. The only thing I did was to interpret it based on the Persian sounds and change it into a Persian word. However, this state did not last too much since I could improve my English through reading more books, listening to the tapes, and engagement in class activities for instance lecturing about a topic. During my language learning, I have always used Persian as a help and it has been very beneficial to me although at more advanced stages I use it little”.

This narration vividly shows that the process of language learning is initially guided by Persian as the first language attractor which is more powerful than target language attractor. As the development occurs, the force of this attraction decreases and instead learning process tends towards English as the second language attractor.

No Attachment to any Specific Theory to Explain SLA

Historically, SLA is crammed with divergent theories each reporting the process of language acquisition in a specific way. Taking a glance at the language acquisition history reveals the fact that each time a new theory has drawn the attention of researchers to provide them with a

rationale accounting for the complex process of language learning. Each theory emerges to give an account of the previous neglected issues of language learning; however, this complex process could not totally be justified by each of these theories. For example, the Universal Grammar (UG) theory of Chomsky (1966) with an emphasis on the innate capacity of mind for learning could overcome the drawbacks of behaviorism which did not determine any role for mind and internal processes. But this theory was also based on the isolationist view of language learning ignoring the significance of social context and influences. In fact, the most important theories which had the most significant impact in the field of SLA might be behaviorism, universal grammar of Chomsky, input hypothesis, output hypothesis, interaction hypothesis, and Vygotsky's sociocultural theory.

A complex model of SLA based on C/CT should be able to accommodate all the opposing ideas, perspectives, and views under the same umbrella. With respect to C/CT which sees language as a complex, and dynamic system with a large number of influences, no theory can solely explain its complexity. However, the influence of different theories as a whole contributes to a new understanding of this process. The analysis of narratives showed that each individual did not learn English in the same way. Actually, each narrative presents different aspects of SLA with respect to divergent theories. Participant #8 narrated the story of his language learning as follows:

“Repetition, practice, and memorization of words and English expressions and idioms helped me improve my listening, speaking, reading, and writing”.

While participant #2 explained:

“I loved to watch films, write the nice idioms and expressions with their meanings and then memorize them. This was a very good way for me to improve English”.

These narratives illuminate that learners could improve their language learning through memorization or rote learning, repetition, and practice. This gives us the insight that the behavioristic view of language learning can also lead to improvement. Further analysis of data indicated evidence for advocating other SLA theories. For instance, participant #7 stated:

“I recall that I used to just attend English classes without purpose. But I started watching soap operas and reading novels in English, or wandering in the library to find an interesting book. Sometimes, I listened to the music. All of these were actually helpful, because consciously or unconsciously I gained something from them which made my English better”.

Based on this narrator's story, all these input sources helped her develop English language proficiency. This indicates that the input hypothesis of Krashen (1987) and the unconscious acquisition through an exposure to language input can also account for the complex process of SLA. Participant #6 narrates based on Swain's output hypothesis (1995):

“I liked speaking so much. It not only gave me enjoyment but also improved my English. Because during speaking, I noticed I didn't know some grammar or vocabulary. Thus, it made me go and look for the grammar and words and learn them”.

She found that the output pushes her to notice the difference between what she knows and what she does not know, or the gap between her interlanguage grammar and target language. Participant #10 witnesses the evidence for UG in terms of principles and parameters:

“Sometimes learning grammar becomes very easy for me. When I understand that in both English and Persian, some structures are the same. For example, both languages have the same tenses, subject position, and prepositions. I think our minds are constructed in a way to understand all of these, because of their sameness in all languages”.

The three pursuing narrative reports sequentially can be taken as the pieces of evidence for acculturation, interaction hypothesis, and sociocultural theory respectively:

Participant #6

“When I watch soap operas I just imagine myself in their world and culture, little by little I get familiar with their culture and the way they act and speak...”.

Schumann's (1978) acculturation assumes that acquisition occurs due to learners' social and psychological integration with the target language group and culture. As the respective quote highlights, the narrator has a psychological tendency to be integrated with English culture.

Participant #1

"I remember I went shopping I liked to where there were many tourists. I found some to speak with them; this type of conversation improved my English. Because when I had a problem in speaking, they tried to understand me and simplified what I meant".

This narration shows language learning inspired by Long's interaction hypothesis (1981, 1996) asserting that comprehensible input was the result of modified interaction (Brown, 2000) and structures are developed through engagement in conversation and interaction with native speakers or more advanced interlocutors.

Participant #10

"I also started to enter into the virtual world and chat with my English friends and other people whose English was perfect. This was a good way of socializing and learning English as well. Sometimes, we made a virtual group, this created a world in which I could learn from those who were more knowledgeable persons, it seems as if I were in a class with a teacher, even better than that. After sometime I myself became knowledgeable with their assistance".

The last narration provides a piece of evidence accounting for language learning process on the basis of Vygotsky's sociocultural theory which explains the relationship between mental functioning and social, cultural, and historical situations in which this functioning occurs (Wertsch, Del Rio, & Alvarez, 1995). Mediation, Zone of Proximal Development (ZPD), and Scaffolding are the key concepts of this theory. Language as a cultural artifact mediates higher mental functioning and social activities.

Thus, language learning takes place through a social interaction when there is distance between one individual's actual developmental level and the potential level that (s)he will achieve through collaboration with a more capable person. Scaffolding refers to the tutorial assistance that is collaborative, contingent, and interactive (Wood, 1988, as cited in van Lier, 2004). The

narration shows that the participant's learning occurred through social interaction in the virtual world in which the participant gained language assistance through interaction with more knowledgeable people via WhatsApp, Viber, Skype, or any other networking devices. Therefore, ZPD was created between the participant who was at a low level of language knowledge with knowledgeable individuals leading to the promotion of language learning.

In sum, the insights obtained from all the above mentioned narratives lead us to understand that there is no single and one size- fits- all theory, method or pedagogy to justify the complexities, dynamicity, and unpredictability of language learning. According to Mirzaee and Ghanizadeh (2013), language learning process is too complex and multifaceted to be captured in an all-encompassing prescription, not tailored to individual needs. Hence, all teaching and learning methods and approaches from inductive to deductive, from drill based instruction to task based instruction, from communicative oriented approaches to grammar oriented approaches should be appreciated. Chaos complexity models of language learning indeed provides implications for theorists, researchers, and teachers to take a more holistic stance towards the complexity of language learning process with a focus on all influences and interactions within and beyond language as a system. In fact, any confinement to a specific theory, method, or approach ignores dynamicity, liveliness, and complexity of language. Accordingly, Harshbarger (2007) believes "Learning and learners are not amenable to a best method, a best book, a best test, or a best curriculum. Learners are most amenable to influences that recognize, respond to, and nurture their truly complex and dynamic learning processes." (p.29)

The C/CT as a plausible theory reconciles all theories in the form of dichotomies in the history of SLA as opposing positions against each other. For instance, the dichotomy of nature and nurture can be considered in a different way in C/CT as an individual possessing cognitive and mental capacity while at the same time an agent who is interacting with all elements and factors in the environment. Thus, to draw a picture of language learning as a nonlinear complex system which is continuously in chaos and order, there is a need to take all the views, theories, and influences into a whole framework and look at the behavior of the whole which better sheds light on this complex phenomenon.

Edge of Chaos as a Zone for Language Development

In a dynamic system, chaos and order coexist in a dynamic tension (Menezes, 2013). Ockerman (1997) states that a dynamic system has the potentiality to exhibit remarkable things when it operates in the narrow zone between order and chaos named as *edge of chaos*. He adds that the edge of chaos is a paradoxical state or a spiral chance between chaos and order accompanied by the features of risk, experimentation, and exploration. Such point in language learning process is where the system functions at the highest level, the information processing occurs, risks are taken, new behavior is experimented and emerges. Actually, with the emergence of new behaviors, the operating rules of the system are modified in a way that overall levels of fitness of system are changed and improved in relation to other systems, so the system has learned or evolved. Accordingly, Larsen-Freeman and Cameron (2008) hold that any system near or at the edge of chaos changes adaptively to establish stability, designating a high level of responsiveness and adaptability.

In Ockerman's sense (1997), five factors determine whether a system has moved into the edge of chaos which include "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) These five factors can be applied to SLA which Menezes (2013) regarded as "the rate of exposure to the language, the richness of interactions, the low level of anxiety, and the rate of autonomy or control of one's own learning" (pp. 409-410).

Iranian EFL learners' narrations illuminates the points which show they move into the edge of chaos through a number of factors not related to the educational context in which they have learned English. For instance, participant #7 highlights how going to American university provided her with a great amount of exposure:

“In language classes of school, a teacher taught us grammar, vocabulary, how to translate texts into Persian. We didn't hear English at all. My ears were not accustomed to any English conversation until I got my diploma and I had to continue my studies in American university. There, what I were exposed to English all the time. It was interesting for me a lot because what I heard English. Actually, going to the university was a springboard for my progress in English”.

Although the participants' experiences in school were associated with poor traditional instruction, they narrated how the richness of interactions and a great amount of rich and diverse input in institutes or other locations led them into the edge of chaos. Participant #3 illuminated that:

“In language institute I had an experience which was not comparable with English in school. We had a lot of interactive activities such as pair work, group work, collaborative projects, and role play. Each session, we had listening texts to work. We watch movies every other session to be familiar with people's behaviors in real contexts”.

The low level of anxiety is another factor which promotes edge of chaos. When a learner has the feelings of frustration, uneasiness, apprehension, and worry, the process of language learning is inhibited. In contrast, language learning process is promoted through creation of conditions in learning contexts in which the anxiety level is lowered. Participant #4 narrated his experience as:

“I was in a language institute that I was put in a class with a language teacher who was very rigid and bad-tempered. When I went to the class, I was so blocked that I didn't understand anything. I had a lot of anxiety in this class. During this term, I didn't learn anything. Next semester, I was put in another class in which the teacher was a kind, good tempered one. In this class, I didn't have anxiety at all. Instead, the class atmosphere was in a way that I could learn all the things. I enjoyed learning a lot. I think not having anxiety helped me to develop my English”.

According to this narrator, when anxiety decreases, the language system becomes open. Hence, new elements can feasibly enter the language learning system and force it toward transformation and development. The individuals can also approach the edge of chaos as they take control of their learning and become autonomous and self-regulated. In regard to this issue, participant #6 said:

“I think the best thing caused my progress was that I had a control on my learning. When I felt that class instruction was not enough me and couldn't learn, I searched on the net and found the materials and read. I always was very eager to learn more and more. I had a notebook in which I noted down the things I had learned that day. I didn't need to be encouraged to work; I self-controlled my work”.

The edge of chaos in all these narrations shows that in each individual's learning history, this critical point differs from another. Different events in learners' personal lives lead to the zone between stagnation and spontaneity or lack of movement and liveliness. This transitory stage or sudden shift transforms stability into growth and creativity.

Movement Towards a Never-Ending Equilibrium

As Waldrop (1993) puts it, the chaotic and complex systems are always in transition and unfolding. If a system reaches the equilibrium, it is not just stable but it is also dead. That is, language learning systems as nonlinear, autonomous, and complex systems continuously move towards the edge of chaos since reaching the undesirable state of equilibrium means the demise of the system. In the case of language learning, the state of equilibrium is gained when learners completely stop learning the language. Participant #5 who experienced this state in learning another language said:

“Because I was supposed to go to Sweden and live there, I decided to study Swedish. It was so difficult for me to learn this language. In Iran, I didn't find an institute to learn it. After sometime, I went to Sweden, but I didn't know anybody, my husband helped me but I could learn a bit. Two months later, we went to Germany and decided to live there. I think, at the moment, I don't know Swedish. I set it completely aside and began learning German”.

This narration clearly shows that a state of equilibrium or language learning cessation has happened to this participant. In fact, language learning is similar to a river, always in movement and never stops moving. Stagnation means the death of the river. Similarly, learning process also never ends in a state of equilibrium though it might experience greater or less stability in different periods. Actually, participant #10 highlights her experience of language learning which provides evidence for the instability of the system:

“Before diploma, the system that we were taught was traditional which included memorization of words and rules, then their applications. We had never practiced conversations in our classes. When I entered the university, I felt discouraged in the first session. Because my field was TEFL and I expected it to be taught on the basis of school system. Every day I faced a lot of challenges. What should I have done? Should I have left the university? In language classes, I didn't understand anything. I thought there was a problem with my mind. But after a while I decided to do my best and study more. I asked for other people's advice. The different ways I used to improve English such as reading story books, watching English books, and listening to the CDs. Finally, I improved my English little by little until I was satisfied with English. At the moment, My English is perfect but my learning has not been interrupted. I use every occasion to learn something for example reading books, newspapers, watching films and so on”.

A look at this narration reveals language learning is accompanied by different stages of temporary stagnation, order, chaos and instability; however, it never does reach equilibrium or stability. At first, the participant takes a road less travelled by and confronts barriers and problems along this learning route. But he, then, overcomes the feelings of confusion and uneasiness, reaches a new learning path, and exhibits a new learning behavior or a strange attractor.

Unpredictable, Self-Organizing, and Emergent Nature of Language Learning

Dornyei and Murphey (2003) state that groups are considered to have a life of their own. That is, each individual behaves differently outside the group. In this regard, Finch (2004) argues that complex systems display unexpected and amazing behaviors that are a property of the system as a whole, rather than its elements. He adds that systems show unpredictability as well as the patterns of regularity. In Kirshbaum's (2002) sense, the unpredictability inherent in the natural evolution of complex systems then produces results that are completely unpredictable on the basis of the knowledge of the original conditions. These unpredictable results are known as emergent properties. Therefore, emergent properties indicate how complex systems are intrinsically creative.

In language learning contexts, each teacher has had this experience that though a well prespecified lesson plan has been followed, it would be impossible to predict what takes place at

any moment in the lesson. Sometimes, unwanted and unpredictable events happen during lessons which lead to maximum amount of learning. Unpredictability can be seen in Iranian EFL participants' narrations. According to participant #8, his SLA continuum was suddenly triggered and augmented since he needed IELTS certificate to go abroad and continue his studies. He explained his experience as follows:

“I wanted to continue my studies at Ph.D. level in one of European universities, I needed IELTS certificate. My English was very weak. During two months that I had time, I began studying hard and participating in classes of language institute near our house. Surprisingly, my English improved a lot. I myself didn't believe how perfect and excellent my English had become”.

Self-organization as a property of complex systems, according to Larsen-Freeman and Cameron (2008), leads to a new phenomenon or a process on a different level or scale which is called *emergence*. They add “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). Iranian EFL learners' narrations show a phase shift is observed when they investigate different experiences outside the walls of language classrooms. For instance, participant #2 stated:

“Language teaching in school was very poor and tiring. The activities the teacher wanted us to do was translating long reading comprehension texts of the textbook, memorizing a long list of words along with their meanings in Persian, and doing exercises. I wanted to become an English teacher in the future. Thus, I decided to improve my English to the extent that I would speak fluently. My English was not good at all. So I decided to do different activities such as listening to music, watching films, reading books, chatting online with my friends, and talking to the tourists. Actually, these activities increased my knowledge of English so that after a while I could speak English fluently”.

This narration indicates that SLA conditions in school are not appropriate to enhance language learning. Thus, a new interlanguage phase or order emerges in this participant's SLA history. This new phase which the learner calls *fluent speaking* is a behavior more than sum of all activities in school and other outside experiences. If we look at all these narrations, it is understood that SLA is facilitated through increasing the rate of exposure to English. For

instance, by dint of mediation of various artifacts including movies, CDs, music, laptop, television, newspapers, books, and online chat, SLA is enhanced.

Conclusion

C/CT is considered as a powerful tool to appropriately investigate the complex process of language learning as an organic entity always in flux and movement. It also broadens our understandings of such a nonlinear, complex, and dynamic phenomenon leading to take a new stance towards it. In fact, the application of theoretical insights drawn from this comprehensive theory can have a striking influence on language pedagogy, methodological choices, and classroom practices. When teachers and researchers gain insightful understandings regarding the fact that SLA is not treated as a fixed, linear, and homogenous phenomenon based on cause and effect relationships, they change the way of approaching this multifaceted phenomenon. It is thus understood that in the social ecosystem of language learning classrooms, a multitude of factors and influences in a chaotic, unpredictable, and uncontrolled fashion are at work all the time giving rise to the emergence of a complex order. This dynamic order has relative stability since never does reach total equilibrium. This order, as van Lier (2004) puts it, provides active participants with affordances and opportunities which are picked up, and eventually learning emerges as the result of interaction between a large number of factors within or beyond the classroom setting.

This narrative research based on Iranian EFL learners' histories and stories applied the theoretical underpinnings of C/CT to obtain a fresh understanding of learners' process of learning English. The qualitative analysis of these narrations showed pieces of evidence for complexities of SLA. Thus, the findings of this qualitative study shed light on the path less travelled by researchers in the field of SLA. Hopefully, this study provides insights and implications for other researchers to conduct empirical studies and further understandings of applying this new theory in the realm of language learning and teaching.

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Genişletilmiş Öz

Dili doğrusal, girdi-çıkı tabanlı bilgi işleme modeli olarak gören basit dil anlayışına karşı alternatif bir dil öğrenme ve öğretme anlayışı öneren kaos/karmaşıklık teorisi (bundan sonra C/CT olarak anılacaktır); son on yıl içinde SLA araştırmacılarının dikkatini çekti. Geleneksel olarak, dil öğrenimi gibi karmaşık bir süreç, safça, doğrusal bir biçimde sunuldu ve faktörler arasındaki sebep ve sonuç ilişkilerini bulmak için bilimsel yöntemlerin uygulanması yoluyla araştırıldı. Ancak, sosyal bilimlerde ve özellikle de SLA'da C/CT'nin ortaya çıkmasıyla birlikte, dil öğrenme süreci ile ilgili bu basit görüş değişti ve dil öğrenme süreci çeşitli kuvvetler, faktörler ve araçların etkilediği doğrusal olmayan dinamik bir sistem olarak görüldü.

C/CT; dil öğrenimini öğelerin iç bağlantıları ve etkileşimlerinin yanı sıra bunların bağlamsal faktörler ve çevre ile ilişkileri açısından açıklar. Dolayısıyla, bu alternatif görüşe göre dil sabit değil büyüyen, gelişen ve aşağıdan yukarıya dil kullanımı dinamiği içinde değişen dinamik bir süreçtir. Dil gibi karmaşık bir sistem için makul bir açıklama sağlamaya yönelik potansiyel katkıları nedeniyle C/CT, araştırmacıların dil ve dil öğrenme sorununa daha fazla ışık turmak için araştırma yapmaları gereken bir alandır. Bu arada, C/CT ve dil öğrenme ile ilgili literatür taraması yapılırken özellikle İran'daki EFL bağlamında, C/CT'nin dil öğrenimi bağlamında dil edinimine uygulanması hakkındaki araştırmalarda bir yetersizlik olduğu saptanmıştır. Bu doğrultuda, C/CT'den esinlenilerek, bu çalışmada öncelikle C/CT'nin özellikleri ve bunların dil öğrenmeyle ilişkilerinin bir incelemesi sunulmaktadır. Ardından, yine C/CT'nin esiniyle, dil öğrenme süreçlerinin gelişimini göstermek için İranlı EFL öğrencilerinin dilsel arka planlarına odaklanılmaktadır.

Bu nitel çalışma; katılımcıların yaşamlarına ilişkin anlatıları, hikâyeleri ve tarihçelerine odaklanan bir anlatısal araştırmadır. Anlatısal araştırma, yaşam deneyimlerine ilişkin detaylı hikâyeleri yakalamak için en iyi nitel yaklaşım olarak kabul edilir (Ary, Jacobs ve Sorenson, 2010). Bu araştırma yönteminin amacı sözlü veya yazılı söylem şeklindeki anlatıyı anlamlandırmaktır. Böylece, amaçlı örnekleme temelinde, orta veya ileri düzeyde dil yeterliliğine sahip her iki cinsiyetten on İranlı EFL öğrencisi bu anlatısal araştırma için seçildi. Bu on katılımcıdan lisans veya yüksek lisans derecesine sahip altısı İran'da yaşamaktalar,

İngilizceyi İran'daki dil enstitülerinde verilen dil derslerine katılarak öğrenmişler ve İran üniversitelerindeki İngiliz Edebiyatı ya da TEFL bölümlerine devam etmekte. Diğerleri Kuveyt ve Almanya gibi ülkelerde yaşamaktalar ve bu iki ülkedeki üniversitelerde İngilizce dışındaki alanlarda eğitim görmekte.

Bu çalışma İngilizcenin yabancı bir dil olarak öğrenildiği ve öğretildiği İran'daki EFL bağlamında yapıldı. Bazıları başka ülkelerde yaşasalar da, katılımcıların İngilizce deneyimlerinin büyük bölümü İran liselerinde ve İran'ın farklı kentlerindeki özel dil enstitülerinde biçimlenmiş. Anlatıya dayalı bu nitel çalışmanın araştırmacısı katılımcılardan işbirliği içinde kurgulanan anlatı ve öyküler temin etmek için röportaj yaptı. Röportajın türü; soruşturma alanının ve soruların önceden belirlendiği ancak görüşmecinin katılımcıların deneyimleri, olaylar ve fenomenler hakkında daha derinlemesine bilgi elde etmek için soruları görüşme esnasında değiştirme ya da çeşitlendirme özgürlüğüne sahip olduğu yarı yapılandırılmış görüşme idi. Araştırmacı, görüşme sırasında her birey ile işbirliği yaparken, her anlatı için silsile, kronoloji ve ortak çalışmaya dayalı yeniden öyküleme sürecine odaklanarak anlatıların önemli özelliklerini dikkate almıştır.

Araştırmacı, anlatıların analizine, bireylerin deneyimlerindeki ilgili temaları ortaya çıkarmak amacıyla deneyimlerdeki bireysel öykülere odaklanarak biyografik bir lensten yaklaştı. Katılımcıların zaman ve mekân bağlamında bireysel deneyim ve tarihlerine dayalı olarak toplanan veri yeniden düzenlendi, çözümlendi ve kronolojik bir sıra çerçevesinde biçimlendirildi. Verilerin tematik analizi İran'daki EFL bağlamında SLA'nın karmaşıklığına ilişkin kanıt parçası niteliğinde temalar ortaya koydu. Bu nitel çalışmanın bulguları SLA alanındaki araştırmacıların pek de sapmadığı bir yola ışık turmaktadır. Aslında, diğer araştırmacılara bu yeni teoriyi dil öğrenimi ve öğretimi alanlarına uygulamak için yeni anlayışlar ortaya koyma ve ampirik çalışmalar yürütme hususunda içgörü ve olanaklar sunmaktadır.

Appendix

Interview questions

- 1) Would you let me know about the story or experience of your learning English from the beginning to the current moment?
- 2) How did you learn English during the first phases of English learning?
- 3) Which ways helped you improve English in the subsequent stages?
- 4) Do you think there was an effective factor(s) in your life helping you more improvement?
- 5) What has been the role of the first language or Persian in learning? Has it been facilitating or debilitating?
- 6) At this level, do you think you need to improve English? Do you think you are perfect in English?
- 7) Do you know any language other than English?
- 8) How did you learn it? Was its learning process different from English?
- 9) Is it used in your life along with English or Persian?
- 10) If you want to suggest someone learn English, or any other language, what is your advice?