A complex dynamic systems perspective on foreign language anxiety

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Abstract

Within SLA, there has been a growing awareness and understanding of complexity theories in recent years. In this article, the authors aim to address foreign language anxiety embodied in individuals in the classroom from a complexity perspective. Through a 'complexity' lens, we attempt to offer complexity-informed explanations for the emergence and maintenance of foreign language classroom anxiety (FLCA), and suggest ways in which it depicts features typical of a complex dynamic system. Core features of complex dynamic systems, such as complex interrelations, openness, non-linearity, decentralized causality, unpredictability, dynamism and emergence, are discussed with a view to suggesting that complex dynamic systems perspective can facilitate our understandings of the dynamism and fluidity of FLCA in SLA studies.

Keywords: complex dynamic systems; foreign language anxiety; foreign language classroom; affective states

1. Introduction

At present, much of the SLA research on individual learner differences implies the influence of affective variables, including attitudes, motivation, language anxiety, and willingness to communicate, among others, on the development of learners' language proficiency. Of these affective variables, foreign language classroom anxiety (FLCA) has long been recognized by practitioners and researchers as a potentially debilitating force (cf. Horwitz, 2010). To grasp a more real-life sense of this affective factor, one could consider the familiar moments in L2 language classrooms when teachers are faced with students who sit in the back of the class, staying as silent as possible, answering questions as little as possible, and/or showing their uncertainty when called upon in class. One of the possible reasons for such classroom reactions can be attributed to FLCA, which often occurs when learners strive to successfully use an L2 which has not yet been adequately acquired or fully mastered (Gkonou, 2011). Given that language classrooms are contexts where self-expression takes place (Gregersen & MacIntyre, 2014), having to perform through a limited linguistic code in the presence of others is potentially face-threatening and can lead to worry and distress. It is perhaps safe to say that almost all language learners might be exposed to FLCA in a way; even high achievers are likely to experience some language anxiety during classroom learning situations (Horwitz, 2000).

Given the abundant stockpile of existent research on FLCA, at a glance one is immediately led to believe that it has clearly occupied a special place in our thinking and understanding of L2 learning. For this reason, one may maintain that within SLA, FLCA is perhaps not in its infancy any longer because it has been recognized and understood in the strict sense of the term. Yet, despite all this research, there is still a long hope-filled way to go through to fully understand its nature. In line with this assumption, there is a hitherto uncharted line of thought, in which case we seem to have fallen short of encompassing its full spectrum. This area of research concern relates to the 'complexity' of FLCA, which possibly bears out a new challenge for researchers. In order to understand the complexity of FLCA, the present paper will view it as a complex dynamic system, emerging from the interplay between multiple interrelated agents dynamically involved in the classroom. The article will begin with a brief overview of complexity theory as well as research on FLCA. It is hoped that the following sections help to provide the necessary grounds for focusing on understanding FLCA as a complex dynamic system in the remainder of the article.

2. Understanding complexity theory: An overview

In the late 1990s, social sciences came to terms with 'complexity' perspectives with an increasing array of books, articles, conferences and workshops on 'complexity', which subsequently led to what Urry (2005) called *complexity turn*. Since that time, 'complexity' perspectives have sought to portray the multi-faceted reality of the world in different fields. At this point, the immediate question that comes to mind is: "What are the assumptions behind Complexity Theory (CT)?"[1]

To begin with, it is noteworthy that 'complexity' is still a new object of inquiry with no rigorous and consensual definition (Mitchell, 2009). However, it has been argued without dissent that CT is a reaction to straightforward cause-and-effect models, linear predictability, and a reductionist, atomistic, analytically-fragmented approach to understanding phenomena, replacing them with organic, non-linear, anti-reductionist and more holistic approaches (Morrison, 2008). In a sense, however, the word 'theory' in CT is likewise not singular, but rather multidimensional (Larsen-Freeman, 2012). It rests on a set of shared tenets with several related approaches including systems theory, chaos theory, complex adaptive systems, complex ecological systems (see Tudor, 2003; van Lier, 2000, 2004), (complex) dynamic systems theory (see de Bot, 2008; de Bot, Lowie, & Verspoor, 2005, 2007), emergent systems, emergentism (see Ellis, 1998, 2008), and non-linear dynamics, among others, which all reject many of the traditional assumptions used to inform and direct research for many years (Dörnyei, 2014; Larsen-Freeman, 2012; Larsen-Freeman & Cameron, 2008; Smith & Thelen, 1993). In a real sense, then, through complexity science, not only is it possible to recognize and respect interdependencies of diverse perspectives, but also to accommodate and integrate them in different ways (Larsen-Freeman, 2012; Morin, 2008). Considering this theoretical backdrop, McAndrew (1997) strongly claimed that no one can find any reality without a complexity-informed perspective in mind.

Basically, complexity theories attempt to explain how complex systems (e.g., flocking birds or schooling fish in nature) emerge and are maintained (Larsen-Freeman, 1997, 2012). But what are really these complex systems? According to Kauffman (1993, 1995), complex systems are composed of myriads of self-similar agents that interact with and adapt to one another and the environment, co-evolving and self-organizing without any central control. According

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[1] In this paper, no distinction is made between chaos and complexity because applied linguists do not seem to distinguish between them, referring to them as chaos/complexity theory (Larsen-Freeman, 1997, 2011; Larsen-Freeman & Cameron, 2008a). Throughout the paper, the authors use the term *complexity theory* for its well-established currency in the field.

to CT, it is impossible to extricate and separate the nested variables and/or agents involved in a piecemeal fashion because the system is irreducible to elementary laws or simple processes (Kauffman, 1993). Hence, it becomes clear that CT characterizes entities as non-linear, complex processes and explains that "[w]e will never be able to identify, let alone measure, all of the factors accurately. And even if we could, we would still be unable to predict the outcome of their combination" (Larsen-Freeman, 1997, p. 157). In this sense, "the 'complexity' of a complex system arises from components and subsystems being interdependent and interacting with each other" (Larsen-Freeman & Cameron, 2008, p. 201). And, as Mercer (2013, p. 377) argued, "boundaries between systems are rather blurry, as one system is usually simultaneously part of and subsumed by other systems".

According to Larsen-Freeman (1997), describing features of complex systems can be summarized as *dynamic, nonlinear, chaotic, unpredictable, sensitive to initial conditions, open, self-organizing, feedback sensitive* and *adaptive*. Of course, we do not intend to overview all these aspects of CT because neither does space allow for a full discussion of every feature nor is it even possible in a single work to address all the path-breaking insights of CT sufficiently (Mercer, 2011a). However, the major CT principles are briefly listed below (Larsen-Freeman, 2012, pp. 205-206):

1. Complex systems are open and dynamic.
2. They operate under conditions that are not in equilibrium.
3. Complex systems are systems because they comprise many elements or agents, which interact.
4. Change/dynamism is central. The systems adapt both through interactions with the environment and through internal reorganization/self-organization.
5. The strength of the interactions changes over time. Therefore, multiple routes are often possible between components, mediated in different ways.
6. The complexity of complex systems is emergent. It is not built into any one element or agent, but rather arises from their interaction.
7. Because the systems are open, what arises may be in nonlinear relation to its cause. In other words, an unexpected occurrence may take place at any time.
8. The structure of a complex system is maintained even though its components may change.
9. The environment in which they operate is part of a complex system.
10. Complex systems display behavior over a range of timescales and at different levels of complexity – the latter are nested, one within another.
11. Complex systems sometimes display chaotic variation.
12. Complex systems iterate – they revisit the same territory again and again, which means that the present level of development is critically dependent on what preceded it.

As for the principles of CT, Davis and Sumara (2008), however, emphasized that one does not *apply* these principles, but rather takes part in their *articulation* and *elaboration*. They claimed that "given the idiosyncratic characters, recursively elaborative and ever-divergent possibilities of complex phenomena, accounts of complexity-informed research can never be offered as events to be replicated or even held up as models" (2008, pp. 42-43).

3. Understandings of foreign language anxiety

In mainstream psychology, anxiety is described as "the subjective feeling of tension, apprehension, nervousness and worry associated with an arousal of the autonomic nervous system" (Spielberger, 1983, p. 3). In SLA, Horwitz, Hortwitz and Cope (1986) were the first to contend that language anxiety, *per se*, is domain-specific and quite distinct from other kinds of anxiety in other domains. This claim is reflected in their definition of FLCA as "a distinct complex of self-perceptions, beliefs, feelings and behaviors related to classroom language learning arising from the uniqueness of the language learning process" (1986 p. 128). Thus, FLCA is a type of anxiety only associated with the language class and should not be viewed as a global construct similar to episodes of anxiety one might experience in everyday life (MacIntyre & Gardner, 1991a). FLCA could best be conceived of as situation-specific (Horwitz et al, 1986; Horwitz & Young, 1991; MacIntyre, 1999) only if there is something unique about language learning process that makes students anxious about it. That is to say, students anxious about language learning may be confident and resilient in most other contexts, for example, in history or math classes, but not in their L2 classes.

In another line of research, MacIntyre and Gardner (1989, 1991b, 1991c) suggested a model that considers FLCA as a latent variable in psychology of language learning, and illustrates how FLCA can best be conceived of as situation-specific. According to this model, anxiety is still an undifferentiated and stable personality trait which is not specific to the language learning situation at initial stages of language learning. In other words, language students at these stages of learning are not expected to be able to differentiate their anxiety yet, "because their experiences in language class have not had sufficient time to become reliably discriminated from other types of anxiety experiences" (MacIntyre & Gardner, 1991c, p. 303). At later stages of language learning, however, students gradually begin to associate feelings of anxiety with the language class after repeated negative experiences with the classroom context. On the other hand, to conceptualize FLCA more pragmatically, Horwitz et al. (1986) developed a *foreign language classroom anxiety scale* (FLCAS) and contended that FLCA is conceptually related to three performance anxieties, namely *communication apprehension*, *fear of negative evaluation*, and *test anxiety*.

Communication apprehension generally relates to shyness, characterized by fear of anxiety about communicating with people in a given situation (Horwitz et al., 1986). In the language classroom, where learners have little control over the communicative situation and their performance is constantly monitored by both their teacher and peers, communication apprehension seems to be augmented due to the learners' negative self-perceptions caused by the inability to understand others and make themselves understood (Horwitz et al., 1986; MacIntyre & Gardner, 1989). *Fear of negative evaluation* appears during social evaluative situations, when students feel that others (the teacher and/or the peers) are ready to criticize them. Examples of behavioral reactions to fear of negative evaluation include sitting passively in the classroom, withdrawing from activities, or entirely cutting classes (Aida, 1994). *Test anxiety* refers to a type of performance anxiety stemming from a fear of failure. Test-anxious students in the L2 classroom probably experience considerable difficulty since tests and quizzes are frequent and even the brightest and most well- prepared students often make errors (Horwitz et al., 1986). Many learners are likely to feel pressure when asked to perform in the L2, because they are often challenged by the fact that they need to recall and coordinate many language points and skills at the same time during the limited test period.

Another line of research in FLCA studies has sought to address the important distinction made between *debilitating/inhibitory* and *facilitating/beneficial* anxiety. Although a good deal of evidence has pointed to the negative influence of FLCA on students' performance, FLCA can also be viewed as having a positive effect or even no effect at all on learners' performance (Dörnyei, 2005). As for *debilitating anxiety*, it is not uncommon for FLCA researchers to imagine that FLCA affects learners either indirectly, causing feelings such as worry and self-doubt, or directly through impaired performance and avoidance behavior. The no-effect position largely originated from Sparks and Ganschow's (1991) Linguistic Coding Deficit/Differences Hypothesis (LCDH), which suggests that high performance in language learning depends on learners' cognitive abilities, L1 deficiencies and aptitude. As for *facilitating anxiety*, research has shown the positive side of anxiety related to alertness (Young, 1992), positive energy (Aida, 1994), and tension or arousal (Ehrman, 1996). Spielmann and Radnofsky (2001) suggested a shift from *anxiety* to *tension* because the term *language anxiety* inevitably has negative connotations and results in the acceptance of a one-dimensional view of FLCA. However, Horwitz (2014) expressly cautioned researchers and teachers to consider it as probably one of the most dangerous aspects of language teaching. She urged language teachers to try to increase students' motivation instead of trying to make them more anxious in class.

Notwithstanding the positivity and negativity view of FLCA, research into FLCA has often focused on the macro-skills of language learning (Gregersen & MacIntyre, 2014), and researchers have tended to explore FLCA through correlations between skill-specific anxieties and general FLCA (Pae, 2013). As such, several studies have been carried out to investigate each of these skill-specific anxieties, namely speaking anxiety (e.g., Gregersen & Horwitz, 2002; Young, 1990), writing anxiety (e.g., Cheng, 2002, 2004), listening anxiety (e.g., Elkhafaifi, 2005; Horwitz et al., 2010; Lund, 1991), and reading anxiety (e.g., Matsuda & Gobel, 2001; Sellers, 2000). Among the language skills, however, it is noteworthy that speaking has often been suggested as the most anxiety-provoking language skill in foreign language learning situations (Gregersen & Horwitz, 2002; Horwitz, 2000, 2001; Young, 1992).

Having outlined the route of FLCA research over the years, let us now return to the question of adopting a complex dynamic systems perspective on FLCA. In the remainder of the article, we will set out to give a brief account of the 'complexity' of FLCA laid implicit in the literature, and then explain how FLCA depicts features typical of a complex dynamic system.

4. On the trail of 'complexity' of foreign language anxiety in SLA studies

Whilst it is true that the above-focused view of FLCA as a language-specific-skill has inspired interesting directions to explore the skill-specific anxieties, it has basically failed to aptly manifest the 'complexity' of this important construct in its entirety. In other words, it is perhaps a leap of logic to believe that simply dividing the whole (language learning anxiety) into separate smaller parts with clear boundaries (i.e., language skills) still leads the way in current research on FLCA. In this anti-holistic view, the concept of *emergence* is not recognized, because, as Mason (2008, p. 33) argued, "the emergent properties of a complex system as a whole are more than merely the sum of its separate parts". As such, the *emergence* of different skill-specific anxieties has been accounted for without considering its complex interactions with each other. This is a misassumption because it is believed that "*emergence* is not built into any one agent, but rather arises from their interactions" (Larsen-Freeman, 2012, p. 205).

Thus, originally FLCA was rather conceived of as a reducible variable with linear, cause-and-effect relationships and explanations in which different anxiety-related aspects are almost accurately measurable and the outcomes are somewhat predictable and linearly justifiable. That is, FLCA, as discussed above, was mainly linked to three distinct but related types of anxiety, namely communication apprehension, fear of negative evaluation, and test anxiety (Horwitz, et al., 1986). But this is a complete contrast to the thinking behind complexity theories

which states "it is unproductive to isolate individual variables as a way of describing a system. Rather, the trajectory of complex systems can be best mapped by the description of emergent patterns of behaviors" (Burns & Knox, 2011, p. 7).

Of course, over the years research has gradually viewed anxiety as being linked to other affective variables, related to the *classroom affective state*, such as motivation (Gardner & MacIntyre, 1993; Gardner, Day, & MacIntyre, 1992), perfectionism (Gregersen & Horwitz, 2002), second language tolerance of ambiguity (Dewaele & Ip, 2013), and foreign language enjoyment (Dewaele & MacIntyre, 2014). As MacIntyre (1995) argued, FLCA is in interaction with several other variables; it is simultaneously influencing and is being influenced by other variables. For example, he argued that "aptitude can influence anxiety, anxiety can influence performance, and performance can influence anxiety" (1995, p, 95). Yan and Horwitz (2008, p. 168) likewise developed a grounded theory model of FLCA and argued that language aptitude, learning strategies, interest, motivation, or achievement influence and are themselves influenced by FLCA. Drawing on these research findings, one may conclude that the 'complexity' vestige of FLCA has already started to manifest itself in the literature over the years.

5. Drawing the line: A complex dynamic systems approach to understanding foreign language anxiety

Given the intertwined interplay between the individual variables existing in the affective domain with their unlimited, multiple, erratic and reciprocal relationships, each individual variable can be considered a complex dynamic system, which just emerges from the interaction between other variables, and it, *per se*, is not an entirely self-contained variable (Osberg, 2008). In that sense, when faced with an overload of variables, the independence of individual variables along with their generalizable findings then becomes questionable in the field (Kramsch, 2011). [2] This might, in fact, make researchers discouraged in their inquiries, which consequently may harm the future of the field (Dewaele, 2014).

The individual affective variables which have already been explored from complexity perspectives include motivation (Dörnyei, 2010; Dörnyei & Ushioda, 2011), willingness to communicate (MacIntyre & Legatto, 2011), and self-concept (Mercer, 2011a, 2011b, 2013). This new place of research interest suggests

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[2] In relation to this discussion, Byrne (2002, p. 31) argued against such "variable-centered analysis" in social sciences and argued for the "death to the variable". However, such a "death blow" seems to be extreme for researchers such as Larsen-Freeman and Cameron (2008) or Mercer (personal communication, 2014) because they hold that the use of the term *variable* is still needed for the investigation of our inquiries. See also Larsen-Freeman and Cameron (2008) for their preferred use of the term *collective variable* in research instead of *variable*.

the potential of exploring other affective constructs from a similar perspective. Therefore, there seems to be an urgent need to delve further into the different subsystems of the affective system of language learners through a complex dynamic systems approach and then try to piece together these insights to create a fuller picture of the dynamics and 'complexity' of the whole affective system. At this juncture, however, it does not seem manageable to ideally study the dynamics and 'complexity' of all the individual variables involved in the *classroom affective state* in a single paper. With this objective in mind, we attempt to build a CT-inspired understanding of FLCA as another complex dynamic system of the whole affective domain. For this article we will focus on certain core CT features, namely complex interrelations, openness, non-linearity, decentralized causality, unpredictability, dynamism and emergence. Moreover, these certain CT features also go hand in hand within a complex dynamic system such as FLCA; therefore, it might also not be feasible to discuss these intertwined features explicitly without reference to each other.

To begin with, it is worth reflecting on the nature of FLCA as 'context-dependent' (see Kim, 2010). For learners, language is only a vehicle for communication, and through language, they mirror their identity in a given context. Interestingly, the context of FLCA (i.e., language classroom) has been described as a complex dynamic system in itself. Whilst it is irreducible to its component parts, it is related to different contexts outside the language classroom (see Cameron & Larsen-Freeman, 2007). Thus, an appreciation of group dynamics and interactions within the classroom, as well as a range of ecosystems outside it, could lead to differential levels of FLCA. In her study of Greek EFL learners, Gkonou (2013) used Bronfenbrenner's (1979, 1993) *nested ecosystems model* to further understand the 'complexity' of FLCA. She found that the mesosystem, that is students' prior foreign language learning experiences, influenced their present degree of FLCA. The findings also indicated the existence of an ecosystem and a macrosystem, which encapsulated local, success-oriented beliefs about language learning and the indigenous learning culture, both exerting an influence on students' FLCA levels in the immediate classroom context. In a sense, then, each language classroom is made up of individuals or agents (i.e., the learners and the teacher) who add to the classroom a series of divergent idiosyncratic characteristics which are entirely situation-specific and context-sensitive. These agents not only observe each other, but are also observed by each other; therefore, they are mutually dependent in multiple complex ways because of their locally-situated interactions.

Another emphasis placed on FLCA from CT perspectives relates to the matter of causality. When looking at the causes of FLCA, causalities appear normally decentered, in the sense that in a dynamic system we cannot attribute a

certain effect to a particular cause because causality is often multidimensional and unpredictable. In the FLCA literature, Dewaele and MacIntyre (2014) have also shown that the effects have been both complex and multidimensional. As such, it is perhaps implied that the occurrence of FLCA cannot be attributed to only one agent, that is, either to the learner or the teacher. This is due to the fact that the strength of the interactions between the agents cannot be easily determined and also the agency of both learners and the teacher can have various and unpredictable effects on the emergence of FLCA.

Another aspect related to the dynamic nature of complex systems is the openness of the system in which there is no initial and ultimate state for the system to reach (Larsen-Freeman, 2012). With respect to FLCA, research on FLCA has often discussed it as a matter of more or less and not of all or nothing because it actually exists on a continuum, displaying its emergence over a range of timescales and situations. In this light, FLCA is not a 'feature' that one might or might not have because it has no *a priori* absolute beginning and ending. As such, Gregersen, MacIntyre and Meza (2014) suggested that researchers need to consider FLCA as a 'state' if they want to understand the essence of this psychological variable. In the classroom, we do not have language learners with absolutely zero FLCA or with completely full FLCA. This affective variable only exists in a *dynamic* (not fixed) continuum as it interacts with many other factors in the system. In terms of the dynamism of affective variables, Norton (2000) similarly argues that anxiety and other affective factors are not stable; therefore, portraying them in terms of binary opposites (e.g., anxious and non-anxious, motivated and unmotivated) is unlikely to work. Returning to the question of FLCA, MacIntyre and Gardner (1991c) explained that FLCA could best be viewed as fluctuating and fluid over periods of time by making the link between anxiety and a range of experiences in the language classroom. If the latter are primarily negative, students may begin to associate feelings of anxiety with the language class. Learners constantly experience FLCA at varying degrees, and more importantly, with different ensuing results. This idea is in line with the CT-inspired reality that the agents of a system never move linearly along a pre-set and stable continuum because the reorganization/self-organization of the whole system operates under conditions which are not only in disequilibrium but are also mediated in different ways (Larsen-Freeman, 2012).

Another sign of the dynamics and fluidity of language anxiety can be found in MacIntyre and Gardner's (1994a) 'stage-specific' language anxiety scales (including input anxiety, processing anxiety, and output anxiety) which were proposed based on Tobias's (1986) model. According to Tobias, the effects of anxiety on learning are seen in three stages, that is input, processing, and output. These stages virtually indicate the cognitive processes involved in language

learning. As explained by MacIntyre and Gardner (1994a, pp. 286-287), "the Input stage illustrates the learner first experiences with a given stimulus at a given time (...) the Processing stage involves the cognitive operations (...): organization, storage, and assimilation of the material (...) the Output stage involves the production of previously learned materials". MacIntyre and Gardner emphasized that the three stages are interdependent and each stage depends on the completion of the previous one; however, there is no clear boundary between these stages. For example, the processing stage might come into play before the input stage has been fully completed. MacIntyre and Gardner (1994b) also cautioned researchers that if we examine only behavior at the output stage, we are, in fact, overlooking the significance and influence of anxiety at earlier stages as well as ignoring the links among stages. Overall, one might argue that the 'stage-specific' approach, as opposed to the 'skill-specific' one, directly points to the dynamism and 'complexity' of FLCA because foreign language anxiety in this approach is seen as more pervasive, subtle, and continually changing within the stages at work.

Another central debate in research on FLCA relates to the function of FLCA. As argued earlier, although most students are witnessing and reporting debilitating anxiety, FLCA could occasionally be conceived of as facilitating. In any event, depending on the initial conditions of the classroom and the mediated interrelationships between the individuals in the classroom, the contextual shaping of the FLCA system is dynamically changing. In this CT view, a fair amount of FLCA can have a positive effect on performance and achievement, facilitating the act of learning for some students whilst for others FLCA can bring about negative results, debilitating the act of learning. In this case, Tran, Moni and Baldauf (2013) addressed the double function of FLCA in a recent work for Vietnamese learners of English, showing that at times FLCA exerted both a facilitating and a debilitating influence upon their learning in class.

Therefore, the contextual shaping of the FLCA system at any timescale unpredictably emerges from the dynamic interactions of the individuals in the classroom. This is perhaps due to the fact that "there is a dynamic interplay between a learner's performance and the context affordances as perceived by the learner" (Larsen-Freeman, 2009, p. 587). *Affordance* here is defined as "the relationship between an organism and a particular feature of its environment" (van Lier, 2000, p. 252). Bearing this in mind, we can realize how the *contextual* shape (or mode) of FLCA offers facilitating anxiety as an affordance to some students whilst it offers debilitating anxiety as another affordance to other students in the classroom. In fact, different individuals perceive different contextual affordances of the *classroom affective state* at different timescales. In another study, Bailey (1983) explained the positive effects of anxiety by means of the formation of competitiveness (or motivation) in language learners. From a CT

perspective, it appears that competitiveness or motivation is what some learners successfully perceive as a contextual affordance of FLCA, which can be used to enhance their learning. As a multifaceted construct, FLCA is thus likely to be composed of both negative and positive functions in differing degrees, depending on a variety of personal and contextual factors. This signifies an important feature of complex dynamic systems, that is systems "adapt both through interaction with the environment and through internal reorganization/self-organization" (Larsen-Freeman, 2012, p. 205).
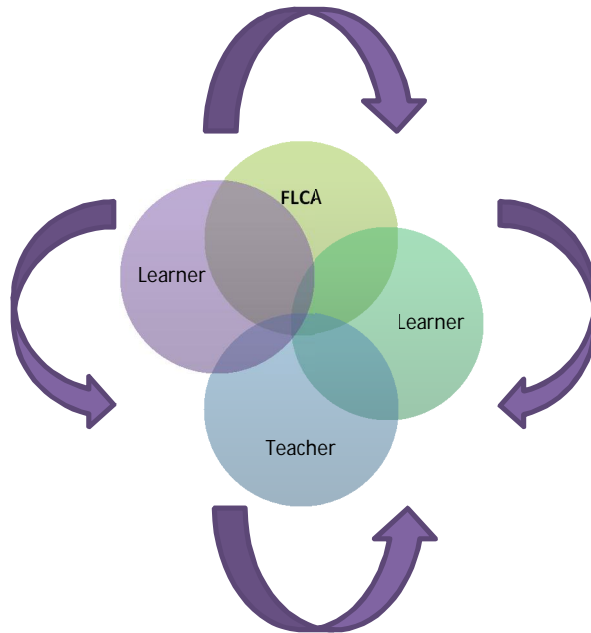

Figure 1. Conceptual illustration of FLCA from complexity perspective.

To capture a complexity-informed perspective on the contextual shaping of FLCA in the classroom, attempts have been made to visually represent the process in Figure 1. As shown above, learners along with the teacher in the classroom dynamically co-adapt the contextual shape of the FLCA system in which FLCA can unpredictably self-organize at times. At this point, it is perhaps the occurrence of self-organization in the FLCA system that is responsible for its *emergence* among individuals over time. In this view, it is plausible to say that the degree and effect of FLCA varying within and across individuals is due to the complex dynamic nature of the FLCA system. In other words, viewing FLCA as a complex dynamic system makes it clear that FLCA is constantly shaped and inherently varies depending on the multiple interrelationships of the individuals at work.

As argued earlier, however, causalities are seen as *reciprocal* in CT perspectives (see the way arrows are depicted in Figure 1); therefore, not only does the contextual mode of the FLCA system shape the learners' language anxiety, but is also shaped by their agencies and relationships. In a real sense, then, this implies that the trace of anxiety that the learners or the teacher leave in the classroom can act as mediation and stimulate the subsequent contextual mode of FLCA. Through this mutually constitutive relation, the learners' anxiety indirectly changes the contextual mode of FLCA in different and unpredictable ways, which subsequently influences their own anxiety. Looked at from this particular view, agent-environment interactions clearly come into play when exploring the contextual function of FLCA; individuals can change the context through this indirect and mediated process, which, in turn, affects other individuals as well.

As an example, consider the familiar moment when an anxious learner expresses their FLCA in the production of output or through their behavior in the classroom; what naturally occurs in such situations is the spread of FLCA in the classroom. As each learner is being influenced by FLCA, s/he is also indirectly influencing other peers in the classroom. This fact has been conceptualized as *dynamic peer orientation* of FLCA in Mahmoodzadeh's (2015) recent empirical study, mainly inspired by Gregersen et al.'s (2014) *idiodynamic method.* Mahmoodzadeh argued that the "dynamic nature of FLCA is not only attributed to intra-individual variations but also to inter-individual variations" (2015, p. 4). That is to say, an increase in one language learner's anxiety intensity can negatively influence other peers, whereas a decline in one language learner's anxiety intensity can positively affect other peers' anxiety in the classroom, too.

On a final note, whilst theorizing psychological variables such as language anxiety is necessary to develop arguments in line with CT, it is, in no way, sufficient to understand it because we cannot research any psychological variables without using appropriate methodology. Gregersen et al. (2014) have proposed a new primarily CT-inspired method called the *idiodynamic method* in order to assess and study the 'complexity' and dynamism of FLCA from a practical point of view. Language anxiety as previously conceptualized and operationalized through a range of instruments (e.g., self-report surveys, interviews, focus groups, diaries, third party observations) cannot track learners' rapidly changing affect in context on a per-second basis, but can only give us an indication of its presence and prominence over a period of several weeks or months. Gregersen et al. (2014, pp. 576-577) noted that "from a dynamic perspective, researchers switch their focus from considering correlations between summative scores on variables across a sample (...) to the formative pattern of change and events underlying the impulses that drive state language anxiety up or down". To our knowledge, the *idiodynamic method* for FLCA is perhaps the only empirical approach which can

truly capture the ongoing 'complexity' and dynamism of FLCA using a well-founded complexity framework. As for the pedagogical implications of using CT-inspired methods such as this, we would like to echo Gregersen et al.'s comment that we can help language teachers to identify individual learners' FLCA on a micro-level which, in turn, can give teachers a great opportunity to take a step back and modify their instructional strategies on a more macro-level.

6. Conclusion

Following the recent contributions of the *complexity turn* to the affective domain of SLA, we have focused on FLCA through a 'complexity' lens, which has been underresearched in the field. In this paper, we have endeavored to explore ways in which FLCA can be understood from a complex dynamic systems perspective and to show that FLCA shares characteristics typical of a complex dynamic system. It is hoped that, through this conceptual paper, awareness of the complex and dynamic nature of FLCA has been raised and that adding a complexity outlook to our understandings of FLCA may help towards developing and adopting more holistic ways of investigating it. Whilst using CT to inform our understandings of FLCA is still in its infancy in SLA, it is worth pursuing it as a promising future trajectory for researchers in the field.

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