

#### Konin Language Studies Faculty of Philology, State University of Applied Sciences in Konin, Poland KSI 6 (4). 2018. 411-436 http://ksj.pwsz.konin.edu.pl doi: 10.30438/ksj.2018.64.3

# Anxiety dynamics in a virtual foreign language learning course

## Majid Elahi Shirvan

University of Bojnord, Bojnord, Iran https://orcid.org/0000-0003-3363-8273 elahishmajid@gmail.com

## Tahereh Taherian

Yazd University, Yazd, Iran https://orcid.org/0000-0003-2583-8224 taherian87@yahoo.com

#### Abstract

As a result of growing awareness of the function of complex dynamic systems, researchers have shifted their attention to the dynamic and changeable nature of individual difference variables. One of the individual differences no longer seen as stable is foreign language anxiety (FLA), a variable in second language (L2) development highly influenced by a dynamic range of factors, which is rarely examined in the context of a virtual environment. In this study we micromapped four language learners' anxiety dynamics during a one-semester virtual language course, using the Motometer combined with writing journals. We explored the FLA the participants experienced via a "complexity" lens in terms of the core features of complex dynamic systems (i.e., changeability, variability and context dependence). Our findings show how the individuals' level of anxiety fluctuates over time during a virtual course while being defined by changeable and stable phases, and the way it is dependent on students' individual context of learning. Furthermore, the results suggest that fluctuations in anxiety, under the influence of online environmental factors, can be effectively studied via the main principles of the dynamic systems theory.

*Keywords*: foreign language anxiety; virtual environment; complex dynamic system; changeability; variability; context dependence

#### 1. Introduction

Foreign language anxiety (FLA) is one of the most influential affective factors in second or foreign language (L2) learning classroom settings. Recently, having applied the dynamic system theory, second language acquisition (SLA) researchers have been interested in the interacting situational factors impacting learners' anxiety (e.g., Dewaele & Dewaele, 2017; Gregersen, MacIntyre, & Meza; 2014; Kasbi & Elahi Shirvan, 2017; Mahmoodzadeh & Gkonou, 2015; Piniel & Csizér, 2015). MacIntyre (2017) argues that "anxiety is continuously interacting with a number of other learner, situational, and other factors including linguistic abilities, physiological reactions, self-related appraisals, pragmatics, interpersonal relationships, specific topics being discussed, type of setting in which people are interacting, and so on" (p. 23). Dewaele (2017) views FLA as a constantly fluctuating emotion over different timescales. However, further research in the realm of FLA is required to provide new insights into the dynamic nature of FLA and its interaction with the related contextual and situational variables in a complex system. In fact, the literature on FLA is mainly dominated by research methods with cross-sectional designs (Horwitz, 2010) and the use of more innovative approaches to examining FLA as a dynamic system is in its fledgling state (see Gkonou, Daubney, & Dewaele, 2017).

Despite the large number of studies focusing on FLA, few have targeted the dynamic nature of this variable (e.g., Gregersen, MacIntyre, & Meza, 2014; Kasbi & Elahi Shirvan, 2017). Thus, exploring FLA with the help of the dynamic system approach in different domains of L2 learning seems to be an urgent need. One of these domains is learning English as an L2 in online environments. Therefore, in the current study, we explored FLA experienced in an academic English language virtual course from a dynamic perspective. More specifically, we focused on descriptions of stability, context, and change in FLA by using a combination of such research tools as Motometers, classroom observations, and learning journals.

#### 2. Literature review

2.1. Dynamic system theory

Following the "dynamic turn" in the field of SLA (Urry, 2005) research, various terms such as *chaos theory* (Larsen-Freeman, 1997), *emergentism* (Ellis & Larsen-Freeman, 2006), *dynamic systems theory* (de Bot, Lowie & Verspoor, 2007) and *complexity theory* (Larsen- Freeman & Cameron, 2008) have been used to indicate the nonlinear dynamics approach to this domain. Consequently,

new research methods have been proposed by researchers to investigate the nonlinear dynamic systems in the case of SLA.

Recently, the exploration of different individual variables as interconnected parts of complex dynamic systems has gained more attention (Larsen-Freeman, 2016). Van Geert (1998, p. 50) describes a dynamic system as "a set of variables that mutually affect each other's changes over time". In this regard, Dörnyei (2009, 2010) and DeKeyser (2012) started to investigate individual difference variables in L2 learning through the lens of dynamic system theory. Dynamic systems focus on change, interaction and variability rather than merely observing isolated associations between variables to formulate generalizations (Waninge, Dörnyei, & de Bot, 2014). With this in mind, Dörnyei (2009, 2010) suggested that there is a higher-order combination of learner characteristics that covers a developing self-organized amalgamation of cognitive, affective and motivational elements. This combination can be regarded as a subsystem, nested in the complex dynamic system of the L2 learner (Larsen-Freeman, 2016).

Scholars advocating the application of dynamic systems theories to SLA research have presented its essential features (de Bot et al., 2007, p. 7; de Bot & Larsen-Freeman, 2011, p. 9), which include sensitive dependence on initial conditions, interrelatedness, nonlinear progress, emergent characteristics, intra-individual variation, inter-individual variation, dependence on internal as well as external factors, and change resulting from interaction with the environment and internal re-organization. Let us review here three core characteristics of system dynamics, that is, stability, change, and context, to better illustrate some of the main principles and potential benefits of the dynamic systems perspective.

#### 2.1.1. Change

What is clear is that dynamic systems do not espouse a static view of SLA. Indeed, they are open and enter into interactions with the outside of the system. To put it in another way, they are regularly under the influence of other factors around them and do not exist in isolation (Larsen- Freeman, 1997, 2012). That is, dynamic systems are under the influence of the energy or input from the outside. The input influences the interactions among different parts of the system. Consequently, a change may take place in the system so that it can adapt itself to new circumstances. What emerges is an ever changing system that depends on external input over time (Mercer, 2012).

One of the crucial aspects of dynamic systems is the initial condition. Larsen-Freeman (2012) argues that this initial state is noticeably less stable. Hence, any subtle change in the initial state of these systems can lead to a great change in the trajectory of their development. Larsen-Freeman (2012) refers to this phenomenon as a *butterfly effect*, in which even a small change in the initial condition of dynamic systems might have a considerable influence on their state. In other words, a subtle difference might impact the initial condition of system development, affecting the initial circumstances as well as the interrelatedness of factors within the whole system.

### 2.1.2. Stability

With regard to nonlinearity or change in dynamic systems, it might be interpreted that they are chaotic in the sense that all factors in such systems change without any order. However, dynamic systems can stabilize or settle down over time, the stage that Larsen-Freeman (2012) calls *attractor state*. That is, dynamic systems are self-organizing systems which have the ability to organize themselves without any external force. They do not need any additional mechanism in order to organize the data existing within the system. For instance, a learner who has been rarely anxious in L2 learning over the course of several years is not likely to change much, even if he or she has a negative experience being exposed to that language during the course of study. On the other hand, a learner who is highly anxious and is still in the early stages of his or her L2 learning might become even more anxious after one sudden negative reaction.

#### 2.1.3. Context

It is believed that a developing person is in constant interaction with his or her surrounding environment in dynamic systems. Van Geert and Fischer (2009, p. 327) claim that the person-environment associations develop across time. That is, the person and the environment are assembled, co-constructed, and in transition all the time. In this regard, we can conclude that the learner is not separate from the context. It should be mentioned that context is not simply another "variable" and researchers themselves are not outside the complex system that they are exploring. As an example, if we delve into the environment of the virtual language learning classroom and focus on the individual learners' behavior, their level of anxiety will be under the influence of a variety of layers of contextual factors such as the behavior of teachers and classmates, the constraints of classroom accessibility, the condition of their home, and their familiarity of using the virtual system and technology in general.

#### 2.2. Foreign language anxiety and its dynamism

Dörnyei and Ryan (2015, p. 180) stated that research on FLA "will need to foreground a more dynamic conception of anxiety, highlighting aspects of change as well as types of adaptation that can lead the behavioral outcomes of anxiety

both in the positive and negative direction". Calls for the investigation of anxiety from more dynamic perspectives represent an underlying change in the field of SLA (Gkonou, Dewaele, & Daubney, 2017). As a result, researchers are encouraged to move away from the limited framework of guantitative research, regarding the characteristics of learners such as FLA as traits, and to apply more innovative approaches to the investigation of these characteristics (Gkonou, Dewaele, & Daubney, 2017). In response to these calls, FLA researchers (e.g., MacIntyre & Gregersen, 2012; MacIntyre & Serroul, 2015) have recently started to use more innovative methods to explore the fluctuations of anxiety across different timescales. On the other hand, with the establishment of learner psychology as an interdependent network of contextual and temporal aspects, the tight connections of FLA to a broad range of contextual variables as well as the challenges arising from them have attracted the attention of specialists (Gkonou, Dewaele & Daubney, 2017). These connections and challenges can be investigated in the context of a virtual course. This section provides an overview of research on FLA arguing that it should be explored from a dynamic perspective.

FLA is one of the crucial individual constructs that has received extensive attention in the field of SLA is FLA (Horwitz, 2010), a construct that emerged in the 1970s (Kleinmann, 1977; Scovel, 1978) and was operationalized by Horwitz, Horwitz, and Cope (1986). Anxiety in learning a foreign language has drawn the attention of researchers for four decades. Research on FLCA across many different settings of L2 classroom has described it as a common but unwelcome emotion "due to its potential to impact negatively in a myriad of ways on the language learning experience" (Gkonou, Dewaele &Daubney, 2017, p.1).

The literature on language anxiety identifies three main approaches to this negative emotion. The first is *confounded approach*, which adopts a combination of a variety of sources (MacIntyre, 2017). Years ago, Scovel (1978) defined it as "apprehension, a vague fear that is only indirectly associated with an object" (p. 134). The major problem in this approach is that not all definable and measurable types of anxiety can be related to L2 learning (MacIntyre, 2017).

The second category can be called the *specialized approach*, which identifies anxiety experiences specifically associated with language learning (Mac-Intyre, 2017). Gardner (1985, p. 34) maintained that "(...) a construct of anxiety which is not general but instead is specific to the language acquisition context is related to second language achievement". Thus, it is "(...) a dimension of general anxiety and those scales that comprise it are not related to language behavior in a reliable manner" (MacIntyre & Gardner, 1989, p. 268). Horwitz et al. (1986) made a distinction between *general anxiety* and *foreign language learning anxiety*. In their view, FLA is "a distinctive anxiety rising from the uniqueness of the language learning process" (p. 128). FLA has played a crucial role in explaining outcomes in L2 acquisition (see Horwitz, 2010). Moreover, scholars distinguish between *trait, state*, and *situation-specific anxiety* (MacIntyre, 1999). Scovel (1978) held that *trait anxiety* is an aspect of personality, and a more permanent disposition to be anxious. Spielberger (1983) asserts that *state anxiety* is an apprehension experienced at a specific moment in time as a response to a particular situation. Finally, Ellis (1998) explains that *situation-specific anxiety* pertains to apprehension that is unique to specific situations and events. FLA has been described as situation-specific anxiety; in other words, repeated momentary experiences of anxiety (state anxiety) are linked to the context of L2 learning in particular.

The third category involves a *contextualized dynamic approach* looking into anxiety with respect to a complex network of language experiences (MacIntyre, 2017). This approach follows the *dynamic turn* in SLA and stresses the multitude of interacting situational factors influencing the process of language learning in the investigation of FLA. MacIntyre (2017, p. 28) claims that anxiety in language learning "is influenced by internal physiological processes, cognitive and emotional states along with the demands of the situation and the presence of other people, among other things, considered over different timescales" (p. 28). Moreover, Yan and Horwitz (2008, p. 168) have proposed a grounded theory model of anxiety, according to which several variables, including motivation, learning strategies or achievement, influence and are themselves influenced by FLA.

A number of researchers have tried in recent years to explain the nature of FLA in terms of the characteristics of complex dynamic systems. For example, Kim (2010) argues that the nature of FLA is context-dependent. Thus, the dynamics of the learning context as well as other systems outside this context could lead to different levels of anxiety. Dewaele and MacIntyre (2014) have also shown that the effects of context of learning are both complex and multidimensional. It has been suggested as well that the occurrence of FLA cannot be attributed to a single agent such as the learner or the teacher, an assumption that has recently given rise to ecological approaches to FLA (e.g., Elahi Shirvan, Karahan, Ahangar, & Taherian, 2016; Gkonou, 2017; Kasbi & Elahi Shirvan, 2017; Saghafi, Adel, & Zareian, 2017). In other words, we cannot attribute a certain effect to a particular cause because causality is often multidimensional and unpredictable. MacIntyre (2017) considers FLA to be a situated variable "which has both internal and social dimensions" (p. 28). Therefore, we can postulate that the contextual or situational dynamics of language learning can contribute to changes in the level of FLA.

Moreover, Gregersen, MacIntyre and Meza (2014) point out that researchers need to consider FLA as a "state" if they want to understand the essence of this psychological variable. In the classroom, language learners do not experience absolutely zero FLA or the highest FLA possible. Gregersen et al. (2014) maintain that an affective variable like anxiety only exists in a *dynamic* (not fixed) continuum as it interacts with many other factors. In addition, Piniel and Csizér (2015), reporting the link between anxiety and motivation in the language classroom, found that writing anxiety could best be viewed as fluctuating and fluid over periods of time. Furthermore, Mahmoodzadeh and Gkonou (2015), considering the main features of dynamic systems, explained the dynamic nature of FLA within a complexity orientation. They argued that through the lens of the dynamic system theory new insights into the dynamic nature of FLA can be obtained. Dewaele and Dewaele (2017) have examined the changes in FLA and foreign language enjoyment (FLE), using a pseudo-longitudinal design. Their findings indicate that the factors contributing to positive and negative emotions, including anxiety, as well as their interactions, are dynamic and change over time.

Anxiety as an emotion fluctuates over time across contexts. Therefore, it should be examined on the timescale of seconds and minutes as it changes during communication (e.g., Elahi Shirvan & Talebzadeh, 2017). Alternatively, it should be investigated as it fluctuates in class over the timescales of weeks or months, taking into consideration different situational factors (e.g., Elahi Shirvan & Taherian, 2018). These situational factors can be interpersonal relationships, linguistic abilities, specific topics, physiological reactions, and *types* of setting in which people are interacting, to name a few (MacIntyre, 2017). One of these settings can be an online course in a virtual environment. The following section focuses on anxiety in such environments.

#### 2.3. Anxiety in virtual environments

Despite the potential of virtual courses in reducing learners' anxiety, Carr, Oliver and Burn (2010) found that first-time users of a virtual environment may encounter a "pain barrier" due to the "public and potentially intimidating nature of this virtual world" (p. 19). Anxiety experienced by language learners within the context of a virtual course can be related to the construct of computer anxiety, the underlying factors of which are fear of using computers as well as resistance to use them (Chua, Chen, & Wong, 1999; Lewis & Atzert, 2000; Maurer & Simonson, 1993; Oetting, 1983). Technical or computer anxiety may lead to learners' feeling anxious in a virtual world. Brown, Fuller, and Vician (2004) argue that computer anxiety and oral communication apprehension contribute to computer-mediated communication (CMC) anxiety, which consequently influences attitudes towards CMC and learning outcomes. Also, Matsumura and Hann (2004) reported that utilizing technology in teaching has contributed to an increase in learners' anxiety due to apprehension, stress and tension while interacting with computers. Rahimi and Yadollahi (2011), investigating the link between achievement in English language as a foreign language and anxiety in using the computer, found a negative

relationship between the two variables. Furthermore, Rovai and Childress (2002), exploring the sources of computer anxiety among students in a teacher education program, concluded that insufficient knowledge regarding the use of computers is a strong predictor of computer anxiety. They also found a close link between general anxiety and computer anxiety.

Bohlin and Hunt (1995) emphasized a long time ago that anxiety in using computers is context-dependent. That is, the anxiety level of language learners might differ in different contexts as a function of such variables as the length of the course or the emotional support provided by the teacher. At the same time, doing the same tasks with the help of computers, some learners might feel highly anxious while others might manifest low levels of anxiety. The chances for interactions beyond written communication were expanded in the 1990s via Internet-based audio conferencing systems. Hassan, Hauger, Nye and Smith (2005) reported that synchronous transmission of voice over the Internet provides L2 learners with a chance to improve their listening and speaking skills in a given foreign language. However, within the realm of computer-mediated interactions, few studies have explicitly addressed learners' emotions (e.g., de los Arcos, Coleman, & Hampel, 2009; Hampel, 2003, 2006; Roed, 2003). Roed (2003) examined language learners' behaviors while communicating in chat rooms and observed that written mediated communication contributed to reducing anxiety by giving students more confidence in their conversations.

Hampel (2003, 2006) pointed out that anonymity in online environments resulting from interaction in an L2 without verbal or visual cues might lead to a sense of isolation from others and increase learners' anxiety. In addition, Hampel and Stickler (2005) considered the lack of teachers' body language in online learning programs as an anxiety-inducing factor and suggested that teachers should benefit from such non-verbal cues to build trust and comfort in learners. On the other hand, Hampel, Felix, Hauck and Coleman (2005) stressed the possibly constructive aspect of anonymity in online environments. They found that not seeing the other learners or the teacher in the online context of their study, Lyceum, reduced learners' fear of making mistakes, thus reducing anxiety. Likewise, Rosell-Aquilar (2005) concluded that the shield of the computer screen renders learners less embarrassed and enables them to make mistakes without the threat of being corrected. Considering the advantages and disadvantages of anonymity in virtual environments, Hampel et al. (2005) concluded that "the loss of embodiment may be experienced as both liberating and restricting" but regardless of linguistic proficiency and computer literacy, psycho-social factors might contribute to the performance anxiety" (p. 25). Stressing the importance of the design of warm-up activities, Hampel and Hauck (2004) asserted that tutors can use them to foster learners' connectedness in audiographic sessions with anonymity of voices and disembodied names. Moreover, Rosell-Aguilar (2005) and de los Arcos and Arnedillo Sa´nchez (2006) suggested that audiographic environments should not be seen as cold and incapable of creating a relaxed atmosphere. Similarly, Hauck and Hurd (2005) reported that self-management skills can contribute to the quality of virtual learning environments (VLEs).

## 3. The study

#### 3.1. Research questions

This qualitative study addressed the following research questions:

- 1. Does students' anxiety in a virtual course demonstrate variability?
- 2. Does students' anxiety in a virtual course demonstrate a detectable stable level?
- 3. If students' anxiety demonstrates variability and stability, can the context of a virtual course account for them?

We attempted to answer these research questions by using a range of data collection tools and data types in a longitudinal study by investigating the variability of anxiety manifested by MA students, prospective teachers of English as foreign language (TEFL), in a virtual language course over the period of one semester.

#### 3.2. Design

Four learners, two males and two females, out of 36 students in a virtual first-semester MA course of TEFL held at Ferdowsi university of Mashhad, Iran, volunteered to take part in this study. Regarding the general conditions of virtual courses at Iranian universities, it should be mentioned that up to 40 students can participate in each virtual course, which is planned to organize educational content and skills concerning the students' field of study. Despite the courses of TEFL being conducted in English, teachers and students are allowed to use their first language, Persian, when necessary. In the virtual environment of the course, learners have access to different options: they can take advantage of the camera to see their teachers, they can activate their microphone to have verbal conversations with teachers, and they can use written chats to answer teachers' questions.

We aimed to undertake a meticulous individual-level microanalysis and therefore the number of participants was thought to be sufficient. The students' variability in anxiety was determined over 10 weeks to capture the micro-fluctuations within the class sessions of the course. The students' anxiety was measured at regular intervals of 10 minutes during 10 virtual class sessions. Participants were invited to write their learning journals after each class session so that variability in anxiety could be documented within the time limit of the session. The approach adopted for the purpose of this study is a qualitative interpretive one (Richards, 2003), providing an indepth explanation and description of learners' anxiety in a virtual environment.

#### 3.3. Participants

Based on our classroom observations and the participants' journals in the first three sessions of the course as well as consultation with the teachers, four participants with the following general characteristics were selected (see Table 1 for details):

*Participant 1*: Most teachers would think of Aida as a good pupil. She usually actively participated in class and answered the teacher's questions (personal communication with teacher, 6 February, 2016). Aida's major was not related to English.

*Participant 2:* Pari was generally distracted in the virtual environment of the course but asked for explanation when something was unclear to her. She was the oldest student in class and was the least familiar with technology.

*Participant 3:* Leila, who is an active participant of classroom interaction, needed confirmative feedback and generally asked lots of questions in the virtual environment of the course (personal communication with teacher, 6 February, 2016).

*Participant 4:* Sara focused on doing things unrelated to the course and she did not engage in classroom activities unless she had to.

Pseudonym	Gender	Age	Background
Aida	Female	25	Her bachelor degree was not related to English and teaching.
Pari	Female	46	She was not familiar with technology. She had been away from the educational context for several years.
Leila	Female	26	She was an active participant and asked lots of questions in the virtual environment of the course.
Sara	Female	28	She was easily distracted and at times disappeared because of her family problems.

#### Table 1 Information about participants

#### 3.4. Instruments

Motometers and writing journals were used to access the participants' anxiety and to document the ongoing processes of their activities in the virtual classroom environment. In line with the longitudinal classroom studies undertaken by Gardner, Masgoret, Tennant and Mihic (2004) as well as Waninge, Dörnyei, and deBot (2014), the Motometer was utilized to measure the participants' moments of anxiety within ten 80-minute online sessions. To start with, an A4 size sheet of paper with ten Motometers was handed to each participants. The Motemeters took the form of thermometer-shaped figures ranging from 0, indicating the lowest anxiety and 100 indicating the highest anxiety points. The students were trained how to indicate their anxiety level, which involved drawing a horizontal line on each Motometer every 10 minutes in response to regular alarms sent to their computers. Our Motometer, while slightly modified, was consistent with the one employed by Waninge, Dörnyei and de Bot (2014) to evaluate motivation at five minute intervals. These researchers concluded that the Motometer does not get in the way of the teaching-learning processes in the classroom. Since it was not possible to actually observe anxiety levels in a virtual course, in order to gain greater insights in this respect, we asked the participants to keep learning journals in which they would document their feelings during each session. The journal prompts concerned the participants' explanations regarding the activities they did in each session, moments of feeling anxious during these activities, the situations in which they felt the most and the least anxiety, and the reasons for this.

# 3.5. Procedures of data collection and analysis

The first session was a pilot one intended to teach the participants how to use the Motometer. The data were collected over 10 weeks through both the journal writing and the Motometer. The Motometer data were analyzed by one of the present researchers who measured the distance between the bottom of the Motometer and the line provided by the participants in millimeters to create a scale of 1-100. The Motometer data for each sessions were translated into graphs with the help of Microsoft Excel. Time was shown on the horizontal axis of the graphs with ten-minute intervals. The vertical axis of the graphs showed the students' anxiety level on the 0-100 scale. The data obtained through the journals enriched the Motometer data analysis. Subsequently, we put Motometer data and journal data together in composite charts.

# 4. Results and discussion

# 4.1. Composite charts

Thanks to the different data collection procedures, a large body of information was gathered from the 10 sessions under investigation. Consequently, 10 composite charts were created based on the information obtained through the Motometers and the journals. Figures 1, 2, and 3 illustrate the students' level of anxiety and students' in sessions 1, 2 and 3 as well as the comments they provided. As explained above, the horizontal axis indicates passage of time at ten-minute intervals and the vertical axis shows the level of anxiety from 0 to 100.



#### Figure 1 Composite chart illustrating change and variability in session 1



Figure 2 Composite chart illustrating change and variability in session 3

Anxiety dynamics in a virtual foreign language learning course



Figure 3 Composite chart illustrating change and variability in session 3

#### 4.2. Change and variability

The charts present many cases of individual variability in the anxiety manifested by the four students. Figures 3 and 4 show the developing anxiety of the participants in session 3 with respect to the group and the individual. Figure 3 illustrates a fairly clear-cut pattern, as the total group anxiety is constantly dropping from a relatively high level (60/100) to a very low level (10/100). In contrast, two students' individual patterns do not reflect this trend, since Leila's and Aida's anxiety increased during the lesson (see Figure 5). Aida's pattern of decrease  $\rightarrow$ maintenance  $\rightarrow$  increase stands in contrast with the group pattern. Also, from Minute 70, Leila is getting more and more anxious till the end of the session. By contrast, the progression of Pari's and Sara's anxiety exhibits a decrease followed by an increase and another decrease, also ending up with a decrease (see Figure 6). These findings support Waninge, Dörnyei and de Bot's (2014) as well as Larsen-Freeman's (2016) claims that group averages cannot be taken to represent individual patterns of students' psychological variables.

This variability was to some extent contextually driven. For instance, Pari experienced an increase in her anxiety in the first ten minutes of the session due to poor audibility of the teacher's voice (see Figure 6). But, when the teacher

typed in the most important points of the lesson, her anxiety decreased within the second ten minutes. Moreover, the virtual center had already prepared the uploaded slides for the students, which allayed her level of anxiety. In the last ten minutes, the teacher's summarizing notes made her calm and decreased her anxiety. This is consistent with Roed's (2003) assumption that facilities provided in computer-mediated learning play a scaffolding role, thus giving anxious students more confidence and making them less anxious. Sara's anxiety in the first 30 minutes of the class increased (Figure 6) because her little son did not let her participate in the discussion or concentrate on what the teacher was saying. After 30 minutes, her son stopped interrupting her and, as a result, she got the chance to focus on the topic, which decreased her anxiety. Sara's pattern was in line with Pari's (see Figure 6) but contrasted with Aida's (see Figure 5), since Aida seemed less anxious during the whole lesson. However, in the last ten minutes of session 3, there was a rise in her anxiety due to the loss of connection. This is in accordance with Hauck and Hurd (2005), who reported that lack of self-management skills in on-line environments might raise learners' anxiety. Moreover, from Minute 70, Leila was confused because the teacher did not answer her question, which might have increased her anxiety. As explained by Hampel et al. (2005), lack of teachers' interest in virtual environments can make learners highly anxious.



Figure 4 Group average of anxiety levels in session 3

Furthermore, the participants displayed different patterns of anxiety in comparison with one another. This is clearly illustrated in Figures 6, 7 and 8, comparing Leila's and Sara's anxiety levels in two sessions. Figure 7 shows a contrasting pattern: Leila was experiencing low anxiety while Sara was experiencing high anxiety throughout session 4, which is in fact contradictory to patterns observed in

session 2. In session 4, both students' initial anxiety was low but their patterns during the session were completely different. Sara's increase in anxiety started from a rather low level and Lila's anxiety gradually decreased as the class progressed (see Figure 7). In Figure 8, we can see a downward trend in anxiety for Sara and Leila in session 2; however, looking at Figure 7, it is difficult to believe that the two students attended the same class. This can be explained by the fact that learners' anxiety while using computers is dependent on context and task, with the effect that some learners feel highly anxious while others might manifest little anxiety (Bohlin & Hunt, 1995).



Figure 5 Leila's and Aida's anxiety levels in session 3



Figure 6 Sara's and Pari's anxiety levels in session 3



Figure 7 Sara's and Leila's anxiety levels in session 4



Figure 8 Sara's and Leila's anxiety levels in session 2

Reflecting between-individual variation, the findings also document within-individual variation. Leila's anxiety level in sessions 1 and 3 is a good example of such variation. Figure 9, charting her anxiety in these sessions, indicates a gradual decrease as the dominant pattern in session 1 but a rising trend in session 3. Moreover, the dominant trend of anxiety in session 3 was a decrease while it was an increase in session 1. In this connection, it might be relevant to note that session 1 was the first time that Leila had participated in a virtual course. Thus, she was not familiar with the procedures followed in this environment. In the next sessions, thanks to her success in benefitting from the

options available in online learning, she felt less anxious. Similar to the findings reported by Rahimi and Yadollahi (2011), who found a negative relationship between attainment and computer anxiety, Leila's achievement in the virtual course contributed to reducing anxiety. Furthermore, the guality of the audio was poor, which made her feel anxious as well. On the other hand, in session 3, she did not have any problems of this kind, except for minutes 40-60 when she lost the connection. This is in line with Bohlin and Hunt's (1995) claim that, in a virtual setting, the presence or absence of certain variables, related to technical issues, can significantly influence learners' anxiety. In the last ten minutes of the class, she could connect with the rest of the class, but she was confused and anxious because she thought that the teacher might judge her fluency in English as she was using her microphone. She preferred using written chats to respond to the teacher's questions and was reluctant to use the camera option. This is in contrast with Hampel's (2003, 2006) assumption that anonymity in online environments resulting from not using visual or verbal cues renders learners anxious. On the other hand, it fits in with Hampel et al.'s (2005, p. 26) assertion that "the loss of embodiment may be experienced as both liberating and restricting", depending on the learning environment.



Figure 9 Lila's anxiety level in sessions 1 and 3

# 4.3. Stability

The findings indicate that variations are not always unsystematic. As demonstrated in Figures 10 and 11, during a number of lesson phases, the group-level and the individual-level results were largely similar. That is, the group-average pattern was reflected for all the participants. Based on the principles of the dynamic system theory, the emergence of such a convergent pattern among participants within the language learning ecosystem confirms the influential presence of a strong attractor, since the change in students' anxiety level can be associated with the nature of classroom activity. More precisely, they were requested to continue the topic of the previous session. However, the teacher introduced a new topic in Minute 8, which resulted in an increase in anxiety, which was confirmed in the participants' comments in their journals. During the class, the students' anxiety decreased. However between minutes of 56-63, there was a problem in the virtual center causing a disconnection and this led to a rise in the students' anxiety (Figure 11).



Figure 10 Group average of anxiety level in session 7



Figure 11 Individual anxiety level during session 7

# 4.4. Context

Information related to the learning context is crucial for revealing factors that cause anxiety variation. Language learning tasks and students' generalized attitudes toward the language (potentially shaped by their teachers) were identified as the most evident contextual effects. Figure 12 indicates that Pari's anxiety increased during session 2 between minutes 10 and 20, which was not caused by lesson content. When she was asked to justify this sudden change, she explained that the reason why she had reported more anxiety was her lack of ability to type fast. As mentioned earlier, the fact that she had stopped studying for several years and she was not familiar with technology played a pivotal role in her high level of anxiety. This is in line with Rovai and Childress (2002) who argue that expertise in using the computer can predict learners' computer anxiety.



Figure 12 Pari's anxiety levels during session 2 (minutes 0-30)

Figure 13 illustrates another example of the importance of context in Sara's trend of anxiety. In the first session, in 30-50 minutes of the lesson, her anxiety rose steadily from 20/100 to 70/100, and then suddenly dropped to 30/100 in the 6<sup>th</sup> minute. Based on her comments in her journals, the increase in her anxiety was related to environmental factors caused by the context of home. Sara seemed to be anxious most of the time. What happened was not language-related at all. While she was taking part in the class, she had to take care of her little son, most of the time interrupting her, making her unable to concentrate on what the teacher was saying. As a consequence, her anxiety especially increased when there was a discussion in the class and she could not participate in it due to this contextual issue.



Figure 13 Sara's anxiety levels during session 1 (minutes 20-60)

#### 5. Conclusion

This study was conducted to explore EFL learners' fluctuations of anxiety during a virtual course, as reflected in progression charts where anxiety levels were indicated at ten-minute intervals. More precisely, the study was intended to map the changes in, the stability of, and the contextual influences on the participants' anxiety over an academic semester in order to explore how anxiety fluctuates and to identify typical trajectories of anxiety.

Regarding the first research question whether the participants' anxiety demonstrated variability in a virtual course, the results indicated that anxiety was subject to variation even every five minutes since significant fluctuations were reported during each session. In line with the findings of Larsen-Freeman (2006) and Waninge et al. (2014), our study showed that averaged group data cannot often adequately reflect variation at the individual level. For instance, in the case of some sessions, the group pattern did not overlap students' individual patterns. This inconsistency was best visible the group anxiety average, which manifested a steady decrease while half of the students experienced an increase in anxiety, as visible in their individual trajectories.

With respect to the second research question, we detected stable patterns of overall anxiety levels in the virtual course. However, it was observed that the initial condition had an impact on the behavior of the entire system. It can be argued that the events which occurred before the lesson could have influenced students' (initial) anxiety during the session. Thus, considering what transpires before virtual lessons can be extremely important as this can lead to diminution of students' anxiety. Regarding the third research question concerning the importance of learning context of each individual learner, it was verified that this context could contribute to fluctuations in students' anxiety. For example, Sarah stated that her high level of anxiety was mostly due to environmental factors as her son was repeatedly interrupting her. This instance offers clear evidence for the existence of a close, inextricable link between classroom context and system behavior, which supports the fundamental tenets of dynamic systems theory, indicating that the immediate context is best perceived as part of the overall system.

Summarizing, we provided an all-inclusive micro-map of learners' anxiety which shows the impact of a combination of dynamic stability and individual variability under the influence of individual learning context. In other words, taking a range of potentially interconnected elements into consideration, sometimes a specific situation can cause a change in students' anxiety. However, in some cases no clear explanation can be offered. Hence, we propose that through the meticulous lens of the dynamic system theory, we can appropriately investigate the process of learning.

As for the implications of this study, the findings showed an intertwined association between the individual e-learning setting and anxiety trends of the participants, confirming that the immediate context of learning is an inseparable part of the overall complex system, which is in line with the main principle of nonlinearity. That is, contextual influences might have a disproportionate or nonlinear influence on learners' anxiety in a virtual course. Thus, the overall picture of our micro-map of participants' anxiety indicated a mixture of dynamic stability, under the influence of the attractor states, and individual variability, under the influence of contextual agents of the online environment. Thus, teachers in an online course can take the complex dynamic perspective into account when considering this overall picture of order and chaos.

The findings of this study yielded many examples of participants' reacting in a similar manner associated with strong attractor states. Recognizing these attractor states, teachers in a virtual course can be encouraged to identify the underlying sources contributing to these attractor states to reduce learners' anxiety. In other words, teachers in online courses should become aware of the forces creating an attractor state in learners' anxiety. Furthermore, the findings indicated that even over a short time span, a rather stable level of overall anxiety is detectable in a virtual course. Considering the significance of the initial level of anxiety, teachers should pay serious attention to the beginning of a virtual classroom session. They could, for instance, start the class with a warm-up activity. Moreover, the findings of this study support the argument that students' anxiety is by no means a stable trait. Teachers should also take into consideration the fact that even the least anxious learner might experience a sudden rise in anxiety or a generally anxious learner might go through moments of relaxation, feeling anxiety at all. Thus, the extent to which teachers in a virtual course can influence this variability certainly matters.

#### References

- Bohlin, R. M., & Hunt, N. P. (1995). Course structure effects on students' computer anxiety, confidence and attitudes. *Journal of Educational Computing Research*, 13(3), 263-270.
- Brown, S. A., Fuller, R. M., & Vician, C. (2004). Who's afraid of the virtual world? Anxiety and computer-mediated communication. *Journal of the Association of Information Systems*, *5*(2), 79-107.
- Carr, D., Oliver, M., & Burn, A. (2010). Learning, teaching and ambiguity in virtual worlds. In A. Peachey, J. Gillen, D. Livingstone, & S. Smith-Robbins (Eds.), *Researching learning in virtual worlds* (pp. 17-30). London: Springer.
- Chua, S. L., Chen, D. T., & Wong, A. F. (1999). Computer anxiety and its correlates: A meta-analysis. *Computers in Human Behavior*, *15*(5), 609-623.
- de Bot, K. & Larsen-Freeman, D. (2011) Researching second language development from a dynamic systems theory perspective. In M. H. Verspoor, K. de Bot, & W. Lowie (Eds.) A dynamic approach to second language development: Methods and techniques (pp. 5-23). Amsterdam: John Benjamins.
- de Bot, K., Lowie, W., & Verspoor, M. (2005). *Second language acquisition*. New York: Routledge.
- de Bot, K., Lowie, W., & Verspoor, M. (2007). A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and Cognition*, *10*, 7-21.
- de los Arcos, B., & Arnedillo Sánchez, F. (2006). Ears before eyes: Expanding tutors' interaction skills beyond physical presence in audio-graphic collaborative virtual learning environments. In P. Zaphiris & G. Zacharia (Eds.), *User-centered computer aided language learning* (pp. 74-93). Hershey: Idea Group.
- DeKeyser, R. (2012). Interactions between individual differences, treatments, and structures in SLA. *Language Learning*, *62*(2), 189-200.
- Dewaele, J. -M. (2017). Psychological dimensions and foreign language anxiety. In S. Loewen & M. Sato (Eds.), *The Routledge handbook of instructed second language acquisition*, (pp. 433-450). New York, NY: Taylor & Francis.
- Dewaele, J. M., & Dewaele, L. (2017). The dynamic interactions in foreign language classroom anxiety and foreign language enjoyment of pupils aged 12 to 18. A pseudo-longitudinal investigation. *Journal of the European Second Language Association 1*(1), 12-22.
- Dewaele, J. M., & MacIntyre, P. (2014). The two faces of Janus? Anxiety and enjoyment in the foreign language classroom. *Studies in Second Language Learning and Teaching*, *4*(1), 237-274.
- Dörnyei Z. (2009). Individual differences: Interplay of learner characteristics and learning environment. *Language Learning*, *59*, 230-248.

- Dörnyei, Z. (2010). The relationship between language aptitude and language learning motivation: Individual differences from a dynamic systems perspective. In E. Macaro (Ed.), *Continuum companion to second language acquisition* (pp. 247-267). London: Continuum.
- Dörnyei, Z. & Ryan. S. (2015). *The psychology of the language learner revisited*. London: Routledge.
- Elahi Shirvan, M., & Taherian, T. (2018). Longitudinal examination of university students' foreign language enjoyment and foreign language classroom anxiety in the course of general English: Latent growth curve modeling. *International Journal of Bilingual Education and Bilingualism* doi: 10.1080/13670050.2018.1441804
- Elahi Shirvan, M., & Talebzadeh, N. (2017). English as a foreign language learners' anxiety and interlocutors' status and familiarity: An idiodynamic perspective. *Polish Psychological Bulletin*, *48*(4), 489-503.
- Ellis, N. C., & Larsen-Freeman, D. (2006). Language emergence: Implications for applied linguistics: Introduction to the special issue. *Applied Linguistics*, *27*(4), 558-589.
- Elahi Shirvan, M., Karahan, P., Ahangar, A., & Taherian, T. (2016). Towards an ecological understanding of university students' anxiety in English as a general course in light of sociocultural perspective. *Procedia-Social and Behavioral Sciences*, *232*, 62-69.
- Ellis, N. C. (1998). Emergentism, connectionism and language learning. *Language Learning*, *48*, 631-664.
- Gardner, R. C. (1985) Social psychology and second language learning: The role of attitudes and motivation. London: Edward Arnold.
- Gardner, R. C., Masgoret, A. M., Tennant, J., & Mihic, L. (2004). Integrative motivation: Changes during a yearlong intermediate level language course. *Language Learning*, *54*, 1-34.
- Gkonou, C. (2017). Towards an ecological understanding of language anxiety. In C. Gkonou, M. Daubney, &, J. M. Dewaele, J (Eds), *New insights into language anxiety: Theory, research and educational implications* (pp. 136-156). Bristol: Multilingual Matters.
- Gkonou, C., Daubney, M., & Dewaele, J. M. (Eds.). (2017). *New insights into language anxiety: Theory, research and educational implications*. Multilingual Matters.
- Gregersen, T., MacIntyre, P. D., & Meza, M. D. (2014). The motion of emotion: Idiodynamic case studies of learners' foreign language anxiety. *Modern Language Journal*, *98*(1), 574-588.
- Hampel, R. (2003). Theoretical perspectives and new practices in audiographic conferencing for language learning. *ReCALL*, *15*(1), 21-36.

- Hampel, R. (2006). Rethinking task design for the digital age: A framework for language teaching and learning in a synchronous online environment. *Re-CALL*, *18*(1), 105-121.
- Hampel, R., & Stickler, U. (2005). New skills for new classrooms: Training tutors to teach languages online. *Computer Assisted Language Learning*, *18*(4), 311-326.
- Hampel, R., Felix, U., Hauck, M., & Coleman, J. A. (2005). Complexities of learning and teaching languages in a real-time audiographic environment. *German as a Foreign Language*, *3*(1), 1-30.
- Hampel, R., & Hauck, M. (2004). Towards an effective use of audio conferencing in distance language courses. *Language Learning and Technology*, *8*(1), 66-82.
- Hassan, X., Hauger, D., Nye, G., & Smith, P. (2005). The use and effectiveness of synchronous audiographic conferencing in modern language teaching and learning (online language tuition): A systematic review of available research. In *Research evidence in education library*. London: EPPI Centre, Social Science Research Unit, Institute of Education, University of London.
- Hauck, M., & Hurd, S. (2005). Exploring the link between language anxiety and learner self-management in open language learning contexts. *European Journal of Open, Distance and E-Learning, 2*(1), 1-12.
- Horwitz, E. K. (2010). Foreign and second language anxiety. *Language Teaching*, *43*(1), 154-167.
- Horwitz, E. K., M. B. Horwitz, & J. Cope (1986). Foreign language classroom anxiety. *Modern Language Journal*, 70(2), 125132.
- Kasbi, S., & Shirvan, M. E. (2017). Ecological understanding of foreign language speaking anxiety: Emerging patterns and dynamic systems. *Asian-Pacific Journal of Second and Foreign Language Education*, *2*(1), 2-20.
- Kim, S. Y. (2010). Is foreign language classroom anxiety context free or context dependent? *Foreign Language Annals*, *43*, 187-189.
- Kleinmann, H. H. (1977). Avoidance behavior in adult second language acquisition. *Language Learning*, *27*(1), 93-107.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18(1), 141-165.
- Larsen–Freeman, D. (2006). The emergence of complexity, fluency and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, *27*(1), 590-619.
- Larsen-Freeman, D. (2012). Complex, dynamic systems: A new transdisciplinary theme for applied linguistics? *Language Teaching*, *45*(1), 202-214.
- Larsen-Freeman, D. (2016). Classroom-oriented research from a complex systems perspective. *Studies in Second Language Learning and Teaching*, *6*(3), 377-393.

- Larsen-Freeman, D., & Cameron, L. (2008). Research methodology on language development from a complex systems perspective. *Modern Language Journal*, *92*(1), 200-213.
- Lewis, A., & Atzert, S. (2000). Dealing with computer-related anxiety in the project-oriented CALL classroom. *Computer Assisted Language Learning*, 13(4-5), 377-395.
- MacIntyre, P. D. (1999). Language anxiety: A review of the research for language teachers. In D. J. Young (Ed.), *Affect in foreign language and second language learning: A practical guide to creating a low-anxiety classroom atmosphere* (pp. 24-45). Boston: McGraw-Hill.
- MacIntyre, P. D. (2017). An overview of language anxiety research and trends in its development. In C. Gkonou, M. Daubney, & J.- M. Dewaele (Eds.), *New insights into language anxiety: Theory, research and educational implications* (pp. 11-30). Bristol: Multilingual Matters.
- MacIntyre, P. D., & Gardner, R. C. (1989) Anxiety and second-language learning: Toward a theoretical clarification. *Language Learning*, *39*(2), 251-275.
- MacIntyre, P. D., & Gregersen, T. (2012). Affect: The role of language anxiety and other emotions on language learning. In S. Mercer, S. Ryan, & M. Williams (Eds.), *Psychology for language learning: Insights from research, theory and practice* (pp. 103-118). Basingstoke: Palgrave Macmillan.
- MacIntyre, P. D., & Serroul, A. (2015). Motivation on a per-second timescale: Examining approach-avoidance motivation during L2 task performance. In Z. Dörnyei, P. D. MacIntyre, & A. Henry (Eds.), *Motivational dynamics in language learning* (pp. 109-138). Bristol: Multilingual Matters.
- Mahmoodzadeh, M., & Gkonou, C. (2015). A complex dynamic systems perspective on foreign language anxiety. *Konin Language Studies*, *3*(1). 89-108.
- Matsumura, S., & Hann, G. (2004). Computer anxiety and students' preferred feedback methods in EFL writing. *Modern Language Journal*, *88*(3), 403-415.
- Maurer, M. M., & Simonson, M. R. (1993). The reduction of computer anxiety: Its relation to relaxation training, previous computer coursework, achievement, and need for cognition. *Journal of Research on Computing in Education*, *26*(2), 205-219.
- Mercer, S. (2012). The complexity of learner agency. *Apples Journal of Applied Language Studies*, *6*(2), 41-59.
- Oetting, E. R. (1983). *Oetting's computer anxiety scale* (*COMPAS*). Ft. Collins, CO: Rocky Mountain Behavioral Science Institute.
- Piniel, K., & Csizér, K. (2015). Changes in motivation, anxiety and self-efficacy during the course of an academic writing seminar. *Motivational dynamics in language learning*. In Dörnyei, MacIntyre, & Henry (Eds), *Motivational dynamics in language learning*. (pp. 164-193). Bristol. UK. Multilingual Matters.

Rahimi, M., & Yadollahi, S. (2011). Computer anxiety and ICT integration in English classes among Iranian EFL teachers. *Procedia Computer Science*, *3*, 203-209.

Richards, K. (2003). Qualitative inquiry in TESOL. UK. Palgrave Macmillan.

- Roed, J. (2003). Language learner behavior in a virtual environment. *Computer Assisted Language Learning*, *16*(2-3), 155-172.
- Rosell-Aguilar, F. (2005). Task design for audiographic conferencing: Promoting beginner oral interaction in distance language learning. *Computer Assisted Language Learning*, *18*(5), 417-442.
- Rovai, A. P., & Childress, M. D. (2002). Explaining and predicting resistance to computer anxiety reduction among teacher education students. *Journal of Research on Computing in Education*, *35*(2), 226-235.
- Saghafi. K., Adel, S. M. R., Zareian, G. (2017). An ecological study of foreign language writing anxiety in English as a foreign language classroom. *Journal* of Intercultural Communication Research, 46, 424-440.
- Scovel, T. (1978). The effect of affect on foreign language learning: A review of the anxiety research. *Language Learning*, *28*(1), 129-142.
- Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory STAI (Form Y*). Palo Alto, CA: Consulting Psychologists Press.
- Urry, J. (2005). The complexity turn. Theory, Culture and Society, 22(5), 1-14.
- Van Geert, P. (1998). A dynamic systems model of basic developmental mechanisms: Piaget, Vygotsky, and beyond. *Psychological Review*, 105(1), 634-677.
- van Geert, P., & Fischer, K.W. (2009). Dynamic systems and the quest for individual-based models of change and development. In J. P. Spencer, M. S. C. Thomas, & J. L. McClelland (Eds.), *Toward a unified theory of development: Connectionism and dynamic systems theory re-considered* (pp. 313–336). Oxford: Oxford University Press.
- Waninge, F., Dörnyei, Z., & de Bot, K. (2014). Motivational dynamics in language learning: Change, stability, and context. *Modern Language Journal*, *98*(3), 704-723.
- Yan, J. X., &Horwitz, E. K. (2008). Learners' perceptions of how anxiety interacts with personal and instructional factors to influence their achievement in English: A qualitative analysis of EFL learners in China. *Language Learning*, 58(1), 151-183.