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# A Complex Dynamic Model of Autonomy Development

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Abstract

Over the last years, language learning has been described as a complex dynamic system, encompassing different interacting subsystems, such as autonomy. In this article, I argue that autonomy development is a complex, dynamic and fluctuating process in which a point of arrival cannot be defined, as autonomy is experienced in a nonlinear and continuous way throughout life, with moments of advances, stability and setbacks, involving the interaction between a large number of processes, elements, agents, among other subsystems. In this paper, I present the Complex Dynamic Model of Autonomy Development (CDMA). This model explains the dynamics of autonomy in learners' language learning trajectory in light of the complexity paradigm. The model has been used in research and activities with a focus on language learning and language teacher education. It has been discussed with language majoring students, pre-service and in-service language teachers as a tool for reflection, self-awareness and self-regulation, as it enables a comprehensive view of the dynamism and complexity involved in the process of developing both learner autonomy and teacher autonomy.

*Keywords*: autonomy, autonomization, complex dynamic system theory, language learning, language teacher education.

In the field of Applied Linguistics, Diane Larsen-Freeman's (1997) article was seminal in describing language development as a complex adaptive system. A decade later, in her coauthored book with Lynne Cameron (Larsen-Freeman & Cameron, 2008), the authors argue that "the nature of meaningful and life-affirming education – and the activity that produces it – will need to continually adapt in order to respond to change in the learners, in other aspects of the educational system, and in society" (p. 33). The authors emphasized that, in order to accommodate the needs and interests of the agents involved in language learning, negotiation of several factors, e.g., goals, types of activities, topics considered relevant and evaluation criteria, is likely to make language learning and teaching more meaningful, as it engages both teachers and students in favoring the emergence of autonomous behaviors.

In light of the above, this paper considers language learning as an open system, subject to adaptations from a wide range of possibilities of interactions among the context and the different

elements, agents, and processes, e.g., materials, students, teacher, advisor, autonomy, motivation, beliefs, identities, emotions etc., as illustrated in Figure 1. A version in motion can be found at https://youtu.be/wHjV9a9bvyo.

**Figure 1**

*Language Learning as a Complex Adaptive System (Borges, 2019, p. 40)*

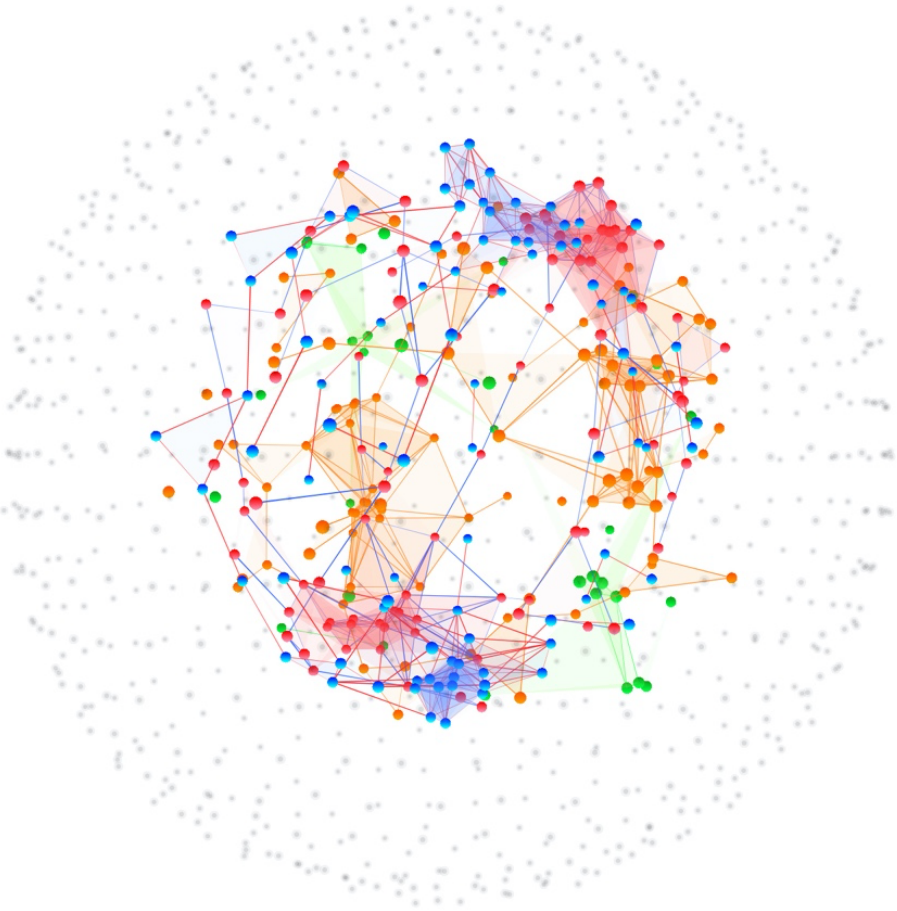


Figure 1 illustrates the complex network of interrelations in a foreign language learning system throughout time, and the active and dynamic role of the context. The context is represented in a comprehensive and fluid way through the dotted outline in gray. The dotted outline permeates the interactions that occur in unpredictable ways in the language learning system. At certain times, some interrelationships between the subsystems – learner, colleagues, teacher, advisor, materials, context, autonomy, motivation, beliefs, identities, emotions, etc. – are more evident than others. Among the interacting subsystems, autonomy is central in this paper.

Autonomy in language learning is a multifaceted phenomenon open to contextual changes. As such, different perspectives have been used to explore autonomy, and its focus of research has changed over the years due to its constant re-elaboration and adaptation (Murray, 2017). Overall, the trajectory of autonomy studies can be organized in three major perspectives: the *individual*, the *social*, and the *complex* (Borges, 2019). These perspectives will be briefly presented in the following in order to contextualize how autonomy is understood in this paper.

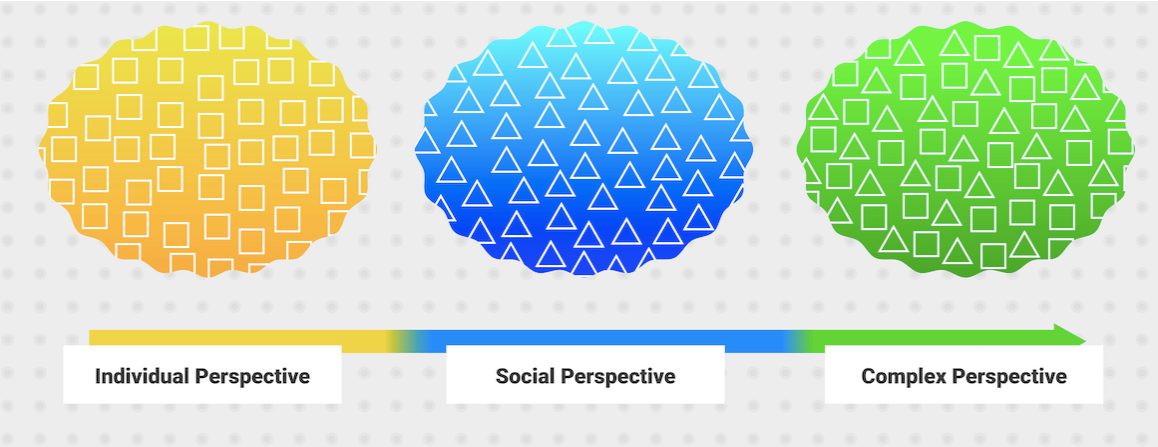
The *individual* perspective centers on learners' independence, characterized by personalized studies according to their needs and interests, which leads to self-directed learning. Holec's (1981) definition of autonomy as the "ability to take charge of one's own learning" (p. 3) is of an individual nature and prevailed for many years. It was assumed that the autonomous learner was one who could gradually assume all the choices involved in the language learning process. Therefore, learners would be considered autonomous if they acquired some key skills, such as, setting goals independently, selecting learning materials, activities, and strategies, which simplifies or even reduces the complex and dynamic nature of autonomy throughout life.

The *social* perspective, then, was inspired by Vygotsky's sociocultural theory (1991). Learner autonomy was investigated with a focus on students' interaction with their peers or mediated by other instruments, considering the contexts in which autonomous behaviors are experienced. In this sense, Little (2000) argues that "the growth of learner independence is supported by learner interdependence" (p. 22). The *social* perspective of autonomy, therefore, focuses on the interdependence between agents involved in the learning context, aiming at learners' effective participation in the learning community.

In the *complex* perspective, the 'individual *or* social' dichotomy gives way to the 'individual *and* social'. Depending on the context, needs, and goals, learners will be able to make choices regarding the way they prefer to exercise their autonomy, acting from both an individual and a social dimension. Instead of understanding autonomy as a monolithic construct, Cooker (2013) suggests that there are "multiple ways of being autonomous" (p. 30). Along the same lines, Murray (2014) contends that autonomy can be exercised in interaction with others or alone when desired. Figure 2 illustrates the interaction and mutual influence between the different perspectives of autonomy. A version in motion can be found at https://youtu.be/JO43peOfYBc.

**Figure 2**

*Trajectory of Autonomy Studies (Borges, 2019, p. 49)*




Autonomy is considered a complex dynamic system, individual and social, interconnected with other learning subsystems, such as motivation, identities, beliefs and emotions, with which it interacts in different ways and in diverse contexts, going through moments of setbacks, stability and advances throughout life (Borges, 2019).

This paper aims to present the Complex Dynamic Model of Autonomy Development (CDMA), contributing to the investigation about autonomy from a complexity perspective. In the following, I will describe the model by introducing the typical movements of autonomization, tools that can foster it, the nested subsystems that influence it, and the relationship of autonomy with the context.

## The Complex Dynamic Model of Autonomy Development

The CDMA is the result of my doctoral research which investigated the autonomization trajectory of undergraduate students of English throughout the four years of the university program (Borges, 2019). Given the dynamic and complex nature of autonomy assumed in this research, the process of fostering learner autonomy is formed by non-linear movements, which do not occur in the same way for a group of learners or even for a single student at different times and contexts.

In this study, autonomy development is seen as a complex, dynamic, and fluctuating process in which a point of arrival cannot be defined, as it is experienced in a non-linear and

continuous way throughout life, with moments of advances, stability and setbacks, involving the interaction among a large number of processes, elements, agents, and other subsystems (Borges, 2019).

The CDMA is represented as a network in order to demonstrate the wide possibilities of interactions in the development of autonomy and the potential mutual influence among its components as shown in Figure 3. A version of the model in motion can be accessed at https://youtu.be/ZeSMJu95fi8, which clearly demonstrates the dynamic and complex possibilities of interaction between the manifold components of autonomy over time.

In Figure 3, I refer to various processes, elements, agents, among other subsystems that interact in learner autonomy. The manifold components of the model were presented in different colors to facilitate their identification: the components that give support to autonomy development are illustrated in red; the nested subsystems that influence autonomy in blue; the primary movements of autonomy development in green; and the contextual aspects in orange. The "context", in which all the interactions occur, is illustrated here by means of a dotted outline in gray, that, in a broad and fluid way, permeates all interactions represented in the model.

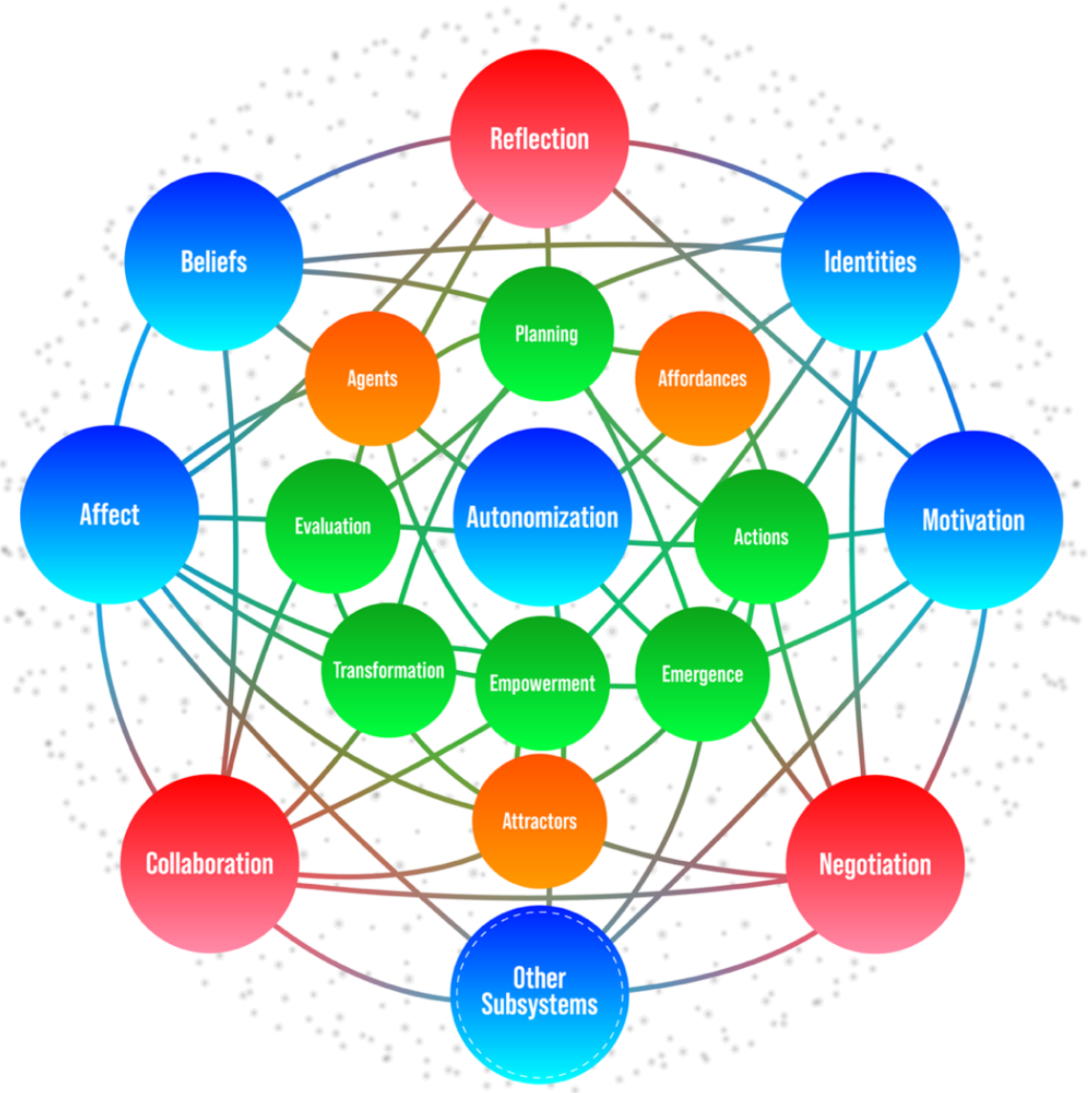
At the center of the model lies autonomization as a complex process. The term autonomization was adopted because the focus of the model lies in the continuous process of autonomy development, in line with Freire's (2006)[1] understanding of autonomy as a constant maturing of oneself. Other authors have also used the term to highlight the process nature of autonomy (see, for example, Little, 2003, as cited in Murphy, 2015; Magno e Silva, 2017, 2018; Borges, 2019).

From the autonomization in the center of the model, lines emerge that point out to elements, agents, movements, and subsystems that influence autonomy development, representing the complex web of interrelationships in this network, encompassing the context, an integral part of this system. The contextual aspects, illustrated in orange, include the "agents" with whom learners interact, the "affordances" of the environment, and the "attractors" or attractor states, i.e., patterns of behaviors preferred by the system in its trajectory. The context, therefore, has an active and dynamic role, influencing changes and being influenced by them at the same time.

[1] Freire's book was originally published in 1996; in this paper, its 34th edition is cited.

**Figure 3**

The Complex Dynamic Model of Autonomy Development *(Borges, 2019, p. 59)*




The primary movements of autonomy development suggested in the model, illustrated in green, do not occur in a sequence nor do they represent a formula to be followed with a guarantee of success. Due to the complexity and unpredictability of this process, autonomization takes place in a unique way for each learner.

At the top of the figure, in red, lies "reflection", considered a supra-dimension that should be present in all movements of autonomization, because the more aware learners are of their own learning process, the more chances they will have to make choices that will help them achieve

their goals. From "reflection" comes lines that interconnect the entire network. This indicates that reflection can influence and be influenced by the entire process. "Collaboration" and "negotiation" lie at the base of the figure. In the CDMA, they are fundamental processes to support the development of autonomy, through which learners can interact in their trajectories.

Among the subsystems nested to autonomization, "motivation", "identities", "beliefs", "affect", as well as "other subsystems" are presented in blue in the figure. Autonomization can relate to these subsystems in an unpredictable way over time. The CDMA also considers the openness of autonomization to the influences of "other subsystems" that may emerge throughout the process.

Finally, the central role of interactions in this model is emphasized, since autonomization engenders numerous combinations among the manifold components of this complex network over time. At times, some interactions are more evident than others. In any case, what prevails are the interactions and the new behaviors that may emerge from them.

## The Manifold Components of the Model

In this section, the manifold components that constitute the Complex Dynamic Model of Autonomy Development are discussed in light of the complexity paradigm: Movements of Autonomization Process; Autonomy Support; Subsystems Nested to Autonomization; and Autonomy and Context. As autonomy is an open system, the nature of interactions within this system is complex, leading to constant adaptation and self-organization, keeping it always far from equilibrium.

### Movements of Autonomization Process

The movements illustrated in the model are represented in a cycle to indicate that it is an iterative process that can be repeated in different situations, without following a fixed sequence. The primary movements for autonomization are reflection, planning, actions, emergence, empowerment, transformation and evaluation, as discussed in the following sections.

#### *Supra-dimension: Reflection*

Reflection and awareness in language learning are fundamental for managing autonomization. Several authors emphasize the importance of reflection for learner autonomy

(Little, 1991; Ryan & Deci, 2000; Benson, 2011; Bambirra, 2014). Benson (2011) states that autonomous learners are essentially able to reflect on the learning process. From experiences in different contexts, they may be able to improve their capacity for reflection, making their own choices consciously and autonomously. In some cases, however, the mediation of other agents such as teachers or advisors is necessary for learners to develop this capacity.

Regarding choices learners make through reflection, Murray (2017) argues that autonomous behaviors stimulate new autonomous behaviors. In this sense, autonomy can be seen as a virtuous circle in which autonomous behaviors can energize and multiply (Borges, 2019; Dantas & Magno e Silva, 2008). For example, receiving positive feedback from a teacher or advisor after overcoming difficulties in oral presentations in a language class may help the learner to assume more confident behaviors in other contexts as well. Thus, feedback may motivate changes, adaptation and self-organization of agents or elements of complex systems (Larsen-Freeman & Cameron, 2008); however, certain outcomes are not guaranteed due to the unpredictability of complex systems. Reflection, therefore, must permeate the various interactions and movements presented in the CDMA, so that the experiences themselves can provide feedback on autonomy.

### *Planning*

Planning can be influenced by several components of autonomization including contextual elements, motivation, beliefs, affective issues, among others. The visions that one projects of his/her possible self (Dörnyei, 2005) may also impact current planning. Therefore, the interaction with these components may contribute both to dynamism and stability of the act of planning one's learning.

In planning their learning, learners may set goals or reformulate pre-established ones, and choose strategies that they deem more appropriate or viable to achieve these goals. Reflection should be present in the planning, as it leads learners to make more conscious decisions concerning their language learning. Different affordances available in the environment should also be considered in the planning. However, learners are not always able to make conscious choices. Sometimes, influenced by an attractor state, beliefs or affective issues, learners choose unfavorable strategies, e.g., strategies that they are already accustomed to using or that require little effort. Other times, if not having the habit of organizing and planning short-term and long-

term actions, they may end up procrastinating decisions and actions. In those cases where decisions remain at the intentional level, planning loses its purpose of driving action. For these learners, collaboration with teachers, advisors, or other agents can lead to the emergence of new autonomous behaviors.

### *Actions*

In the language learning context, action induces learners to transform their intentions into attitudes through the exercise of their agency, initiative and activity, leading to autonomization (Borges, 2019). Agency is related to learners' ability to undertake autonomous and self-regulated behaviors (Mercer, 2011). In this sense, agency can be seen as a determining aspect for the dynamism of autonomization. In the model, agency is represented by "actions".

One of the conditions for the development of autonomy is the availability of opportunities for the learner to take control over learning (Benson, 2011). In this sense, the ability and willingness to take responsibility for learning must be accompanied by the actions necessary to make this possible (Oxford, 2017). The trajectories of the participants of my doctoral studies showed that learners who take initiative and act to maintain the dynamism of their learning system are more susceptible to the emergence of autonomous behaviors (Borges, 2019).

### *Emergence*

"Complex systems are adaptive; they can 'learn' as a result of experience. An adaptive system changes in response to changes in its environment" (Larsen-Freeman, 2017, p. 16). Adaptation is a constant process in language learning, as students adapt to teachers and vice-versa, classmates adapt to each other, teachers and learners adapt to materials, academic context, language, culture, methodology, etc. (Larsen-Freeman & Cameron, 2008). In this process of co-adaptation, new patterns of behavior may emerge, different from those observed previously (De Bot & Larsen-Freeman, 2011). Emergence occurs when the components of the system interact with each other and with the environment and combine to the point of spontaneously generating a new state (Mercer, 2012; Larsen-Freeman & Cameron, 2008). For example, the interaction with a new agent, such as a language advisor, can lead the learner's system to self-organize and present new emergent autonomous behaviors, such as learning how to set short and long-term

goals and how to self-regulate his/her own progress. Thus, both teachers and advisors can cause perturbations on learners' systems promoting change and emergence on their trajectories (Paiva, 2007; Magno e Silva, 2016).

### *Empowerment*

Empowerment is the process of helping students become aware of the impact they can make on their environment (Shrader, 2003). It contributes to the success of autonomization and its purpose of enhancing individual initiatives, risk taking and broader social participation. Empowerment can lead learners who participate peripherally in a community to assume increasingly central roles (Nicolaides, 2017). There are several contextual factors that can favor or inhibit learners' empowerment, including identity and affective issues, e.g., feelings of exclusion or belonging, insecurity or self-confidence. Thus, empowerment is connected to autonomy in language learning, being both a prerequisite for autonomization and a result of this process (Shrader, 2003). Such processes are interrelated and can feedback each other (Borges, 2019). In this sense, autonomization benefits from a holistic view of the factors that influence its development as this view can raise learners' awareness and empower them to exercise new roles in their community.

### *Transformation*

One of the expectations in the autonomization process is that learners should be able to use whatever favors their learning in broader contexts. Little (1991) describes this capacity as transfer, whereas Nunan (1997) refers to it as transcendence. From a complexity perspective, using knowledge or favorable strategies in other contexts implies somehow transforming and adapting them to the new context (Larsen-Freeman, 2017). Therefore, using previous knowledge or successful strategies in a new environment generates transformation of this knowledge or reconfiguration of these strategies, as they influence and are influenced by the new context of use. To give an example, a pre-service teacher considered to be an autonomous language learner may not become an autonomous language teacher in his/her professional career. The trajectory from learner autonomy to teacher autonomy is not a guaranteed or a spontaneous process, but an experience of transformation and empowerment that requires reflection and investment, which should be emphasized in teacher education contexts (Borges, 2019; Borges & Castro, 2022).

Thus, the capacity for transformation reinforces the continuous and perpetual character of autonomization, as it can encourage and empower learners to not settle for the goals already achieved, leading them to always seek broader goals, and transforming acquired knowledge or successful strategies in more challenging contexts.

### *Evaluation*

In evaluation, individuals reflect on their progress in relation to their goals and they are influenced by various contextual factors. This involves comparing their actions in past or current events, as well as future possibilities (Dörnyei & Ottò, 1998). In the model (Figure 3), evaluation is expected to not only occur at the end of a cycle or after achieving goals, but throughout the whole autonomization process, influencing planning, actions and investment in expected behaviors.

Self-assessment is part of evaluation and involves such key elements as reflection, awareness, and preparation for decision-making (Tassinari, 2012). Thus, learners can readjust their choices and renegotiate actions that they deem more appropriate at any time, so that their goals can be achieved. The continuous self-evaluation can help learners avoid stability when facing difficulties and adapt to new challenges encountered in their trajectory. This leads to making new choices, replacing less favorable strategies, or transforming successful strategies in new contexts, enabling new autonomous behaviors to continue to emerge.

## Autonomy Support

In the CDMA, collaboration and negotiation are processes that learners may use as support to their autonomization. Given their significance, these processes are illustrated at the base of the model.

### *Collaboration*

Autonomy develops through interdependence and collaboration. Regardless of whether learners are conscious or not, the fact that they are in the presence of others makes them an integral part of a social environment (Murray, 2014). In language learning, collaboration is even more necessary since language is both the object of learning and the means that enables interaction.

Lewis (2014) highlights autonomous learners' skills that are intrinsically related to collaboration, such as, empathy and respect for the autonomy of others. The author suggests that autonomous learners can collaborate with others by helping and empathizing with them, assuming altruistic attitudes and being fair with each other. Therefore, attitudes in favor of personal or others autonomy should be encouraged in language learning.

### *Negotiation*

Negotiation in this context means giving in power, listening to the other, suggesting options or alternatives, pondering, accepting and making relevant learning choices both by learners, colleagues, teachers, advisors or other agents involved (Borges, 2019).

In the process of negotiation, learners exercise willingness and choices – key factors in autonomization, and learn how to be more strategic in selecting appropriate actions for each situation (Oxford, 2017). Thus, learners need to be encouraged to speak for themselves (Ushioda, 2011); and teachers can facilitate it by negotiating with the students relevant aspects of learning such as goals, materials, projects, evaluation criteria, and so one. In fact, autonomy can become a failure without the negotiation of aspects related to language learning (Voller, 1997).

In this model, negotiation involves reflection on interactions with different elements and agents of the system that are meaningful for one's learning. Negotiation represents a fundamental tool to give voice to learners, and empowering them in the development of their autonomy.

## Subsystems Nested to Autonomization

Complex adaptive systems are nested within other systems. This means that they mutually influence one another. The model presents numerous possibilities of interaction among several subsystems that influence the autonomization process, including the motivational, identity, beliefs, and affective systems, all nested in a larger system – the language learning system.

### *Motivational subsystem*

Motivation and autonomy help sustain individuals' active engagement in language learning (Benson, 2006). They are interconnected in the sense that the development of one stimulates the development of the other (Dörnyei & Ottó, 1998; Benson, 2006; Dantas, 2008;

Ushioda, 2009). From a complexity perspective, this is not guaranteed. Due to the unpredictability of the system, motivating experiences lived in different contexts may or may not lead to the emergence of autonomous behaviors; as well as demotivating experiences can lead the system to stabilize or even to assume unexpected autonomous behavior patterns.

Motivation is defined by Paiva (2011) as "a dynamic force involving social, affective and cognitive factors manifested in desire, attitudes, expectations, interests, needs, values, pleasure and efforts. It is not something fixed" (p. 63). This means that motivation, just like autonomy, needs to be continuously sustained and "protected" (Dornyei & Ushioda (2011, p. 66), so it remains in development.

***Identity subsystem***

The definition of identity as, how people interact and understand their relationship with the world and how this relationship is developed on present and on future experiences (Norton, 2000), is in accordance with the CDMA. It highlights how identity can change in different contexts and timescales being influenced by the nature of our interactions. Identities are dynamic and unpredictable, and they are in a continuous process of expansion due to their openness to new experiences, making language learning a process of identity construction (Paiva, 2011). Along the same line of thinking, investing in language learning is investing in a continuous identity construction, in a projection of one or more images of oneself in relation to the other (Aragão, 2014).

The identity system of language learners can also be affected by the visions they project of their possible selves (Dörnyei, 2005). The potential for action of possible selves is highlighted in the model, as these visions can influence the emergence of new identities and new behaviors assumed by learners in the present state.

***Beliefs subsystem***

Beliefs are ways of representing reality, related to cognition and perception, and influence behaviors in dynamic ways (Barcelos, 2015). They are certainties that influence our daily actions and emotions, and they are often neither conscious nor questioned (Aragão & Cajazeira, 2017). It is important and necessary to reflect on beliefs about language learning and to relate these reflections to one's own or others' experiences to give meaning to them (Kalaja et

al., 2015). Because the way of seeing reality can change in different timescales and spaces, it is important to note that beliefs are dynamic and interactive, and that other agents play a crucial role in this process. In other words, beliefs can be reinforced or altered through experiences with others.

Beliefs can empower students leading to the emergence of new behaviors or they can keep stability in the learning system. Therefore, learners' beliefs about language learning influence their actions, contributing to the dynamism or stability of the learning system.

### *Affective subsystem*

Emotions are part of language learning experiences. They shape the flow of our actions (Aragão, 2008) and influence what learners do and how they learn (Barcelos, 2015). Emotions and actions are intertwined, affecting not only learners' reflections but also their choices, attitudes and relationships with others and the context. In this respect, Aragão (2008) argues "when we change our emotions, we change our actions" (p. 296).

In the affective subsystem, the model encompasses the interrelation between autonomy and empathy in language teaching and learning. They are both dynamic and context-sensitive skills that can be nurtured and developed throughout life (Krznaric, 2014; Mercer, 2016). In this regard, autonomy and empathy are essential in language teaching contexts because they demand from teachers the sensitivity in respecting others' learning process and their decision to exercise their autonomy in and beyond the classroom (Borges & Castro, 2022). In addition, reflection, self-knowledge, and emotion self-regulation help learners gather the necessary energy to move from one attractor state to another, where new patterns of behavior may emerge.

## Autonomy and Context

Like autonomization, context also needs to be seen as a complex system that encompasses a large number of components. The context represents a latent potential for learners to interact with it (Mercer, 2012). Therefore, it is not the context itself that fosters or hinders autonomy, but how learners interpret the potential offered by the resources present in the learning context (Tatzl, 2016).

Contextual elements can propel or repel the system towards a certain attractor state (Waninge et al., 2014). In the model, agents and affordances in interaction with learners in the

context can contribute to the emergence of autonomous behaviors or to lead to attractor states in which the system remains in dynamic stability, as will be discussed in the next sections.

### *Agents*

Different agents can influence the autonomization system, including teachers, more competent peers, advisors, native speakers or someone special who inspires or motivates the learner. The interaction with each agent occurs in a unique way, generating synergy or entropy depending on the relationship a learner has with a certain agent. For example, the relationship with a teacher who uses a grammar-focused methodology and repetition can generate a loss of energy in the system for some learners and encourage autonomous actions for others.

Learning advisors can also be seen as agents that stimulate changes in learners' trajectories. They act at a point of bifurcation, helping learners to deviate from less favorable routes in their language learning (Magno e Silva, 2016). However, the relationship with learning advisors do not necessarily mean that significant changes will occur for certain learners. Instead, it is the quality of interaction between the student and the advisor that may or may not lead to the emergence of new autonomous behaviors.

### *Affordances*

In the CDMA, affordances are part of the context. It is in the environment that learners will be able to act on the available resources. Learners can make use of resources from the environment according to their perception of the relevance of resources. A TV show in the target language can be an affordance for learning, whereas it can be a leisure activity for another person. For someone who has no intention of learning the language, the same resource may even restrict rather than trigger a learning action. This demonstrates that more important than the possibilities available in the context is the way learners perceive and use them (Van Lier, 2004). In this regard, autonomy can mediate the relationship between learners and the context of language use and learning. This mediation can lead learners to act on the resources available around them (Murray, 2017). Therefore, the actions that learners take in search of interaction with new elements and agents in the context in order to dynamize their own learning are evidences of autonomy.

***Attractors***

The autonomization process in language learning fluctuates between moments of greater dynamism and dynamic stability. As the result of self-organization, systems can stay in preferred states called attractors, in which they usually stabilize (Waninge et al., 2014). The students, as agents of the system, have an important role in maintaining the system's dynamism by reacting to the affordances provided by the environment, exercising their autonomy.

Even though the focus of the system is on changes, it is also important to consider the factors that may contribute to the stability of the system. The model described in this paper suggests reflection on the relationship between attractors and motivation, beliefs, identities and emotions, as these are nested subsystems that directly influence autonomization. For example, students who believe that the teacher is the main agent responsible for their learning success can settle in an attractor state when facing a teaching methodology they do not identify with, losing motivation for language learning. It is important to note that it is not possible to predetermine whether attractor states will be favorable or unfavorable to autonomization. Because attractor states are neutral, only the relationship between the individual and the context can define the quality of their behaviors.

## Students' Feedback on the Model in "Learning to Learn Foreign Languages" course

This section describes how the Complex Model of Autonomy Development has been used as a basis for reflection in a TEFL undergraduate program in the Northern Brazil, especially in the course "Learning to Learn Foreign Languages". This course is taught to freshmen students aiming to help them manage and regulate their learning and autonomy development throughout their lives during university and beyond.

The cornerstones of this course are reflection, negotiation and collaboration, which are paramount processes in autonomy development according to the CDMA. Thus, the teacher negotiates with the students all the main aspects of the course, such as individual and common goals, the chronogram, the activities, the evaluation instruments and criteria, among others, in order to provide students the opportunity to reflect on their learning, make choices and exercise their autonomy.

In the theoretical background of this course, autonomy is studied from the perspective of complexity paradigm. The discussion of the CDMA contributes to raising awareness about the

influence of several aspects that affect language learning, e.g., motivation, identities, beliefs, affect, context, among others. The model also helps students become aware of factors that may favor or inhibit their autonomy. After discussing the model, students are encouraged to reflect on the strengths of their autonomy as well as on the areas that need greater attention and investment, associating their learning experiences with the theory studied. Below are some students' comments[2] on the use of the model. These comments were generated through a written assignment during remote classes held during the Covid-19 pandemic:

> This model will help me in my acquisition of English, because from it I got to know which elements interact with each other, how I can make them relate in a way that benefits my learning, and I learned the effect of knowing my identities, beliefs and not excluding the affective side of this process. (...) By holding all this knowledge, not only will I benefit myself, but in the future, I will drink from these waters to help my students in the classroom. (Nádia)

> I believe the model helps me to view learning English as my responsibility as a student. I realize the need to take responsibility mainly over the processes of reflection, planning and evaluation of my learning, so that I can be aware of the repercussion of the elements of this system in my English studies. (Daniel)

> Being aware of it makes me analyze and reflect on what is pushing me or even pulling me back, and the interconnections of its components make it easier to identify this. (Camila)

> Autonomization is not a constant, but a complex process, and understanding that there are interactions with other agents, from the social to the emotional, makes me see, understand and accept the ups and downs of the process. Feeling frustrated is part of the process but understanding that this frustration is just a phase can help, just as continuing learning from a new perspective or in a new way to find the motivation or whatever it might help. (Lídia)

[2] The comments of the students were originally in Brazilian Portuguese and they were translated by the author. Each student received a pseudonym.

> The model is very interesting and helped me reflect on my learning. Based on the model, I am able to self-evaluate and to know myself more. It motivated me to set new goals and work more on my autonomy. I realized how important it is to be autonomous and to develop elements of autonomization. I can focus not only on language learning, but on many other areas of my life, especially in the professional one. (Paula)

The feedback received from learners on the model suggests its potential for reflection, self-awareness of the aspects that make the learning system to change or stabilize, and management of autonomy in language learning. Students recognize that the reciprocal influence between different components and subsystems can favor or inhibit their autonomy, helping them become aware of their own role to maintain the dynamism of autonomy in their learning trajectories.

In addition, students make use of metalanguage to explain their own language learning trajectories, indicating a higher level of reflection on the matter. Because of the chaotic nature of the system, this level of reflection can potentially influence their language teacher identities, classroom experiences, and future students, just like the butterfly effect, in which small changes may generate unpredictable results.

## Conclusion

This paper highlights the complex, dynamic, and perpetual character of learner autonomy, which is developed in a nonlinear and continuous way throughout life and is subject to advances, stability and setbacks. The CDMA sheds light on the central role of interactions, which are the basis of the complexity paradigm, in the development of autonomy. As an open and dynamic system, autonomization engenders unpredictable combinations among various elements, agents, processes, and subsystems of this complex network. At certain times, the interactions between certain components are more evident. Thus, it is the quality of the interactions between learners and the manifold components of the system that can generate significant changes, from which new autonomous behaviors emerge.

The model represents a tool for reflection, self-awareness, and autonomy management, and it contributes to language teacher education, the focus of which should go beyond the development of linguistic competence. Rather, language teacher education should encompass greater objectives, such as the formation of more reflective and autonomous professionals, who consider their own

needs, choices, beliefs, motivations, identities, emotions, and wellbeing as well as those of their students. The model is relatively recent, so, in the future, it should be utilized in experiments in different learning and teaching contexts, in which new interpretations and repercussions may emerge.

## Notes on the Contributor

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