Fractals and Fragmented Identities in Language Acquisition

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1. Introduction

The acknowledgement of the need to study the relation between identity and language acquisition is not something new. Many scholars have provided important insights into this field[1] and explored identity issues, such as national identity, racial discrimination, group identity, power relations and so on. Although the studies developed so far offer important contributions to the field of Applied Linguistics, they tend to focus on second language acquisition, especially, on immigrant experiences. Little has been said about the relation of identity and foreign language acquisition; we could wonder if experiences of students who learned the language without living in the country in which it is spoken were interwoven with matters of identity as well. Some could argue that in situations like these, identity issues would be minimized once the students were not exposed to cultural shock and to the need to reconstruct their social identity in face of language learning. However if we take the challenge and go deeper in the process, studying those students' histories, we can find out how identity matters are not only important but imperative if we are to

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[1] See, for example, Schumann (1978), Andersen (1983), Norton (2000), Marx (2002), Rajagopalan (2003), Pavlenko and Lantolf (2004), Warschauer (2004), Golafshani (2004), Murphey et al. (2005) and Block (2005, 2006).

understand language acquisition in a complex way. Because of that, this paper takes as its first challenge to try to demonstrate the inter-relation between foreign language acquisition and identity issues through the study of students' narratives and to provide evidence that foreign language acquisition can affect and be affected by identity matters in a complex way in which one might reconstruct the other. To do that it borrows the corpus of narratives from the *AMFALE* project[2], developed at the Federal University of Minas Gerais (UFMG), in Brazil.

When reflecting about this subject, one could ask if it is identity which influences language acquisition or if it is the latter which influences identity reconstruction. The answer to this question is not simple. As a matter of fact, it's very hard to be given if we establish this dichotomy, studying the two processes in a Cartesian perspective which places them in distinctive and contradictory poles. The complexity involved in this kind of study may call for a rupture with this Cartesian view, and demand the use of a new scientific paradigm. It's here where we place the second challenge of this study: to reflect upon identity and language acquisition borrowing the theoretical framework provided by Chaos Theory. In this perspective this paper seeks to show identity in the XXI century as a chaotic system which interacts with the social world in order to create the paradox of the individual who is unique and social at the same time and to prove that identity and language acquisition are in fact two sides of the same coin.

In the next section, a brief introduction to Chaos Theory will be provided to help the reader understand some of its basic concepts.

2. The Chaos theory

The word *chaos* is used to refer to behaviors which are apparently disordered and unpredictable, but have an underneath order. The study

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[2] *AMFALE* stands for "*Aprendendo com Memórias de Falantes e Aprendizes de Língua Estrangeira*" (*Learning with speakers and learners of foreign languages*). This project is developed at UFMG, in Brazil, and is coordinated by professor Vera Lúcia Menezes de O. e Paiva.

of chaos dates back to 1960s when a meteorologist named Edward Lorenz was making some weather simulations in his computer. He entered some data in the computer and ran the program to check which weather conditions those initial data would generate. When he decided to recreate a movement and entered the data again, he decided to round down the last decimal numbers. He was surprised to see that this small change caused a completely different behavior. It was proved that in chaotic systems small changes in initial conditions can cause huge effects. The sensibility to initial conditions means that two extremely close conditions may generate totally independent things (Stewart 125). The metaphor of the "butterfly effect" has been widely used to explain this principle of chaos theory: a simple movement of the wings of a small butterfly in one part of the word can generate a hurricane in another part of it. The metaphor of the butterfly came to be used due to the graphic representation (which resembles a butterfly) of this chaotic behavior developed by Lorenz, and which he called "Lorenz attractor" (picture 1).

PICTURE 1 - Lorenz attractor.

Because of this characteristic of chaotic systems, another principle emerges: there is not a single cause to explain a specific effect. It's because of the interaction of different aspects and conditions that one specific pattern emerges and we cannot understand this pattern if we study a single movement isolated from the others.

Now that the reader has some idea about Chaos theory, the next section will be dedicated to present some other concepts of it and relate

them to identity issues in an effort to show identity in the post-modern era as a chaotic system.

3. Chaos and identity

In this section, the concepts of attractor, bifurcation point, strange attractor and fractal will be presented and related to the works of Bakhtin, Giddens and Hall to discuss some issues about identity.

3.1 Attractor

Stewart explains that "the essence of an attractor is a portion in phase space in which any point in movement around it approaches more and more to it" (121). In stable structured systems – typical and predictable ones – the attractors are single points and stable cycles, and the only possible movements are to keep stable in one point or to repeat periodically some series of movement. An example of an attractor is the planet orbit (picture 2) – it is a pattern of movement that repeats itself and "attracts" any object, as a satellite for example, which is put in its orbit.

PICTURE 2 - attractor: planet orbit.

3.1.1 Attractor and identity

Once the concept of attractor has already been cleared, what is the analogy we can make to identity issues?

Bakhtin ("The Dialogic Imagination" 270-72) states that two forces act in discourse: centripetal and centrifugal. The author explains the first one saying that the unitary language of a specific society acts as a centripetal force once it contributes to guarantee mutual understanding; it's necessary to overcome the heteroglossia and moves toward unity.

When Bakhtin comments on language, he makes it clear that nobody creates language for the first time – "we are not the ones who disturb the eternal silence of the universe" ("Estética da criação verbal" 270-85); we communicate using genres that precede us and act as a vehicle to transmit and naturalize ideologies. Once the genres of a specific society have a historical character, they bring rules that constrain behavior. It is imperative to explain here that genres in this sociohistorical perspective not only constrain linguistic behavior but also and mainly constrain human acceptable behavior in a given society. The values naturalized via discourse and stated in the use of genres determine the appropriateness of language and human behavior in different social contexts and institutions.

These arguments are also stated by Hymes when the author suggests that "a person who is a member of a speech community not only knows the language, but also what to say" (123). The inference we can make through this statement is that the members of a speech community not only share the same "language," but also "the social norms" underneath this language.

It is clear that in any society there are centripetal forces that, just like the attractor, "attract" the people to some specific and appropriate behavior which is prescribed by language use. Any person who is born or lives in such society (making the analogy with attractors – any point which is put in the area) is caught in the movement pattern, or behavior pattern, of that such society.

To exemplify this point and relate it to language acquisition, let's take a look at some extracts from the narratives in *AMFALE* project:

Extract 1:

My good performance in my English classes led my father to make the sacrifice of enrolling me at Cultura Inglesa. My self-stem had increased, once a placement test had allowed me to enter, straight forward, in the third period of the basic course. I was in the last year of "ginasial" and my dream was to be a doctor. I decided to make vocational test to try to convince my father that I needed to attend "curso científico" to have better conditions to succeed in "vestibular". The tests indicated vocation to teaching. Frustrated I hid the results and insisted with my father that I didn't want to take the teaching course, but I didn't succeed. I was obliged to take "Curso Normal".

Extract 2:

In 1974, my English teacher gave me and my sister a scholarship to study English at his English school. I didn't want to study English. To tell you the truth, I hated English. I wanted to attend "Belas Artes". My father, then, talked to me and told me it would be important to study English, once it would help me with "vestibular". This way, I went to such school not very happily.

In both extracts, the individuals wanted to follow different paths; however, societal values, naturalized via discourse, constrained their behavior according to the rules prescribed for that society. In extract 1, the girl wanted to be a doctor at a time in which this job was to be performed by men. The "good girls," who belonged to the "good families," should attend a teacher's course, called "Curso Normal" in Brazil, to become teachers and afterwards get married and raise children. Although this specific girl didn't want to follow this track, she had to agree with it because of the social prescriptions. Those prescriptions affected the course of her life, determining her present identity. In a similar way, in extract 2, the boy wanted to study Arts, which was not "a man's subject," and he was kind of "obliged" to change his option and become something else. In both examples, the people involved became English teachers, although this was not their aim when they had to make their choices. In fact, they didn't have those choices. Also in both examples, the presence of parental discourse is very strong, thus showing the influence of the institution "family" in creating the identity of its members. Those identities reflect the social roles prescribed by the genres used in that society.

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Giddens observes that "all individuals actively, although by no means always in a conscious way, selectively incorporate many elements of mediated experience into their day-to-day conduct" ("Modernity and self-identity" 416). This appropriation of mediated experience is accomplished through the incorporation of habits in routine. What is "routine" if not some pattern that repeats itself over and over again? So, taking once more the concept of attractor and the analogy proposed here, the values and ideologies of a given society are naturalized by a pattern of repetition which we call routine and this pattern "attracts" the individual and determines a long term typical behavior. In the extracts presented above and in many others, the discourse about learning English because "it will be important for the future" is a pattern which repeats itself and determines, in the majority of cases, a typical behavior – the person enrolls him/herself in an English course.

Although those social patterns are clearly observable in any society, of course there are some other options of behavior which call for a rupture and which are also constructed via discourse. In order to make a deeper examination of this statement, let's present a new concept of Chaos Theory – "bifurcation points".

3.2 Bifurcation points

There are some bifurcation points which cause a change in the route of an attractor. Each bifurcation point is a decision point. The system may pass by it and keep its regular route or it may change its movement pattern (picture 3).
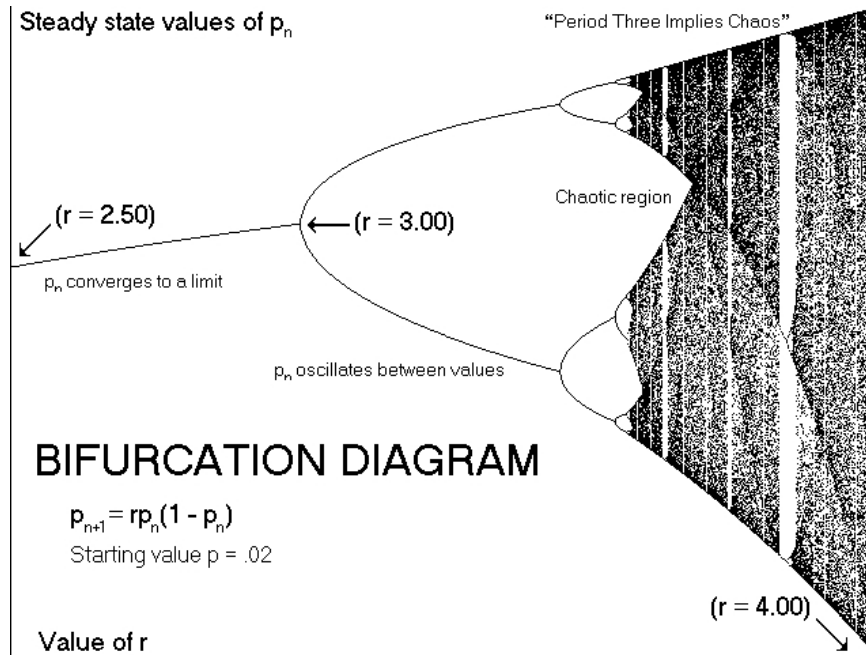
PICTURE 3 - Bifurcation diagram.

In picture 3, we can see that there is a bifurcation in the trajectory of the system. The system suffers a rupture in some points and bifurcates in two. Each of these two may suffer new bifurcations and duplicate and so on. This movement will continue indefinitely. It's important to notice, however, that the system may pass by those points and keep its normal route or it may bifurcate. What causes the bifurcation or not is what is called "critical state."

The critical state may be caused by some external disturbances, such as, for example, a small change in the context; or it may develop from the system itself what is called self-organized criticality. Gleria et al explain that the self-organized criticality seems to emerge when the parts of a system start to move away from the equilibrium point (103). In critical states, there are no specific causes to great events. Small forces may have huge effects.

3.2.1 Bifurcation points and identity

As stated before, some social forces constrain social action and cause a typical appropriate behavior in a given society. However, there are some points in life in which different discourses can cause a rupture and establish a new pattern of behavior. It doesn't mean, however, that every individual will react the same way to the same discourses. To some, new discourses will merely not be considered and they will follow their pattern of behavior in the typical way they had done so far. Therefore, for others, those same discourses may be appealing and cause the emergence of a new identity. Giddens explains those bifurcation points, although the author treats them as "risky moments:"

> To take care of our own lives involves risk, once it means to face the diversity of possibilities opened to us. The individual must be prepared to make an almost complete rupture to the past, if it is necessary, and must consider new courses of action which cannot be guided only by the established habits. The security reached by strict obedience to the established patterns is ephemeral, and at a certain point it will break. ("Modernidade e identidade" 72)

As has been argued here, those risky moments can cause a rupture with the established habits and generate new possible behaviors, and I would add here new possible selves. The extracts 3 and 4 presented below illustrate how the access to new discourses contributed to some bifurcation points and to the construction of new identities, in this specific case, the identities of language students and English teachers.

Extract 3:
But a really strong fact that would lead me to the fields of languages came up: in a Christmas Night Eve my mother invited all the family to sit down in front of our living room TV in order to watch the Mass the pope was going to celebrate and we did it. As the Mass went on something extremely awesome caught my attention: the pope sent out a Christmas message to all over the world in at least fifty-seven languages and I got petrified by that ability of his. I went to bed that night knowing what I would like to do for the rest of my life: study every language I would come across in my lifetime.

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Extract 4:

I grew up in the 60s, in the rock era and the first jeans, which in that time were called "Lee pants". The American culture influence brought by music, films and buying society bombed us day and night. And I ... studied German ... My sister, 5 years older than me, studied English at "InterAmericano" in Curitiba. And I ... studied German. It's not that I didn't like German, but it was much more "cool", using a slang, to study English.

In extract 3, the same mass transmitted on TV to millions of people caused a change in that specific individual. Many others who watched the mass went on with their daily patterns of life, but to that individual a different message was sent. We may ask ourselves why that specific individual had that reaction to that discourse. Perhaps for some time this person had already been thinking about the choices he/she would have to make in a near future; in other words, maybe this person was already in a critical state, approaching the moment of rupture. In this example the bifurcation of the self was caused by inner motives or, using the chaos terms, by the system itself in a state of self-organized criticality. In extract 4, however, the bifurcation was caused by some external perturbation, meant by the access to a different discourse – in the extract, the discourse of the 60s.

With new identities there are new possible courses of action and new movement patterns – to use the concepts borrowed from Chaos Theory; in other words, new attractors emerge which are called "strange attractors."

3.3 Strange attractor

In dynamic and chaotic systems, the attractors are not stable points or cycles, but a pattern of movement which never repeats itself; it's a system that never returns to the same place. This kind of attractor has a fractal form and is sensitive to small changes. According to Lewin, they are not stable but change the dynamic possibilities each time the environment changes (93). This new kind of attractor received the name of *strange attractor*[3] (picture 4).

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[3] Stewart explains that the name "strange attractor" is a "declaration of ignorance," since whenever mathematicians are not able to explain something, they treat it as "pathological, abnormal or strange" (134).
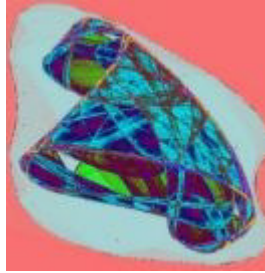
PICTURE 4 - Strange attractor.

The strange attractor is typical of chaotic systems. Each bifurcation point creates a change in the movement pattern of that attractor. As it is sensitive to small changes, a minimum change in the environment can cause a bifurcation and a consequent change in the pattern. Because it is always changing, and because it's sensitive to the environment, it's difficult – if not impossible – to predict exactly the dynamic possibilities it will take, although it's possible to be aware of some probable behavior if we examine all possibilities of change in the environment. The problem is that the range of possibilities is infinite and we never know for sure which of them will cause a rupture. Because of this, it seems the pattern changes at random, or in a chaotic manner. However, if one looks back to the movement pattern, it's possible to identify the points which caused the bifurcations and to acknowledge an underneath order. In other words, it's possible to visualize the order within the chaos.

3.3.1 Strange attractor and identity

As the strange attractors change the dynamic possibilities each time the environment changes, so identity is also sensitive to environment changes. As it was stated by Josselson, "the identity is the interface between the individual and the world, and its elements may be altered according to the environment around us" (qtd in Golafshani).

We have already seen that each individual follows his/her route up to certain decision points in which a specific discourse may appeal to him or her and cause a bifurcation in his/her path. This bifurcation contributes to the generation of a new identity. The more society becomes mediated by global culture, more discourses are offered to the individual and may cause the bifurcations. As Hall observed,

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> The more the social life becomes mediated by the global market of styles, places and images, by the international trips, by the images from the media and by the interconnected communication systems, more the identities become disconnected of times, places, histories and specific traditions and seem to "float freely." We are confronted by several different identities (each one appealing to us, or better, appealing to different parts of us). (75)

There is an infinite number of possibilities opened for the individual and it is impossible to predict which of them will appeal to him/her. Therefore, it is impossible to predict which new identities may or may not emerge in the individual's life. It also seems to happen without a clear explanation or implicit order, or, as Hall put it, identities "seem to float freely" (75). However, the same way we reflected before about the strange attractor, if we look back to the social history of this individual, it will be possible to acknowledge some points in which the contact with some discourses contributed to the emergence of multiple identities. Furthermore, as the strange attractors are patterns of behavior that never repeat themselves, so individuals, in each social experience lived, are always new people. Nobody leaves one social encounter the same way he/she entered it. We are always reconstructing ourselves with our social experiences and according to the discourses brought to us by the social institutions.

Returning now to Bakhtin, these different discourses offered by the social institutions represent the centrifugal forces of the language. They contribute to the heteroglossia and carry on "the uninterrupted processes of decentralization and desunification" ("The Dialogic Imagination" 272). The author identifies the existence of both forces in language – centripetal and centrifugal, but he recognizes that the later are more important.

To exemplify what has been argued so far, let us take a look at some other extracts from the *AMFALE* narrative corpus:

Extract 5:
It was not the teaching, but myself. I started to discover things that had gave me motivation to learn English. At that time I started to have contact with interesting stuff in English, specifically music and RPG. The music I started to listen was the English and the American Rock and Roll and the RPG was, at that time, a game that had all the rules in English.

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Extract 6:
Then I went to high school, where English classes are simply awful. Every year the same subjects were taught to us, such as verb to be, negative forms, interrogative forms etc. However, the sport I have been practicing from that period so far is full of English words and expressions, what made me more interested in English. In fact skateboard has been a 'catapult' to my English learning process.

In both extracts we can notice how the access to new discourses contributed to the emergence of new selves. Also, we can see how those discourses contributed to group identities: a rock'n roll person and an RPG player (extract 5), and a skateboard person (extract 6). Those group identities in interaction caused the emergence of new identities: language students. In extract 6, it's also interesting to observe that the person mentions the "student" identity, associated to the social institution "school," and contrary to what many would think, it was not this identity that triggered language acquisition, but his social identity as a "skateboard guy."

As it was argued before, the strange attractors have a fractal form. That's what we are going to talk about in the next section.

3.4 Fractals

A fractal is a geometric figure which is self-similar in different scales and represents the mathematics of Chaos. The term was created by Benoit B. Mandelbrot in 1977 when he surprised his math colleagues asking about the length of the British Coast. A question that apparently had an obvious answer was used by Mandelbrot to prove the math of Chaos. He proved that the British coastal length was, in fact, infinite. If we look from above, there is a physical limit to the coast, but when we approach the length of observation, it is possible to see that the external limit has infinite possibilities of internal fragmentation. Each depression, lake, small holes, and so on, contributes to increase the length of the coast, although it is still limited by an external demarcation – it has an infinite perimeter within a finite area. What is interesting to observe is that no matter the level of approach used in observation, each part presents the

same properties of the whole. To understand better the properties of the fractal, let us examine picture 5.

PICTURE 5 - Cantor Dust.[4]

Picture 5 shows a segment between two points A and B. If we take the medium thirds of this segment AB, we have other smaller segments which are self similar to the AB segment. If we keep doing this same procedure, we have smaller segments, but all of them self-similar to the whole. We have infinite possibilities of internal fragmentation, limited by the length of the segment AB. Now let us see how all of this can relate to identity issues.

3.4.1 Fractals and identity

It has already been argued that multiple selves coexist within the same person and those multiple selves emerge due to different social contexts, the social roles of the individuals in the social encounters and according to the discourses presented by the different social institutions throughout the individual's lifetime.

Taking the properties of fractals mentioned above, although we are externally limited by our human embodiment, that is, by our physical nature and by our social historical experiences, we still have infinite possibilities of internal subdivisions. To each discourse we affiliate, in each social community we take part, a new self emerges and we have infinite possibilities of internal fragmentations. As proposed by Giddens, "such a

[4] This model was created by Henry Smith (1875) and used again by George Cantor (1883) to explain the fractal properties (see Stewart 134).

view is often thought to imply that an individual has as many selves as there are divergent contexts of interaction" ("Modernity and self-identity" 417).

In spite of this, Giddens suggests the diversity of social contexts also contributes to unification. According to him, "a person may make use of diversity in order to create a distinctive self-identity which positively incorporates elements from different settings into an integrated narrative" ("Modernity and self-identity" 418). It is exactly because only a single individual has lived his/her social experiences, has had his/her social encounters and finds himself/herself in a coordinate of time and space that is occupied just by himself/herself that we can say that he or she is unique. This is the great paradox of identity – we are unique exactly because we are socially constituted.

Borrowing the concept of fractals once again, regardless of how many internal fragmentations we have, we are still limited by who we are. In other words, we are one with infinite possibilities of internal subdivisions. Then we come to the second property of the fractals – self-similarity. Although there are those internal subdivisions, we are not pieces of ourselves. Each self has the same properties of the whole individual and the individual is unique just because it keeps the same properties of his/her internal selves. The several selves do not coexist in isolation, but interact among themselves. It means that I am the mother I am because I was the daughter I was, because I am the researcher, the teacher, etc. that I am. One could ask: "which identity aligns all the others?" The answer is quite simple: no one. Just like the gestalt property of "figure/background," each time one identity emerges, all the others are in the background contributing to the one which is in the fore.

Having the concepts of Chaos in mind, especially the properties of fractals presented here, it is now time to argue for the substitution of the widely used term "fragmented identities" to "fractalized identities."[5] Fragmentation evokes the idea of isolated pieces that do not interact with

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[5] The idea of using the term "fractalized identities" to refer to the multiple identities which coexist in a person was suggested by Dr. Vera Lúcia Menezes de O. e Paiva – my supervisor. I'd like to pay her a tribute for that and acknowledge her important suggestion to use this term.

each other. Fractalization evokes the properties of fractals and can explain better the arguments presented so far, that is, the fact that the multiple identities coexist in interaction within the same individual, and it's due to this very interaction that the human being has a social identity that is unique. The negotiation of those fractalized identities may contribute to or hinder language acquisition, as we can see in extracts 7 and 8 below.

Extract 7:

My life is confuse because I'm married I have a son and I don't have money. So I don't have free time to study. When I started study my son was four months and he cried a lot, but my first teacher here didn't understand my life and she told me that study was more important than everything. I didn't think with her, so I didn't ready speak, learn English. Now I don't speak English but I like it and I want to speak, ready, learn English. I need learn English. This is very important in my life.

Extract 8:

My first impulse for learning a foreign language, English, to be more specific, was not to be here where I am now, studying for becoming an English teacher. No, before that there was my passion for another kind of language (if could call it like that, I am sorry for the musicians if I cannot), "music". (...) I may be sorry for being here, taking the place of somebody who is and wants to be a teacher, but I cannot be sorry for the time that I have passed here, for all that I have learned thanks to this course, I have learned so much about so many things and about myself. My experience here, more than academic or professional, was personal. The knowledge I am holding with me for ever in golden frame. The degree I will send to my family is black silk paper.

In extract 7, it's possible to identify several identity fractals: wife, mother and a student. The negotiation among those many selves is not done in harmony and thus, hinders language acquisition. In a similar way, in extract 8, we can also identify several fractals: language student, prospective teacher, musician, and son. The negotiation of the multiple selves, however, is well accomplished and the person is able to deal with those fractals in order to improve his or her opportunities to learn.

4. Final comments

There is no doubt that the postmodern era is marked by a process of fragmentation of the self, but this fragmentation may also lead to unification. Accepting the challenge of using a new theoretical framework introduced by the Chaos theory, it was possible to better understand the paradox of the individual who is unique because he or she is socially constituted. I also argued that the term "fragmented identities" would not properly explain this paradox and a new term, based on the concept of "fractals," was suggested: "fractalized identities."

The challenge of studying the relation between foreign language acquisition and identity issues showed that identity, far from being just one aspect of learning, is, indeed, an important matter if we are to have a holistic view of the complexity which encompasses this process. While matters such as national identity can have a weaker impact on learning in such contexts, other issues related to group identity and social institutions effects on individual identity emerge as something worth reflecting upon. Finally, it was demonstrated that the Chaos theory can be a useful theoretical tool available to Applied Linguists if we are to account for the complexity which involves processes of language acquisition and identity reconstruction. After all, we should remember, as Bezerra has stated, that "the human being is this amalgam of vicissitudes which make it irreducible to exact definitions."[6]

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[6] Paulo Bezerra in the introduction to *Problemas da poética de Dostoiévski*, p.xi.

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