

PARADIGM SHIFT IN LANGUAGE TEACHING AND LANGUAGE TEACHER EDUCATION

Mudança de paradigma no ensino de língua e na formação de professor de língua

Elaine Ferreira do Vale BORGES (Universidade Estadual de Ponta Grossa, Paraná, Brasil)

Abstract

In this article, I intend to conduct a short literature review and discussion about paradigm shift in language teaching and language teacher education from Cartesian to the complexity paradigm. For that, I use the Kuhnian notion of scientific revolution to present a short compilation of works related to paradigm shift in different sciences, including psychology, linguistics and, more emphatically, applied linguistics. The main proposal is to show the evolutions of paradigm shift in language and social sciences and its impact on the emergence of the complexity paradigm in language teaching and language teacher education fields.

Key-words: *Paradigm shift; Language teaching; Teacher education; Complexity.*

Resumo

Neste artigo, visio apresentar uma rápida revisão da literatura e discussão sobre mudança de paradigmas no ensino de língua e formação de professores, indo do paradigma cartesiano ao paradigma da complexidade. Para tanto, uso a noção kuhniana de revolução científica, apresentando uma compilação de trabalhos relativos à mudança de paradigma nas diferentes ciências, incluindo a psicologia, a linguística e, mais enfaticamente, a linguística aplicada. O propósito central é mostrar a evolução na mudança de paradigma nas ciências sociais e da linguagem e seu impacto na emergência do paradigma da complexidade nos campos de ensino de língua e formação de professores.

Palavras-chave: *Mudança de paradigma; Ensino de língua; Formação de professores; Complexidade.*

1. Introduction

In general, the Kuhnian sense of *paradigm* in science has to do with a consensus worldview, a tacit knowledge, an intuition or common belief of a certain scientific community and its implication in the development of a theory, models and the scientific research itself. To be more specific, the Kuhnian paradigm “is the universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners” (KUHN, 1970[1962], p. viii). *Paradigm shift* or *scientific revolution* occurs when anomalies appear and they cannot be solved or explained by the current paradigm. For Thomas Kuhn, the optical illusion of some images, like those of the Gestalt psychology, is a good example of paradigm shift, when the same information can be seen in an entirely different way. Well-known examples of paradigm shifts provided by Kuhn in *The Structure of Scientific Revolutions* (SSR) in physical sciences include: from *Aristotelian dynamics* to *Copernican astronomy*, and from *Newtonian mechanics* (classical physics) to *Einstein’s theories of relativity* (quantum physics).

In the postscript-1969 to the second edition of SSR, Kuhn reinterprets his view of paradigm in a broader sense as “what the members of a scientific community share, and, conversely, a scientific community consists of men who share a paradigm” (KUHN, 1970[1962], p. 176). This reinterpretation is a consequence of Masterman (1979)’s criticism. The author pointed out twenty-one different meanings of paradigm in the SSR. The broader sense of the Kuhnian paradigm, as revealed in the postscript, was then divided into two complementary senses, i.e., 1) *sociological paradigms* (“it stands for the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community” (p. 175), a set of group commitments, an exemplar); 2) *paradigms as exemplary past achievements* (“it denotes one sort of element in that constellation, the concrete puzzle-solutions which, employed as models or examples, can replace explicit rules as a basis for the solution of the remaining puzzles of normal science” (p. 175), shared examples, a disciplinary matrix). The former is more fundamental, more global in application, since it defines the elements in the framework that constitutes the latter by means of examples. Here it is also taken into account the

three categories into which Masterman (1979) had divided the twenty-one different meanings of the term paradigm in the SSR, namely, the *metaphysical paradigms* or *metaparadigms* (as a set of beliefs), the *sociological paradigms* (as a universally recognized scientific achievement), and the *construct paradigms* (as a textbook or classic work). Borges (2009, p. 65-66) interprets Masterman's categories as phases or stages in the development of a sociological paradigm, where a metaparadigm or metaphysical paradigm (philosophical) is its first stage, followed by a construct paradigm (less than a theory; Gestalt figure), and finally reaching the stabilization of a sociological paradigm (the concrete puzzle-solutions). On the other hand, Eckberg and Hill (1980) have already emphasized three different levels for the Kuhnian paradigm: 1) metaphysical (world view), 2) sociological (disciplinary matrix), and 3) concrete (exemplar). It should be highlighted that the sociological and concrete paradigms in Eckberg and Hill can be understood as the final stages of the Kuhnian's broader sense paradigm.

As it can be seen, the SSR's postscript-1969 provides a new way to understand paradigm in science. Moreover, this broader sense of Kuhnian's paradigm also brings the *social sciences* more effectively (BORGES, 2009, 2010b) into the reflection on how the science progresses, since the maturity of a science is no longer characterized by a paradigm in a narrow sense (as previously used in natural sciences). As Kuhn (1970[1962], p. 179) pointed out, "what changes with the transition to maturity is not the presence of a paradigm but rather its nature" and the scientific research in the language and/or social sciences is not grounded on unequivocal and binding paradigms of some sort, as the ones Kuhn showed to happen in physics, for instance.

Nevertheless, to talk about paradigm and paradigm shift in physics and social science one must be aware of the language-game of each science. In *Philosophical Investigation*, Wittgenstein (1986[1953]) argues that the meaning of words is constituted by the function they perform within any given language-game. In a language-game, word "is not something that is represented, but is a means of representation" (p. 25). Therefore, any field of knowledge has its own language-game and this can explain the emergence of different terms that have in fact the same meaning like *paradigm*, *world view*, *theory*, *model*, *revolution*, *framework*, *metaphor*, *notion* and *approach*, for instance, concerning the meaning of the term paradigm in itself. On the

other hand, it is also possible to come across different sciences that somehow emphasize any aspect about the so called *complexity science* terms like *complexity paradigm*, *complexity theory*, *complexity revolution*, *complex model*, *complex thought*, *complex thinking*, *complex system theory* and so on, sharing the same meaning that characterizes something with many parts in an intricate arrangement. Those terms are going to appear throughout this paper while I am going to discuss the paradigm and paradigm shift in physics and social science.

With that in mind, this article aims to present some examples of paradigm shifts in language and social sciences, as it will be shown in the two sections below, *Paradigm shift in psychology and language sciences* and *Paradigm shift in language teacher education*. Additionally, it describes the impact of the emergence of paradigms in language teaching and language teacher education fields that ultimately leads such fields to complexity theory.

2. Paradigm shift in psychology and language sciences

In the history of linguistics evolution as a science, Koerner (1976a; 1976b; 1981) and Dascal (1978) emphasize the *Schleicherian*, *Saussurean* and *Chomskyan paradigms*, suggesting that they are example of paradigm shifts.

First, during the 1860s, as a major breakthrough in the 19th-century linguistics theory, and with a Darwinian concept of language as a living organism and of linguistics as a natural science, August Schleicher's work provided "a framework or paradigm for subsequent research in historical-comparative linguistics" (KOERNER, 1981, p. 157). Schleicher's view "was imbued with naturalist conceptions, both about the nature of language in general and about its mechanism and evolution" (KOERNER, 1981, p. 158) and that was a general agreement among 19th-century in the 1880s. After reading Charles Darwin's work, Schleicher argued that it was perfectly applicable to languages:

Languages are organisms of nature; they have never been directed by the will of man; they rose, and developed themselves according to

definite laws; they grew old, and died out. They, too, are subject to that series of phenomena which we embrace under the name of "life". The science of language is consequently a natural science; its method is generally altogether the same as that of any other natural science (SCHLEICHER, 1869, p. 20-21).

Second, in the end of the 19th and the beginning of the 20th-century, Ferdinand de Saussure provided a new frame of reference in general linguistics theory by conceiving “his conception of language as a code and a semiological system which can operate exclusively on the basis of some form of conventional agreement established among the members of a given speech community about the value of the signs” (KOERNER, 1976b, p. 702). Saussure brought the social nature of language to the linguistics theory, although the emphasis of his work was based on the system underlying linguistic interaction. Thus, while Schleicher used the term language meaning an ‘organism’, Saussure used it in the sense of ‘system’ (*langue*) as opposite to the verbal expression of the individual speaker (*parole*). Therefore, Schleicher conceived language as governed by unalterable natural laws. On the other hand, Saussure understood system (*langue*) as under social laws that changes from time to time.

Finally, in the 1950s, Noam Chomsky’s work emerged grounded on symbolic logic, on mathematics and on “the dynamic nature of synchrony which, in Saussure’s understanding, was essentially static” (KOERNER, 1976b, p. 704). Basically, his linguistics theory attempted to describe and explain the language and its mechanisms (i.e., the structures underlying linguistic performance); also it gave rise “to an unprecedented general theory-orientation in linguistics” (ibid).

Markova (1982) highlighted two large-scale world views, or Western philosophical-cultural frameworks, namely *Cartesian* and *Hegelian frameworks*, which guided works in the field of psychology. However, the fundamental perspective on each of these frameworks – the individualistic and the social nature of mind respectively – is the developmental base of models and methodologies in many other sciences as well. Figueroa (1994), on the other hand, relating the Markova frameworks to those in linguistics and sociolinguistics, distinguished the *formalist paradigm* from the *functionalist paradigm*. The former, as mentioned by author, defines language “as an

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autonomous system” (p. 22) and shares meanings not only with the Cartesian framework but also with the Saussurean and Chomskyan paradigms (as discussed above). The second, as in Halliday’s work, for example, defines language “in relation to its social functions” (p. 22) and shares the same world view with the Hegelian framework.

Spivey (2007) went a step further and suggested the existence of a movement in the cognitive sciences in favor of a *continuous dynamical framework* in replacement of a *computer metaphor of the mind* for describing cognition. Larsen-Freeman and Cameron (2008), in the same way, but in the context of second language acquisition (SLA), discussed the limits of the ‘*brain as computer*’ metaphor and stated that “the minimal claim that we are making for complexity theory is that it adds another way of understanding phenomena in our applied linguistic problem space” (p. 13). Additionally, the authors affirmed that the metaphorical nature of analogies is only a provisional help to thoughts and reflections, and it can be of great damage if we start to see it as ‘the truth’. Larsen-Freeman and Cameron claimed that this may have happened to the ‘*computational mind*’ metaphor in linguistics, and to terms like ‘*input*’ (as ‘the truth’ for listening) and ‘*output*’ (as ‘the truth’ for speaking) in language teaching. This wrong way of using metaphor can make one “lose sight of how humans construct meaning through social interaction” (p. 13). Moreover, it can hold an entire research field from advancing in the way it understands its phenomena.

Still using a metaphor to conceptualize language education, one can find in van Lier (1996) a discussion about an *ecological metaphor* in language curriculum design; and in Paiva (2008) a reflection about *chaos as a new metaphor* in SLA. Before that, Herron (1982) brought up the *mind-body metaphor* or a *gymnastic theory of mind* (mental training) to describe the grammar-translation method in language teaching, as well as the *production metaphor* (education for social order and efficiency) to illustrate the audiolingualism. From my understanding, both methods share meanings with the ‘*brain as computer*’ metaphor cited above. Yet, Nattinger (1984) claimed for a new metaphor for communicative language teaching (CLT) but, as the author himself emphasized, that new metaphor still remains uncertain. In fact, CLT – as far as the development of communicative skills are concerned (in language for specific purpose

courses, for example) – still “suggests that an aspect of the production metaphor remains” (HERRON, 1982, p. 239).

Within this panorama, Herron (ibid) advocated that what has happened in language teaching is an option for the use of an *eclectic approach* to language teaching, where “we retain what we know from experience to be effective foreign language learning strategies, while experimenting with new techniques that may lead to more successful teaching” (p. 241). A similar reflection was made by Prabhu in what he has called as the *teacher’s ‘intuition’* “of how classroom activity leads to the desired outcome of learning” (PRABHU, 1987, p. 106) or as the teacher’s *sense of plausibility* in a post-method era. In this era “the notion of good and bad methods is itself misguided” or “no single method is best for everyone, as there are important variations in the teaching context that influence what is best” (PRABHU, 1990, p. 161-162).

Howatt (1988) exposed the same fact about the close connection between production metaphor and CLT by stating that “CLT was born from a desire to improve, rather than from a desire for change” (p. 25). With such a statement, the author implies that CLT is still attached to the Cartesian framework in fundamental issues, like those “of direct method and structural language teaching (...) largely unexamined and undisturbed, just as they have been for a century or more” (HOWATT, 1988, p. 25). Howatt also stated that:

CLT has adopted all the major principles of 19th century reform: the primacy of the spoken language, for instance, the inductive teaching of grammar, the belief in connected texts and, most significant of all, the monolingual (direct method) principle that languages should be taught in the target language, not in the pupils’ mother-tongue. What the CLT has achieved, apart from curbing the excesses of audio-lingualism? It has added an extra dimension to traditional progressive methodology. (p. 25)

Considering the two last paragraphs and Howatt’s quote above, the Kuhnian’s view of paradigm in social sciences can be brought for reflection.

For Kramersch (2006), conversely, learning a language is not only to learn how to communicate as a member of a particular socio-cultural group (as defended by the CLT and by applied linguists such as Breen and Candlin (1980)), but also to enrich and

embed it “into the ability to produce and exchange symbolic goods in the complex global context in which we live today” (KRAMSCH, 2006, p. 251). In this matter, close attention needs to be paid to “how linguistic form shapes mental representation, that is, what word choices reveal about the minds of speakers” (KRAMSCH, 2006, 251). The symbolic/ecological competence, as opposite to communicative competence (and CLT), possess similarities with the complexity theory (LARSEN-FREEMAN & CAMERON, 2008), the continuous dynamical framework (SPIVEY, 2007), and the ecological/chaos as a metaphor (van LIER, 1996; PAIVA, 2008).

This discussion can also be applied to the notions of *affordance* and *input*. As van Lier (2000) pointed out, most of the discussions in the field of language teaching “[are] based on an input-output metaphor of learning and cognition, in which mind and brain are seen as ‘containers’ of both learning process and learning products” (p. 257). He suggested that “the notion of input can be replaced by the ecological notion of affordance, which refers to the relationship between properties of the environment and the active learner” (ibid).

It becomes now necessary to show some important theories and/or hypotheses of SLA regarding the *input-output metaphor* that are known to be the basis of methods and approaches to language teaching.

Krashen’s Input Hypothesis and Swain’s Comprehensible Output Hypothesis, for example, despite being considered ‘rivals’ (KRASHEN, 1994), play an important role in the CLT; additionally, they are part of what Larsen-Freeman and Long (1991) defined as *nativist* and *interactionist theories of second language acquisition*, respectively. Krashen’s hypothesis “states that ‘acquisition’ takes place as a result of the learner having understood input that is a little beyond the current level of his competence (i.e., the $i + 1$ level)” (ELLIS, 1985, p. 262). On the other hand, Swain’s hypothesis claims that “we acquire new language when we attempt to produce a message”, but when “we experience communicative failure, we adjust our output and try a new version of the rule we are acquiring” (KRASHEN, 1994, p. 47).

Regarding more traditional language teaching methods one may quote, for example, Skill-Building Hypothesis, Simple Output Hypothesis, and Output plus Correction Hypothesis, as listed in (KRASHEN, 1994). The first claims that “we

acquire language by first consciously learning individual rules or items, and then, through output practice (often in the form of drills and exercises), we make these rules automatic” (p. 46-47). The second states that “we acquire language by producing it” and that “speaking or writing alone, without any feedback or interaction, will result in language acquisition” (p. 47). Finally, the third claims that “we acquire language by trying out new rules or vocabulary items in production (...) if we receive negative feedback, we alter our conscious hypothesis about what the rule is or what the new word means” (ibid). Those three hypotheses share meaning with *nativist* and *environmentalist theories of second language acquisition* as pointed out in Larsen-Freeman and Long (1991).

van Lier (2000)’s proposition to replace the input-output metaphor for the *ecological notion of affordance* comes from questioning the common assumption “that language, cognitions, memories, and intelligence are uniquely contained inside the brain, and that learning consists of various ways of putting them there” (p. 257). Inside this proposition lies the reflection made by the same author in 1996 and also in Paiva (2008). The former pointed out that “we can neither claim that learning is caused by environmental stimuli (the behaviorist position) nor that it is genetically determined (the innatist position)”, but it is rather “the result of complex (and contingent) interactions between individual and environment” (van LIER, 1996, p. 170). The latter, in turn, emphasized that “a complex model can accommodate apparently opposed elements in an effort to explain SLA” (PAIVA, 2008, p. 7), such as those highlighted by nativist, environmentalist, and interactionist theories of second language acquisition.

Yet in the field of applied linguistics, before Larsen-Freeman and Cameron’s (2008) claims for a complexity revolution, the articles of Howatt (1988), van Lier (2000) and Kramsch (2006) had already provided two examples on paradigm shifts in language teaching. The first goes from *structural* (system-oriented approaches) (HOWATT, 1988) and/or *grammatical paradigm* (KRAMSCH, 2006) to *communicative* (text-oriented approaches) (HOWATT, 1988) and/or *communicative revolution* (KRAMSCH, 2006). The second goes from *input* (scientific reductionism) (van LIER, 2000) and/or *communicative competence* (communicative revolution) (KRAMSCH, 2006) to *affordance* (action of emergence) (van LIER, 2000) and/or *symbolic/ ecological competence* (KRAMSCH, 2006). On the other hand, and as far as

an approach to language teaching is concerned, Borges (2009; 2010a; 2011) brought up some interesting arguments about the rise of sociological paradigms and metaparadigms in the applied linguistics constitution. She claimed the existence of three main approaches to language teaching or metaparadigms in the *communicative movement/sociological paradigm*: 1) instrumental approach or English/language for specific purposes (as in Hutchinson & Waters, 1987), 2) communicative approach (as in Widdowson, 1978), and 3) communicational approach (as in Prabhu, 1987); being the audiolingualism the main approach to language teaching or metaparadigm in the *grammatical movement/sociological paradigm*.

3. Paradigm shift in language teacher education

Another important aspect related to language teaching deals with language education curriculum. Clark (1987), for instance, approached the Skilbeck's (1982) three broad educational value systems (classical humanism, reconstructionism and progressivism) to discuss language teaching curriculum design. The author revealed that "classical humanism places its emphasis on content, reconstructionism on objectives, and progressivism on methodology" (p. 6), which gives rise to very different methods and approaches to language teaching (subject-centered, skills-based and process-oriented, respectively). In this context, it can be understood that subject-centered methods are an intrinsic part of grammatical syllabuses, while skills-based and process-oriented methods are an intrinsic part of communicative syllabuses.

This interpretation is reinforced by Finney (2010[2002]), who goes a step further by proposing a *mixed-focus curriculum* in a 'new pragmatism' system value. The mixed-focus curriculum is in fact a blend of the grammatical (content) and communicative (objectives and process) syllabuses. In essence, this new pragmatism view is very similar to the concepts presented above, i.e., the eclectic approach (HERRON, 1982), the sense of plausibility (PRABHU, 1987), the ecological metaphor (van LIER, 1996), the symbolic/ecological competence (KRAMSCH, 2006), the continuous dynamical framework/complexity theory (SPIVEY, 2007; LARSEN-FREEMAN; CAMERON, 2008), and the chaos as a new metaphor (PAIVA, 2008).

In this same vein, Borges and Paiva (2011) – aligned with the *AAA curriculum* (van LIER, 1996) and the *ecological approach to language learning* (van LIER, 2000) – proposed a *semiotic-ecological syllabus design* based on the complexity theory. The van Lier’s AAA curriculum (awareness, autonomy, and authenticity) aims at a curriculum based on the practitioners’ knowledge of language learning and education, and on his/her values of language use in society, since “the interpretation and application of them might vary in practice” (van LIER, 1996, p. 22). On the other hand, his ecological approach to language learning “places a strong emphasis on contextualizing language into other semiotic systems” (van LIER, 2000, p. 259). The semiotic-ecological syllabus as outlined by Borges and Paiva (2011) is based on two axes (or van Lier’s dimensions) as follows: a) *horizontal*, “forging links between different subjects, exploring cross-curricular themes, and dealing with global linguistic problems and issues” (van LIER, 1996, p. 19), also working with the “linguistic normativity (habit and structure)” (van LIER, 2000, p. 258) as a centripetal force of language; b) *vertical*, “providing deep and rich language experiences throughout the child’s academic career, and building usable and lasting language skills, both oral and written” (van LIER, 1996, p. 19), as well as making operational the “linguistic creativity (variety and invention)” (van LIER, 2000, p. 258) as a centrifugal force of language.

The next subject to be dealt with in this paper concerns theories of language teaching in teacher education. First of all, the interesting work in this subject published by Richards (1999; 2010[2002]) should be highlighted. The author conceptualized different natures of language teaching that lead to different approaches to teachers’ preparation and teaching skills (this can be noticed by the use of certain methods and approaches to language teaching). His concepts are based on the three broad conceptual categories of good teaching provided in Zahorik (1986), namely *science-research*, *theory-philosophy*, and *art-craft*. The *science-research conceptions of language teaching* “are derived from research and are supported by experimentation and empirical investigation” (RICHARDS, 2010[2002], p. 19). Richards included within the science–research the concept of ‘operationalizing learning principles’, and related this last concept to audiolingualism, task-based language teaching (as in Prabhu, 1987), and learner training. The *theory-philosophy conceptions of language teaching* are a) “derived from what ought to work” or b) based on what is “morally right”

(RICHARDS, 2010[2002], p. 22). The former is viewed by Richards as theory-based approaches to language teaching, and claimed to be CLT and silent way method. The latter is named as values-based approaches to language teaching, being essentially community language learning and learner-centered curriculum. The learner-centered curriculum – as I understand it – can be associated with English/language for specific purpose (E/LSP) as in Hutchinson and Waters (1987). In the Brazilian context, E/LSP (generally based on reading skills) is called an instrumental approach to language teaching and it has been widely used throughout the country. Finally, the *art-craft conceptions of language teaching* are dependent on the teachers' competence to make decisions according to the demands of specific situations. As pointed out by Richards (2010[2002]), in this context “there are no general methods of teaching; rather, teachers should develop an approach to teaching¹ which allows them to be themselves and do what they feel is best” (p. 23). The art-craft conceptions in education of language teacher – sometimes called *a reflective approach to teacher education* or simply *reflective practice* – have been used in Brazil in the past few years, as demonstrated, for example, in the works of Abrahão (2002; 2006) and Gimenez (2004).

Likewise, the *complexity approach to language teaching* proposed by Borges and Paiva (2011) is also related to the art-craft conceptions. This approach expanded some essential elements presented in Larsen-Freeman and Cameron (2008), such as *brain-body-world connections* (that involve learning), *dynamics of language-using* (by teacher and students), *co-adaptation* (as change in connected systems), and *dynamics of learning* (that is managed by teaching). This complexity approach calls the attention for: a) the conception of language, learning, second language acquisition/development and learner identities as a complex adaptive system; b) the focus on the learner performance (self-organized), and on the social practices of language; c) the design of a semiotic-ecological syllabus (discussed above in this paper); d) the autopoietic organization of human beings; e) the reconstructive dimension of the teaching and learning nature; and f) the teacher's role as the key that moves the whole system. Furthermore, an important feature of this approach² is that it allows the teacher's methodology (BORGES, 2010c)

¹ I personally prefer to call 'methodology' (BORGES, 2010c) as similar to 'sense of plausibility' in Prabhu (1987).

² Once it conceives the view of language, learning, language acquisition/development as complex adaptive system.

or the teacher's sense of plausibility (PRABHU, 1987) in action to hold on to as many conceptions of language and learning as necessary to keep the dynamics of the learning process. This also holds true for the theories/hypotheses of SLA and methods/approaches to language teaching, since eclecticism is not conflictive within the complexity theory. However, it is not to say that "anything goes" in a complexity approach to language teaching, as pointed out by Larsen-Freeman and Cameron (2008), but that some choices may indeed be better than others. In the case of the many methods and approaches to language teaching already available, as highlighted above, Richards (2010[2002]) claimed that an art-craft conception of language teaching "does not deny the value of knowing about different methods of teaching and how to use them, but it suggests that commitment to a single method of teaching may impede the teacher's full potential as a teacher" (p. 23).

Next, Table 1 synthesizes the paradigms and paradigm shifts in different sciences discussed in this article. However, the relation established between them is my own interpretation.

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TABLE 1
A synthesis of Kuhnian paradigm shifts in different sciences

Sciences	Authors	Paradigm Shifts		
Physics	Kuhn (2001[1962])	<i>Newtonian mechanics</i> (classical physics)		<i>Einstein's theories of relativity</i> (quantum physics)
Linguistics	Koerner (1976, 1981) Dascal (1978)	<i>Schleicherian, Saussurean and Chomskyan Paradigms</i>		
Psychology	Markova (1982)	<i>Cartesian Framework</i>	<i>Hegelian Framework</i>	
Sociolinguistics and Linguistics	Figuroa (1994)	<i>Formalist Paradigm</i>	<i>Functionalist Paradigm</i>	
Cognitive Psychology	Spivey (2007)	<i>computer metaphor of the mind</i>		<i>continuous dynamical framework</i>
Teacher/ Language Education and Applied Linguistics	Herron (1982)	<i>mind-body and production metaphors</i> (grammar-translation method and audiolingualism)	<i>production metaphors</i> (CLT)	<i>eclectic approach to language teaching</i>
	Nattinger (1984)		<i>uncertain metaphor</i> (CLT)	
	Zahorik (1986) Richards (1999, 2010[2002])	<i>Science-Research Conception of Teaching</i> (operationalizing learning principles/ audiolingualism and task-based LT)	<i>Theory-Philosophy Conception of Teaching</i> (theory-based/communicative LT) (values-based/learner-centered)	<i>Art-Craft Conception of Teaching</i> (reflective practice/ approach to teacher education)
	Clark (1987) Finney (2010[2002])	<i>Classical Humanism</i> (grammatical syllabuses) (subject centred)	<i>Reconstructionism and Progressivism</i> (communicative syllabuses) (skills/ process-oriented)	<i>'new Pragmatism'</i> (mixed-focus curriculum)
	Prabhu (1987, 1990)			<i>sense of plausibility</i> (post-method era)
	Howatt (1988)	<i>Structural</i> (system-oriented approaches to language teaching)	<i>Communicative</i> (text-oriented approaches to language teaching)	
	van LIER (1996)			<i>ecological metaphor</i>
	Larsen-Freeman; Long (1997)	<i>Nativist and Environmentalist Theories in SLA</i>	<i>Interactionist Theories in SLA</i>	
	van LIER (2000)	<i>Nativist, Behaviorist or Constructivist Perspectives</i> (input-output metaphor) (scientific reductionism)		<i>Ecological Approach to Language Learning</i> (affordance) (notion of emergence)
	Kramsch (2006)	<i>Grammatical Paradigm</i>	<i>Communicative Competence</i> (communicative revolution)	<i>Symbolic/ Ecological Competence</i>
	Larsen-Freeman; Cameron (2008)	<i>'brain as computer' or 'computational mind' metaphor in linguistics</i> (input-output or listening-speaking in language teaching)		<i>Complexity Theory</i> (metaphors of complexity)
	Paiva (2008)			<i>chaos as a new metaphor</i>
	Borges (2009; 2010a)	<i>Grammatical Movement / Sociological Paradigm</i> (audio-lingual approach to LT/ metaparadigm)	<i>Communicative Movement / Sociological Paradigm</i> (instrumental/LSP, communicative and communicational approaches to LT/ metaparadigms)	
	Borges; Paiva (2011)			<i>Complexity Approach to Language Teaching</i> (semiotic-ecological syllabus)

4. Conclusion

In the field of applied linguistics, or more specifically in language teaching and language teacher education, it is fair to say that there are two Kuhnian paradigm shifts (paradigm in a broader sense). The first is from *structural* to *communicative* approaches to language teaching, and from *science-research* to *theory-philosophy* conceptions of teaching – found, for example, in works such as Herron (1982), Nattinger (1984), Clark (1987), Howatt (1988), Larsen-Freeman and Long (1991), Kramsch (2006), Richards (1999; 2010[2002]), Finney (2010[2002]) and Borges (2009; 2010a). The second is from *communicative* to *complexity* approaches to language teaching, and from *theory-philosophy* to *art-craft* conceptions of teaching – found, for instance, in Herron (1982), Richards (1999; 2010[2002]), Kramsch (2006), Finney (2010[2002]), and Borges and Paiva (2011). However, according to the works of Herron (1982), Howatt (1988), Prabhu (1990), van Lier (1996; 2000), Richards (1999; 2010[2002]), Larsen-Freeman and Cameron (2008), Paiva (2008), and Borges and Paiva (2011), the existence of only one paradigm shift can be deduced (more precisely) from *structural/communicative* to *complexity* approaches to language teaching, and from *science-research/theory-philosophy* to *art-craft* conceptions of teaching. In this context, the paradigm shift in language teaching and language teacher education can be related to those in physics and cognitive sciences, respectively, as follows: from *Newtonian mechanics* to *Einstein's theories of relativity* (KUHN, 1970[1962]), and from *computer metaphor of the mind* to *continuous dynamical framework* (SPIVEY, 2007).

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Elaine Borges is an Adjunct Professor in the Teaching Methods and Techniques Department and in the Graduate Program in Education at UEPG - Universidade Estadual de Ponta Grossa. She is BSc in Languages/UNESP, MSc in Applied Linguistics/UNICAMP, and PhD in Education/USP. She did her doctoral internship at University of Murcia (Spain) and post-doctoral research at UFMG. Email: elainefvb@uol.com.br