

Interaction and second language acquisition: an ecological perspective

Vera Lúcia Menezes de Oliveira e Paiva (UFMG /CNPq)

What is interaction?

The word interaction is formed by the prefix **inter**, which implies togetherness, reciprocity, and the noun **action**. So interaction is a mutual activity which requires at least the involvement of two persons and which causes mutual effect. Ellis (1999, p.1) defines interaction as “the social behavior that occurs when one person communicates with another”. He also says that it “can occur inside our minds, both when we engage in the kind of ‘private speech’ discussed by Vygotsky (1978), and, more covertly, when different modules of the mind interact to construct an understanding of or a response to some phenomenon”. Ellis focuses on interaction as an interpersonal and intrapersonal phenomenon, but Chapelle (2003, p.56) proposes the addition of interaction “between person and computer”. She offers a table where she synthesizes the basic types of interaction in the light of three different SLA theoretical perspectives discussed by Ellis (1999): interaction hypothesis (HATCH 1978; LONG, 1996; PICA 1994), sociocultural theory (LANTOLF and APPEL 1994) and the depth of processing theory (CRAIK and LOCKHART, 1972).

Table 1. Benefits of three types of interaction from three perspectives

Basic types of interactions		Perspectives on the value of interaction		
		Interaction hypothesis	Sociocultural theory	Depth of processing theory
Inter-	between people	Negotiation of meaning	Co-constructing meaning	Prompting attention to language
	<i>between person and computer</i>	<i>Obtaining enhanced input</i>	<i>Obtaining help for using language</i>	<i>Prompting attention to language</i>
Intra-	within the person's mind	Attending to linguistic form	Stimulating internal mental voice	Cognitive processing of input

Source: Table 2.2 in Chapelle (2003, p.56)

Chapelle (2003, p.56) explains that

The cells in the table suggest the hypothesized benefits to be attained through interaction from each of the theoretical perspectives. For example, from the perspective of the interaction hypothesis, interaction between people is expected to promote negotiation of meaning, and if it does so, this should be beneficial for language acquisition. Since the three theories do not specifically address learner-computer interactions, I have filled in the logical predictions in italics.

Other benefits of interaction can probably be added to Chapelle's table, such as identity construction and motivation, but no matter how many the benefits are, the fact is that interaction is a basic human instinct as posed by Lee et al (2009) and it occurs in a multimodal way and not only through oral or written media.

Interaction as an instinct

According to Lee et al (2009, p. 5) "crucial for language acquisition is what we call an "interactional instinct. This instinct is an innate drive among human infants to interact with conspecific caregivers." Ellis (1999) also sees interaction as "the primary purpose for our species-specific language capacity" and Tomasello (2003, p.2), reminds us that it "takes many years of daily interaction with mature language users for children to attain adult-like skills, which is a longer period of learning with more things to be learned—by many orders of magnitude—than is required of any other species on the planet".

It is well known that interaction is a characteristic of any living species. Most of us have already seen small dogs teasing big ones, birds making sounds to call their mates or even to warn each other of enemies, or plants moving themselves to meet the sunlight. I was astonished when I heard, this year, in my garden, two birds' terrified sounds. Their desperate sounds called my attention, and I decided to find out what was happening and then, from my bedroom window, I could spot a cat on the wall between my garden and my neighbor's. It seemed that the cat was eating something among the leaves of a climbing plant, probably bird babies in their nest. As soon as I made the cat jump off the wall, the birds stopped crying. It is just an example of interaction among a human being (myself) with two birds and a cat. I am not saying that the birds had the intention to call a human being attention. But I understood their sounds as a cry for help and I acted. I could mention several examples of interaction in nature, but my purpose in here is to talk about human interaction.

Going back to the thesis that interaction is an innate drive, one can find on the Web several videos showing parents interacting with very young babies. One example is *Noah De Leon First Interaction caught on camera* (FIG. 1), available at Youtube. An explanation was added under the video screen saying that “This is the first time that Noah’s interaction with us was caught on camera. He is so eager to talk and socialize.”



FIG. 1. Noah De Leon First Interaction caught on camera
Source: <http://www.youtube.com/watch?v=2KdzybMp7ck>

In fact, this video shows Noah’s eagerness to socialize and his gladness while interacting with his mother. As only Noah is shown on the video, one can infer mother and son have made eye contact, which is also a form of interaction. Noah reacts to his mother’s attempt to interact by making vocal sounds, smiling, and making different movements with his arms and head. This is a multimodal interaction.

Another video, *Baby Interaction 2*, also found at Youtube, shows two children interacting.



FIG. 2. Scenes from Baby Interaction 2
Source: <http://www.youtube.com/watch?v=qcQsR1FdmBo>

One can see how happy they are by making touch contact (FIG. 2), by smiling, by voicing sounds and making different body movements. A third partner, probably the

mother, is acknowledged by the girl's eye contact and one can also hear that an adult's voice in a short passage of the video. According to Barnhart, "even as babies, humans have the need for close interaction with others". He adds that

positive interaction helps to build a good foundation on which a young child can use to assist in helping them to get through the rest of life where things will be as difficult as they are in childhood, just in different ways. This foundation is like a mental and emotional outline that is built on as the child grows to adulthood. Without this outline it is likely they will follow an entirely different course. When the interaction in childhood is negative (the child feels unloved, insecure, and unsafe) a negative outline can develop.

An experiment entitled "Still Face Experiment" shows how babies react when they do not manage to interact with their mothers. A video of this experiment, narrated by Tronick, is also available at Youtube. Some scenes from the video are reproduced in FIG. 4.



FIG.4. Still Face Experiment

Source: <http://www.youtube.com/watch?v=apzXGEbZht0>

Dr. Tronick says in the video that young children are extremely responsive to the emotions and reacts to social interaction. In the experiment, we see in the video, a mother sits down and plays with her baby. The child points at different parts of the room while the mother tries to engage with her by looking at those places. One can observe the coordination of emotions while both interact using eye contact, smiles and vocal sounds, but all of a sudden the mother stops responding. The baby very quickly picks upon this unusual situation and uses all her abilities to try to get her mother back. She smiles at her mother, she points because the mother is used to look at where she points, she puts both hands before the mother, she screams and as she does not get her mother's attention. She reacts with negative emotion, turns away, feels distressed, loses control of her postures and cries. Finally mother gives attention to her and socialization is repaired.

Lee et al (2009, p. 167) explain that “the social bond that develops early between a child and a mother (facilitated by oxytocin and other hormones) rewards and thus motivates social behavior.

Another example of human need to interact is our behavior in front of a computer, as discussed by Paiva (2003).



FIG. 5 hour-glass



FIG.6. downloading signal

The same way silence or a still face disturbs the participant in an interaction, as shown in Tronick's experiment, computers also disturb their users if the machine does not give them any hint in response to their actions. Computer specialists took interactional instinct into account when they devised semiotic clues to calm us down. To mention just a few, an

hour-glass tells us that it is worth the wait for saving a file, or opening a program; a specific sound gives us feedback about wrong actions, and a green bar informs us about the progression of a file downloading, as shown in FIG. 6, where one can see a myriad of different information pieces: percentage of downloading, the representation of the percentage in a bar, the amount of MB downloaded, the rate of the transference speed, and the amount of time expected for the conclusion of that task.

Semiotic signals to facilitate our interaction with electronic devices were also developed. When dealing with an I-phone, for instance, a green bar informs us about the progress of the I-phone recharging, as in FIG. 7, and a special sound warns us that a

texting message has just arrived. A GPS device gives us multimodal directions as we can listen to the instructions and also look at the map.



FIG.7. I-phone recharging

All those signals are necessary for us to wait for the machine response without stress or useless repetition of similar actions. Who has not repeatedly pushed the elevator button just because there were no light indicators working? Or who has never resent a message because he or she missed a message saying that “your message was successfully sent”?

Second Language Classroom Interaction

As Lee et al (2009, p.9) point out “the interactional drive essentially motivates infants to achieve attachment and social affiliation with their caregivers.” The authors explain that it is out of social interactions that grammatical patterns emerge and language is acquired. Lee et al (2009, preface) argue that “interaction produces grammatical structure in evolutionary time”. They assume that “innate mechanisms for bonding, attachment, and affiliation ensure that children engage in sufficient and appropriate interactions to guarantee language acquisition” (2009, preface). The authors acknowledge that “whereas primary-language acquisition is inevitable in all normal children, adult second-language acquisition (SLA) is never guaranteed” (p.170). Nevertheless, they agree that,

under conditions where social and emotional affiliation with target language speakers is sufficiently strong, aspects of the mechanisms underlying the interactional instinct may be activated in ways that facilitate second-language learning. (p. 8).

Applied Linguistics has been emphasizing the importance of interaction for second language acquisition (SLA). Hatch (1978) and Long (1981, 1996), for instance, consider that interaction is essential for SLA. Hatch disagrees that learners first learn structures and then use them in discourse. She considers the reverse possibility. “One learns how to do conversation, one learns how to interact verbally, and out of this interaction syntactic structures are developed. (p. 404)”.

Based on an empirical study, Long (1981) observed that, in conversations between native and nonnative speakers, there are more modifications in interaction than in the input provided by the native speakers. He does not reject the positive role of

modified input, but claims that modifications in interactions are consistently found in successful SLA. Long (1996, p. 451-2) suggests that “*negotiation for meaning*, especially negotiation work that triggers *interactional* adjustments by the NS or more competent interlocutor, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways”.

In a joint work, Larsen-Freeman and Long (1991, p.266) argue that the interactionist views are more powerful than other theories “because they invoke both innate and environmental factors to explain language learning”. It is also worth mentioning that the interactionist hypothesis conceives language not only as a set of syntactic structure but also as discourse.

Many other researchers must be mentioned when we focus on interaction and SLA, such as Pica, (1987), Tsui (1995), Ellis (1999) and his collaborators, van Lier (1996) Hall and Verplaetse (2000) and collaborators, Kelly Hall (2004, 2007, 2009, 2010), to mention just a few. In Brazil, we can list many works, always running the risk of ignoring relevant ones. Leffa (2003) organized a book on this theme with several Brazilian researchers. Among them, I would like to mention the works of Consolo and Vani (2003) focusing on interaction in the classroom; Figueiredo (2003) discussing the benefits of peer correction in oral interactions, and Leffa’s own work on virtual interactions. Other works are Consolo, in Kelly Hall and Verplaetse Kelly (2000), Consolo (2006), Lima (2000), Lima and Fontana (2003); Sturm and Lima (2008) and many others.

All those works emphasize how important interaction is for SLA. Kelly Hall (2000, p. 292) concludes that the works in her book offer persuasive findings on classroom interaction. One can learn about “the consequential roles of repetition, paraphrasing, recasting, and revoicing by class participants of their own and each other’s utterances in fostering cohesive and effectual communities of language learners and users”. Kelly Hall (2004, p. 611) explains that the role of interaction is not just a matter of gathering “individuals to work toward a common goal that leads to transformation”. She adds that “rather, it is the actual interactional relationships that are developed, with the methods – the interactional procedures – by which talk is accomplished in these relationships creating the object of knowledge and, at the same time, the tools by which that knowledge is known”.

In spite of the paramount importance of the studies in classroom interaction, I would like to propose an ecological view of interaction. In this approach interaction is understood

as “the relation between species that live together in a community; specifically, the effect an individual of one species may exert on an individual of another species”¹.

Interaction in an ecological perspective

As pointed out by Leffa (2003, p. 2), “nobody learns alone, the same way nobody grows up, lives, suffers or dies alone; we are always acting and reacting with the context around us”². An ecological approach, as pointed out by van Lier (2004) takes into consideration what is happening in the environment. He explains that “things are happening all the time, in schools, classrooms, at desks and around computers” (p. 11). In fact, learning might happen anywhere the learner is likely to have interpersonal or intrapersonal linguistic experiences.

We live in biomes, in ecological communities. According to a webpage at The University of Michigan, “an ecological community is defined as a group of actually or potentially interacting species living in the same place”. In order to grow and reproduce in our biomes we need some resources. Language is a powerful resource for language learners who need linguistic input and interaction to acquire the language. A Chinese student of English, in a corpus of learning narratives collected by Alice Chick in Hong Kong, illustrates this point, by saying: (...) as my mom often said, “*language is as vital as water and oxygen because human cannot live a lone without any interaction with the outside world. Human needs to communicate with each other by language...*”³

Second language learners in a poor linguistic environment encounter difficulties acquiring the language. Similarly, according to the text “Plant Competition”⁴ (unknown author), “organisms that live in a resource-poor habitat, or are living with more organisms than the habitat can sustain, are not likely to do as well as those in better habitats with more resources”. According to that text, too little resources “will result in death or at the least, very minimal growth”. We can also predict that learning a language in poor environments, with lack of input and interaction, will also lead to minimal evolution.

There are different types of interaction between the species in a biome as shown in table 2.

¹ <http://encyclopedia2.thefreedictionary.com/ecological+interaction>

² My translation of “Ninguém aprende sozinho, como também ninguém cresce, vive, sofre ou morre sozinho; estamos sempre agindo e reagindo com o contexto que nos cerca”.

³ The full text is available at <http://lhs.wetpaint.com/page/25>

⁴ Plant Competition. Available at http://scene.asu.edu/habitat/activities/plant_competition.html. Access in: 9 May 2010.

Table 2. Types of Interaction

type of interaction	sign	effects
mutualism	+/+	both species benefit from interaction
commensalism	+/0	one species benefits, one unaffected
competition	-/-	each species affected negatively
predation, parasitism, herbivory	+/-	one species benefits, one is disadvantaged

Source: http://www.globalchange.umich.edu/globalchange1/current/lectures/ecol_com/ecol_com.html

An example of mutualism is the interaction between humming-birds and flowers and the consequent pollination process (FIG.8). Both humming-birds and flowers benefit from this association. Commensalism can be illustrated by orchids and mosses and their commensal relationship with trees. Although orchids and mosses are benefited by the hosting tree, the latter is not affected. But what happens if lots of plants are growing very close together? They will compete for sunlight (see FIG, 8), for water and nutrients otherwise they will not survive. These plants do not grow as well as the ones growing farther apart from each other. In addition, some of them are better at the struggle than others. The last type of interaction is the predatory one, and, in this case, one's benefit represents disadvantage for the other. One example is the grasshopper (FIG.8) eating the crops.



FIG. 8 example of interactions in nature

In a classroom interaction, we can also find similar types of interaction, mutualism, when both partners benefit from interaction; commensalism, when less proficient ones benefit from the interaction without no benefit for the most competent partners; competition when the extroverts steal the floor from the shy ones; and predation when mockery and bullying silence less proficient learners.

In addition to these four kinds of interaction, another must be included in the list: the mediated interaction. Man is the only species able to develop technology to improve his interaction within and outside his own biome. Books, mail, telegraph, telephone, TV, radio, cinema, and the Internet are some of the examples. Most of those cultural artifacts have been employed by education to improve interaction in the classroom, mainly in language classes.

I would like to go further with the ecological perspective and claim that classroom interaction is not enough for SLA. Language learning narrative research (MURPHEY, 1997, 1998; MENEZES, 2008; MURRAY, 2009) has shown the importance of interaction in natural environments for SLA.

The same Chinese student who talked about language as a vital resource also said that “we cannot only use Chinese to communicate with people whose backgrounds are similar to ours for the rest of our lives”. Another Chinese student highlighted the importance of interaction with native speakers and says “I make some friends with classmates who are native speakers of English and those who have been studying overseas, and I have more chance to speak English. Through the interactions with them, I can speak more fluently⁵. This student seems to understand that men are not enclosed in a biome as certain species are.

In fact, humans can live in every known biome on Earth and are making attempts to live in other spaces in the universe. As language is our main communicative resource, it is necessary to learn other languages to interact within our native biome or in other biomes with which we have contact. Empowered by new technologies learners can enlarge their interactional experiences beyond the schools.

We all know that classroom interaction has not received the attention it deserves in our schools. In my own narrative research (PAIVA, 2007 and MENEZES, 2008), narrators repeatedly complain about lack of interaction in the classroom. One of them said “I do not think that my course was communicative enough. It lacked more interaction, functional language, role-playings and dynamism. Its focus was more on grammar and correct structures”. Few narrators talk about positive interactive experiences in regular schools, but we can find positive remarks when they talk about language schools, such as the following experience:

Classes were very communicative and student-centered; varied materials were applied; there was a lot of interaction - we were usually encouraged

⁵ The full narrative is available at <http://llhs.wetpaint.com/page/29>

to express our point of view and give personal exemplification; the purpose of the course and activities used were definitely very well clarified; we learned variations of the language- accents, British x American English, slangs etc. Another good point was the number of students in class: not more than eight.
(Available at <http://www.veramenezes.com/i018.htm>)

What calls my attention when I read the narratives in my corpus is how experiences outside school contribute for language acquisition. A representative example is given by a student who is also a skateboard competitor. See what he says :

In fact skateboard has been a ‘catapult’ to my English learning process. It is common to meet native English speakers in skateboard contests, so I had to communicate with them in order comment the contest, or even about my turn in it, for instance. This first steps where then, related to communicative learning process, since real use of language was required in order to communicate. Slangs and jargons were used all the time, and I did not know what exactly they meant, but I could get their meaning through the context we were in. After that, my interest have increased in many aspects of English, such as music, art and sports, what is just the continuity of the process that I began with when I was a child.
(Available at <http://www.veramenezes.com/i001.htm>)

Another significant example is told by a Spanish language learner⁶ who is fond of soccer and started looking for more information about South American teams in different countries. He says that, on doing research about that, he got in touch with the songs the fans used to sing during the competitions . He then decided to learn the language to understand the lyrics.

Many other examples can be found in our data bank, but the ones reported here are enough for our understanding that the interactional affordances for language learners are not the same for every learner. As I have argued in another work (PAIVA, forthcoming),

Affordances are directly linked to the idea of perception and action. Perception is seen not as a mental capacity, but as an ecological phenomenon, the result of the animal’s interaction in the environment. Animals, including humans, perceive what the niche offers them (substances, medium, objects, etc.), interpret the affordances and act upon them. Some actions are done automatically (e.g. drinking water) and others require complex cognitive processes (e.g. finding the solution for a problem). As far as language is concerned, we can say it affords uses restricted by the user’s perceptions.

⁶ His story in Portuguese is available at <http://www.veramenezes.com/audio06e.htm>

Concluding remarks

It is not my intention to minimize the role of interaction in the classroom, but, in my corpus of language learning narratives, learners with interactional opportunities beyond the classroom report that those experiences were turning points in their SLA. Those stories indicate that learners will only become fluent if they have the chance to broaden their perceptions as language users and engage themselves in authentic linguistic social practices.

My assumption is that we teachers can collaborate to enlarge our students' biomes by putting them in touch with learners or speakers in other environments mediated by technology. Several examples could be mentioned here. One is the International Writing Exchange (<http://www.writeit.to/>), coordinated by Ruth Vilmi, in Helsinki. A Brazilian example is the *Teletandem Project*, coordinated by João Telles at UNESP, where pairs of students work together by teaching his or her own language and learning the partner's language at the same time. A third example is the *Ibunka*⁷ project, coordinated by Watanabe in Japan. His project gathers together classes in different parts of the world to exchange their views about different cultural issues. The activities involve a bulletin board discussion, chat sessions, and a video letter exchange.

I would like to close this discussion using the film *Avatar* as a metaphor. In that story a paraplegic marine, is able to control his Alien body with the help of technology and interact with a new world, Pandora. I invite teachers to empower their students to abandon their classroom desks and explore other worlds full of interactional opportunities with the help of technology.

References

BARNHART, D. The need for positive interaction for babies and young children. Available at <http://www.helium.com/items/503386-the-need-for-positive-interaction-for-babies-and-young-children>

CHAPELLE, C.A. *English Language Learning and Technology*. Amsterdam: John Benjamins, 2003

CONSOLO, D.A.; VANEI, J. P. Ensino de línguas na escola um estudo transversal da interação em sala de aula. In: LEFFA, V. (Org.) *A interação na aprendizagem das línguas*. Pelotas: Educat, 2003. p.47-74

⁷ "Ibunka" means "different cultures" in Japanese

CONSOLO, D. A. (2006). Classroom oral interaction in foreign language lessons and implications for teacher development. *Revista Linguagem e Ensino*, v.9, n. 2. Available at <http://rle.ucpel.tche.br/index>

CONSOLO, D. A. . Teachers' action and student oral participation in classroom interaction. In: Joan Kelly Hall; Lorrie Verplaetse. (Org.). *Second and Foreign Language Learning through Classroom Interaction*. 1a ed. Mahwah, New Jersey - EUA: Lawrence Erlbaum Associates, Inc. Publishers, 2000, v. , p. 91 -107.

CRAIK, F. I. M.; LOCKHART, R. S. [Levels of processing: A framework for memory research](#). *Journal of Verbal Learning and Verbal Behavior*, v. 11, 671-684, 1972.

ECOLOGICAL COMMUNITIES: Networks of Interacting Species. Available at http://www.globalchange.umich.edu/globalchange1/current/lectures/ecol_com/ecol_com.html

ELLIS, R. *Learning a second language through interaction*. Amsterdam: John Benjamins, 1999.

FIGUEIREDO, F. J. Q. A aprendizagem colaborativa: foco no processo de correção dialogada. In: LEFFA, V. (Org.) *A interação na aprendizagem das línguas*. Pelotas: Educat, 2003. p.125-157

HATCH, E. Discourse analysis and second language acquisition. In: HATCH, E. (Ed.). *Second language acquisition*. Rowley, MA: Newbury House, 1978.

HALL, J. K. Language learning as discursive practice. In: L. Wei ; V. Cook (Eds.), *Contemporary Applied Linguistics* , Volume 1 Language Teaching and Learning. New York: Continuum, 2010, p. 256-273.

HALL, J.K. Interaction as method and result of language learning. *Language Teaching*. v. 43, p. 1-14, 2009.

HALL, J. K. (2007) Redressing the roles of correction and repair in research on SLA. *Modern Language Journal*. v. 91, p. 510-525, 2007.

HALL, J. K. Language Learning as an Interactional Achievement. *The Modern Language Journal*, V. 88, N. 4, Special Issue: Classroom Talks. Blackwell Publishing on behalf of the National Federation of Modern Language Teachers Associations, p. 607-612, Winter, 2004,

HALL, J.K. ; VERPLAETSE, L. (Eds.). *Second and Foreign Language Learning through Classroom Interaction*. Mahwah, New Jersey: Lawrence Erlbaum, 2000 .

LANTOLF, J; APPEL, G. *Vygotskian approaches to second language research* . Norwood, NJ: Ablex, 1994.

LEE et al. *The interactional instinct: the evolution and acquisition of language*. Oxford: Oxford University Press, 2009.

- LEFFA, V. Interação simulada: um estudo da transposição da sala de aula no processamento de leitura-escrita dos aprendizes. In: LEFFA, V. (Org.) *A interação na aprendizagem das línguas*. Pelotas: Educat, 2003.
- LIMA, M. S. ; FONTANA, Beatriz . A negociação de sentido e a interação na aquisição de LE. In: Telma Gimenez. (Org.). *Ensinando e Aprendendo Inglês na Universidade: Formação de professores em tempos de mudança*. Londrina: ABRAPUI, 2003, v. 1, p. 233-239.
- LIMA, M. S. Vozes da sala de aula: interação em língua estrangeira. In: Freda Indursky; Maria do Carmo Campos. (Org.). *Ensaio: Discurso, memória, identidade*. Porto Alegre: Sagra- Luzzatto, 2000. p. 535-546.
- LONG, M.H. The role of linguistic environment in second language acquisition. In : RITCHIE, C; BHATIA, T. K. Bhatia (Eds.) *Handbook of second language acquisition* San Diego: Academic Press, 1996. p. 413–468.
- MENEZES, V. Multimedia language learning histories. In P, Kalaja., V. Menezes and A.M.F. Barcelos. (Eds.), *Narratives of learning and teaching EFL, 2008*, London: Palgrave-Macmillan, p.199- 213.
- PAIVA, V.L. M.O. As habilidades orais nas narrativas de aprendizagem. *Trabalhos em Lingüística Aplicada*. v. 46, n.2.p.165-179, 2007.
- MURPHEY, T. (Ed.) *Language learning histories II*. Nagoya, Japão: South Mountain Press, 1998.
- MURPHEY, T. (Ed) *Language learning histories*. Nagoya, Japão: South Mountain Press, 1997.
- MURRAY, G. L. (ed.) *Restrospective: Learning English in Japan*. Akita: Center for Independent Language Learning, Akita International University, 2009.
- PAIVA, V.L.M.O. [Affordances beyond the classroom](http://www.veramenezes.com/beyond.pdf) (forthcoming). Available at: <http://www.veramenezes.com/beyond.pdf>
- PAIVA, V.L.M.O. Feedback em ambiente virtual. In: LEFFA.V. (Org.) *Interação na aprendizagem das línguas*. Pelotas: EDUCAT, 2003. p.219-254.
- PAIVA, V.L.M. O. Autonomia e complexidade. *Linguagem e Ensino*, v. 9, n. 1, 77-127, 2006.
- PICA, T. Research on negotiation: What does it reveal about second-language learning conditions, processes, and outcomes? *Language Learning*, v. 44, n. 3, p.493–527, 1994.
- PICA, T. Second language acquisition, social interaction in the classroom. *Applied Linguistics*. v. 7, n. 1. p. 1-25, 1987.
- STURM, L. ; LIMA, Marília dos Santos . Repensando a formação docente: interação e mediação do conhecimento. In: SANTOS, S.C.K.; MOZZILLO, I. (Org.). *Cultura e*

diversidade na sala de aula de língua estrangeira. Pelotas - RS: Editora UFPEL, 2008, p. 208-227.

THE UNIVERSITY OF MICHIGAN. Ecological Communities: Networks of Interacting Species

Available at:

http://www.globalchange.umich.edu/globalchange1/current/lectures/ecol_com/ecol_com.html

TOMASELLO, M. *Constructing a language : a usage-based theory of language acquisition*. Cambridge, Mass.: Harvard University Press, 2003.

TSUI, A. B. M. *Introducing classroom interaction*. London: Penguin English, 1995.

Van LIER, L. *The ecology and semiotics of language learning : a sociocultural perspective*. Norwell, Mass.: Kluwer Academic Publishers, 2004.

Van LIER, L. *Interaction in the Language Curriculum: Awareness, Autonomy, and authenticity*. London: Longman, 1996.

VYGOTSKY, L. S. *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press, 1978.

WEINBERG, K.; TRONICK, E. Infant Affective Reactions to the Resumption of Maternal Interaction after the Still-Face. *Child Development*. n. 67, p.905-914, 1996.