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Transdisciplinarity in the Study of Human Communication: A 21st Century Challenge

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Abstract

The following article attempts to list a series of theoretical and methodological challenges language studies have yet to overcome. My claims are based on what is known as 'complex thought' and a set of conceptual tools that can be traced back to Edgar Morin's work. Applying complex thought to the domain of human communication reveals that the phonemic, grammatical, non-verbal and cognitive systems are closely related and indeed interdependent, which is why we need to adopt a transdisciplinary approach to the matter.

In accordance with this approach, I have divided my presentation in four parts, namely: (1) I will firstly provide a brief introduction to complex thought and its proposed transdisciplinary method. (2) The second part presents several conceptual tools that can help us understand the complexity of language, such as the concepts of emergence and the hologrammatic principle. (3) The third part of this article deals with a modern cognitive theory that allows us to progress by means of the transdisciplinary method I propose. (4) The conclusion provides a brief summary of previously reviewed questions.

Keywords: Complex thought, Cognition, Language, Linguistics, Transdisciplinarity**.**

1. Complex Thought and Complex Method: Transdisciplinarity

The development of complex thought lies at the heart of Edgar Morin's work (1981, 1982, 1987, 1992 and 2002). This author posits a radical mistrust with regards to the Descartes method and tries to show that the inability of classical science to understand the complex does not only have scientific consequences, but also affects entire cultures as well as our whole lives.

As a method, Morin's complexity attempts to implement a network-based type of relational thinking whereby the centrality of the cognitive self (*le vif du sujet)* turns rational thought into a hermeneutic exercise. Morin calls it the anti-method because, rather than presenting a set of rules, it tries to prompt a more general, environmental approach to the world and one's own knowledge by taking the many other perspectives into account—that is, to place our subjects of study in their own context and to produce a harmonizing, overcoming synthesis.

As Lee (2002) points out despite the holistic experience of social relations, social sciences have institutionalized a series of de-constructions by "dividing the human world into isolated domains which are intellectually separated into disciplines, and institutionally separated into college departments" (p. 210). In opposition to the kind of thinking that divides knowledge into stagnant departments; complex thought stands as a way to re-connect and alludes to the transdisciplinarity that allows for a network-based type of thinking.

As the prefix *trans-* indicates, transdisciplinarity concerns that which is at once between disciplines, across different disciplines and beyond all discipline (Nicolescou 2000). The goal of transdisciplinarity is to understand reality, to provide an all-encompassing view of the world (Garrafa 1990); and to achieve that, it is primordial to unify knowledge. Transdisciplinarity seeks to understand the dynamics generated by the simultaneous actions that take place in several levels of reality (Nicolescou 2000).

If we apply complex thought to the domain of human communication, we come to the conclusion that the phonemic, grammatical, non-verbal and cognitive systems are closely related and interdependent. The essential category in all communication sciences (Linguistics, Cognitive Science, Mass Communication and Psychology) is that of meaning, and in order to develop a theory of communication we need to carry out an analysis of languages in relation to meaning. This results in a concept of language that blurs the dividing lines between the branches of Linguistics, Paralinguistics, Socio-linguistics, Social Psychology and Cognitive Science. Furthermore, the study of meaning needs to explain movement (emergence or dynamism) bearing in mind that the nature of thought is 'public', as humans are so essentially social that they are part of the cultural domain and act from within it. Language is a form of culture and the connections between language and culture are of a dialectic nature because they entail reciprocal exchange.

These are the subject matters I am going to address, and I will now proceed to tackle the first point.

2. Emergence

The aforementioned dynamism or movement is the root of emergence. In complex thought, the concept of emergence is fundamental to grasp the subject of study, which is why I deem it necessary to attempt an explanation. For such purpose I will refer to an example Reuben Ablowitz adduced in 1939, the same year he published an article titled Theory of emergence, which is still frequently quoted today. Ablowitz claimed the following: "If I play two notes together on the piano, there is an aspect or quality of this sound which is not the property of either of the notes taken separately. The chord has a harmonious characteristic, a new attribute which none of its individual components had, but which is due solely to their togetherness." (Ablowitz 1939, 2).

Harmony is an emergent phenomenon that needs to be differentiated from resulting phenomena. For instance, I can tell precisely what the volume or loudness of the new sound will be if I consider the amplitude of each note, because volume is a resulting phenomenon, not an emergent one. "Resulting properties are additive; emergent properties are not. Additive phenomena can be deduced; genuinely emergent phenomena may not" (1939, 3). Emergence thus refers to the apparition of new structures that emerge from the interaction of the constituent parts of a system.

A paradigmatic example of one such system is that of hurricanes. There are many variables involved in the formation and lifting of this type of storm. Some of those variables —the wind or oceanic temperatures— can dramatically influence the apparition or emergence —and also the behaviour— of hurricanes. Other variables may be less relevant, such as the presence of an island in the hurricane area, though sometimes these "secondary" variables may trigger unexpected and disproportionate processes (Harshbarger, 2008). The non-linear notion refers to this type of processes.

Does not the same occur in human communication? What make a phenomenon complex is the connections and interdependencies among its elements. Hence, what is decisive is not the quantity of elements, but their qualitative aspects. That is why Jakobson said that "the fundamental reality linguists deal with is interaction" (Jakobson 1974/ 1981, 20).

We can rigorously claim that human communication is a complex system that is co-determined by external and internal variables that hold a multi-causal connection. Each constituent part of the system appears to be essential for the maintenance and development of the whole. It is also a non-hierarchical system because human beings do not only use verbal language to communicate, but also resort to other semiotic systems that are organised, co-structured and can be expressed together with verbal language in linguistic interaction (Payrató 1998, 46). A new structure emerges from the interaction of these semiotic systems: the intended or interpreted meaning of the message.

2.1 Emergence and (Intended and Interpreted) Meaning

I have stated that the emergence of intended or interpreted meaning comes from the interaction of semiotic systems. I will now provide a brief overview of each of those systems.

a) If we consider that the *intended meaning* is a phenomenon that emerges from the interaction of all of the speaker's levels of language and (inside and outside) context, we must consider linguistic utterances as dependent products that are originated in the frame of intentions and socio-cognitive situations, an environment that may significantly influence the selection of linguistic elements (Bastardas 1998, 2003). Complex thought urges language sciences to study this dynamic. Any attempt to build a communication model that bares no connection to the participants and their context is an attempt to "detach the code from the actual act of communication, which threatens to reduce language to a scholastic fiction" (Jakobson, 1974/ 1981: 89).

b) If the idea is to study the interpreted meaning, the two phases involved in the hermeneutic exercise must be considered: the grammatical and the psychological. The former involves language; yet, in order to understand the meaning of a text, it is not enough to literally understand the words that compose it –we need to reconstrue and reproduce the creation process of the text in the speaker. It is not sufficient to apply rules; we need a divinatory act which can reveal that which is "individual" and related to the self (Nubiola & Conesa 1999/ 2002: 219). As Schleiermacher put it: "A message cannot be understood without grasping its general dimension, but neither can it be understood without grasping its personal and private realms" (1987, 19). There is indeed a connection from "the part to the whole" and from "the whole to the part". This is known as the hermeneutic spiral, or "hologrammatic principle of interpretation", as it is known in complex thought terminology. This type of reasoning is almost instinct-driven and definitely emergent, and it depends on the semi-unconscious perception of connections among different aspects, a perception pragmatic philosophers call 'abduction' (Ballesteros 2012).

I believe I have so far justified the claim that the essential category in all communication sciences (Linguistics, Cognitive Science, Mass Communication and Psychology) is the category of meaning. I have defined this concept as a phenomenon that emerges from the interaction of all levels of language and the (inside and outside) context of speakers. In complex thought, the objective of all communication sciences is to explain how linguistic units, cognitive processes and emotional processes are interrelated[1].

Before I go onto the third part of this article, I would like to expand on a principle that is paramount to complex thought: the Hologrammatic Principle.

2.2 Hologrammatic Principle

The hologram metaphor has profoundly influenced the epistemology of complexity because it

[1] For example, intonation plays an articulating role in the construction and interpretation of utterances. Intonation does not bear semantic content, but it plays a main role in the processing of the meaning of an utterance because it establishes connections among different acoustic, gestural and grammatical parameters. These connections link signs which also have a socio-cultural nature, as "the meaning is the cultural unit whose representation can only be understood through other subsequent cultural units" (Eco, 1990:74). The epistemology of complexity studies this type of connections.

seems to contain a principle of general organisation that is present in many domains of reality: not only the parts are inside the whole, but the whole is also in the parts. A hologram is a photographic technique that generates 3D images of physical objects that vary according to the point of view of the observer. The reason why this technique has impressed and inspired complex systems scholars is the way in which information is distributed within the hologram. In a photo, every part of it represents a specific part of the object it represents. However, in a hologram, every part contains the totality of the object. Thus, while a photo torn in half only provides information about one half of the object it represents, each fragment of a hologram contains information about the whole object. The same occurs in genetics: the whole hereditary legacy is found in each and every cell.

When applied to the field of communication, this metaphor helps us understand two ideas. On the one hand, the system which studies Linguistics is merely one part of the human communication system. Complex thought makes us consider communication not as one of the goals of language, but as language. If communication is a complex system that is integrated, and not a group of disconnected parts, it is no longer viable to study linguistic elements when isolated from the rest of elements that take part in a communication act. We will always find the whole in the parts (Ballesteros 2011). Methodological reductionism is indeed useful to science: components are isolated, studied, and tested within controlled conditions in order to learn things we wouldn't be able to learn otherwise. However, if the goal is other than to integrate all that data, the only result is that we are *informed* —yet to have information, data, is not the same as understanding or comprehending. The objective information needs an explanation that provides unit and sense: we need to shift to a higher, more ample point of view.

On the other hand, the hologram image allows us to consider the emergence of the intended meaning and the interpreted meaning as a process based on human nature itself, which is corporeal, intelligent, emotional and cultural (Yepes 1996). Complexity has the felicitous consequence of urging us to explain emotions as a vertical structure that affects all language dimensions, because it is also present in all the dimensions of an individual. This is particularly relevant in cognitive studies.

3. An attempt to Integrate: Cognitive Science

This integrated study has been carried out in the field of Cognitive Science. As we know, Cognitive Science emerged in the mid-twentieth century with the goal of undertaking the study of human reasoning in an empirical and interdisciplinary manner. It aims to provide a complete and global explanation of all cognitive phenomena:

"It is a discipline that seeks to understand cognition, be it real or abstract, human or mechanical. The goal is to grasp the principals of cognitive and intelligent behaviour. It hopes to allow us to better understand the human mind, teaching and learning, psychological abilities, and the development of intelligent devices that may significantly and constructively enhance human capacities" (Norman 1987, 13).

One of the main aspects of Cognitive Science is that it studies cognition scientifically, as its

findings are checked against test results. This is a change from studies prior to the birth of Cognitive Science, as those were merely speculative or used isolated test results to corroborate philosophical speculations *a priori*. Those results could therefore not constitute proper premises on which to build new theories.

In 1977 the first issue of the magazine Cognitive Science published an article in which Allan Collins explained the tools employed in Cognitive Science: he highlighted some techniques related to artificial intelligence and experimental psychology, and the fact that Cognitive Science explicitly rejects the publication of articles that are solely specialised in Psychology, Artificial Intelligence or Linguistics, thus favouring transdisciplinarity.

Since its early stages, the dominant view in Cognitive Science has been the so-called classic cognitivism, which provides a type of explanation inspired in IT programs of artificial intelligence. In fact, most studies are based on models that can be used in machines, as part of a scientific enterprise that is capable of providing an explanation of thought and make it measurable, and thus scientifically and technically approachable. Moreover, the computational metaphor has prevailed. It equates the human mind with software, and the brain as the hardware.

Since that first magazine issue, the models and metaphors applied to the study of cognition have changed and the disciplines that compose Cognitive Science have also changed to include Neuroscience, Anthropology and Philosophy.[2] Likewise, we are increasingly convinced that we cannot have anything that resembles a human mind or a mental capacity if it is not totally incarnated or embodied. This is known as *embodied cognition* and conceives cognition as born of the interactions between the subject and the environment: the knowledge depends on experiences matured thanks to the fact of having a body with certain capacities sensory motorboats, and initiates from the skill of an organism to act in an environment (Lackoff and Jonhnson 1987, Varela Thomson and Rosch 1991, Wilson 2002).

In 1980, linguist George Lakoff and philosopher Mark Johnson published a book that was spectacularly well-received: *Metaphors We Live By.* These authors came up with an explanation of cognitive phenomena that is based on the awareness and analysis of daily language metaphors, as the authors believed these provide the ideal access to the human conceptual system. This theory is known as *Experience Realism* or *Experientialism.* Authors present three types of metaphorical concept structures[3]:

i. Orientation metaphors: they are related to spatial orientation and come from our physical constitution. Example: HAPPY is UP, SAD is DOWN: it cheers me *up*; to be in *high* spirits, to feel *low*; to *fall* into a depression, etc. VIRTUE IS UP, VICE IS DOWN: one can have *elevated* thoughts or be dragged *down* by one's

[2] Within these disciplines, the works that are considered to be pure Cognitive Science are those that are compatible with this concept of Cognitive Science as a natural science (Iglesias Martinez 2006).

[3] The theory of metaphor presented in *Daily life metaphors* is part of a minority school of thought which finds its origins in Aristotle's texts on the cognitive nature of metaphors. Its main milestones are Giambattista Vico and Charles S. Peirce, as well as today's Ivor Richards' and Max Black's interaction theory (Nubiola 2000: 83).

lowest passions, one can be high-minded or have as low morality.

ii. Ontological metaphors: they categorise a phenomenon by considering it as a substance, a recipient, a person, etc. Example: THE HUMAN MIND IS A CONTAINER: to *bear/keep in* mind; to have an *empty* head; to be *saturated*; to mention something *off the top* of your head; to have something *at the back* of your mind; to have a song *stuck in* your head, etc.

iii. Structural metaphors: in which an activity or experience is structured according to another activity or experience. Thus, TO UNDERSTAND is TO SEE and an ARGUMENT is a FIGHT.Examples: I see what you mean/your point; You see?; I can't picture you saying that, we had a fight over the restaurant bill, etc.

Years later, in the book *Philosophy in the Flesh, The embodied mind and its challenge to western Thought* (1987), Lakoff and Johnson proposed three ideas, not just about categories, but also about human reason in general. They argue that human thought is embodied because the structures that are used to integrate our conceptual systems arise from our body experience and have felt in term of it, moreover, the core of our conceptual systems is directly based on the perception of body movement and of physical and social experience. On the other hand they set that human thought is imaginative: the concepts that are not directly based on the experience employ metaphor, metonymy and mental images. This imaginative capability is what enables abstract thinking and which brings mind beyond what we can see and feel. Finally they understand that categorization is a consequence of our body structure. "We have evolved to categorize and if we had done we would have not survived" (1987, 15).

As a response to what it is known as "Absolute Objectivism" (Scientific Realism in American culture) and "Radical Subjectivism" (literary scepticism), Lakoff and Johnson propose an intermediary path they named *Experientialist Synthesis*, which aims to unite reason and imagination. In my opinion, it is a harmonising, overcoming synthesis that is based on the observation of how we use every-day language.

Together with other authors, Lakoff has presented numerous studies on the applicability of the metaphor theory in different fields: mathematics, politics, literature or philosophy (Lakoff and Turner 1989, Lakoff 1996, Lakoff and Núñez, 2001). But they have given up on a series of basic questions to understand cognition, namely:

- What is the factor that makes us construct abstract concepts on this corporeal base?
- How do our concepts escape beyond our experience?
- How can social and personal aspects of language and thought be formalised?

The answers to these questions probably do not allow for empirical proof, which is the only type of proof admitted in Cognitive Science.

As we can see, going beyond the disciplinary divisions is essential for a deeper interpretation of human reason and human communication. As Sanz and De la Torre put it, "besides the sensible world, there is an inter-subjective world, that of emotions and feelings, intuition,

premonition, values and spiritual aspirations. Many of these aspects are not accepted by Positive Science; not because they are not real, but because we still do not possess tools to observe or replicate them as we do with physical phenomena. When faced with the dilemma of having to choose between excluding everything that cannot be measured from science or accepting the challenge of including all non-measurable phenomena as subjects of study, we opt for the latter. We accept it knowing that we are in need of a new paradigm, another methodology with scientific rigour that allows us to explore those fields by means of refutable evidence" (Sanz and De la Torre 2006, 40).

In the field of Cognitive Science itself, neurobiologist Varela, philosopher Evan Thompson and psychologist Eleanor Rosch (1991) have reiterated a co-dependency between the inside and the outside of an individual, a co-dependency that underlines the emergence of the mind as well as a complex relation between the self and "the other".

(..) research in cognitive science requires more and more that we revise our naive idea of what a cognizing subject is (its lack of solidity, its divided dynamics, and its generation from unconscious processes), the need for a bridge between cognitive science and an open-ended pragmatic approach to human experience will become only more inevitable. Indeed, cognitive science will be able to resist the need for such a bridge only by adopting an attitude that is inconsistent with its own theories and discoveries (1991, 127).

Jerome Bruner, one of the founding fathers of the cognitive revolution, has recently and brilliantly denounced both the historical development and the current situation of Cognitive Science. He accuses modern Cognitive Science of getting caught up in technical problems that are marginal to the purposes and to the drive that sparked the Cognitive Science movement: the conviction that the fundamental concept should be 'the meaning, processes and transactions that take part in the construction of meanings" (1991, 52). According to Bruner, Cognitive Science must explain the movement (the dynamism) of reason bearing in mind the public character of thought cognitive capacity is structurally intersubjective.

Thus, "transdisciplinarity becomes the key notion to attempt a complex system analysis such as those carried out in Social Sciences" (Juntsch 1979, 130).Though it turns out evident that both interdisciplinarity and transdisciplinarity indicate an overcoming of the limits between disciplines, there are important teleological differences between them (since these differences consist on the purpose that these approaches seek). For example, since it has been explained the Cognitive Sciences aim to provide an empirical study of human reasoning and that is why they exchange information to justify its affirmations. But the relationship between disciplines in interdisciplinariry is dependent because they omit the study of all what is not empirically mesurable or contrastable.

From complex thought, instead, the comprehension of the totality includes not only empirical aspects of the reality but also its essence, not only the parts but also the whole because, according to the Hologrammatic Principle, the whole is in the parts. Nevertheless, the unity of a thing does not guarantee the unity of its knowledge. This unity must be carried out by the subject and needs a transdisciplinar attitude.

In transdisciplinarity, contents, structures and linking areas between disciplines continuously change thanks to a coordination that is focused on the execution of a common purpose. Since human complexity is theoretically inexhaustible, transdisciplinarity is an open approach and it is prepared to include new factors that have not yet been discovered. Cognitive Science understands that de-constructing human beings and our language (which is what an analytical method would do) would result in a fragmented view and, more often than not, in an erroneous reality.

4. Conclusion

In this article I have defended the need to adopt a transdisciplinary approach to understand human communication. In complex thought, the phonemic, grammatical and cognitive systems are closely related and interdependent.

Therefore, in order to develop a theory of communication, we need to analyse the connection between language and meaning. This approach to language blurs the dividing lines between semantics and pragmatics, semantics and grammar, grammar and supra-segmental phonology, grammar and lexicon, lexicon and segmental phonology and between phonetics and phonology. In addition, the study of meaning needs to explain movement (dynamism) while bearing in mind the 'public' quality of thought, as humans are so essentially social that they are part of the cultural domain and act from within it. Language is a form of culture and the relation between language and culture is of a dialectic nature because it entails reciprocal exchange.

I think the mind-body dichotomy posed by Cognitive Science shows the need to expand the notion of experience and the notion of science in the quest to find an adequate frame to explain cognition. We ought to spread the conviction that instead of absolutising any of the two aspects of human experience, it is necessary to find their reciprocal interrelation. Thus, complex thought forces us to expand the concept of science beyond the limits of natural science, and it presents itself as an adequate field to find a more complete and satisfactory explanation of human language. Complex thought advocates a transdisciplinary type of research that integrates and re-connects the findings of different fields of knowledge, a type of research that can help us explain how and when we should intervene in each discipline in order to get relevant findings.

This still incipient approach can help us overcome certain limits posed by classical Linguistics. In intonation studies, the complexity approach allows us to re-direct research so as to shed light on the role of communication.

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References

Ablowitz, R. (1939). The theory of emergence. *Philosophy of Science* 6, (1), 6-16.

Ballesteros Panizo, M. (2012). La entonación del español del norte. Tesis doctoral. Universidad de Barcelona. Unpublished raw data.

Ballesteros Panizo, M. (2012a). Pensamiento complejo para el estudio de la comunicación. *PHONICA* 7. [Online] Available: http://www.ub.edu/lfa/esp/lfaesp.htm

Ballesteros Panizo, M. (2013). "La semiosis: un regalo de Charles Sanders Peirce para el estudioso del lenguaje". *Moenia*, (19) Manuscript submitted for publication.

Bastardas Boada, A. (1999). "Lingüística general y teorías de la complejidad ecológica: algunas ideas desde una transdisciplinariedad sugerente", J. Fernández González *et alii* (eds.), *Lingüística para el siglo XXI* (p. 287-294). Salamanca: Ediciones Universidad de Salamanca. [Online] Available: http://diposit.ub.edu/dspace/bitstream/2445/11474/6/SALAMANCA_Ling_complejidad.pdf (April 8, 2011)

Bastardas Boada, A. (2003). Lingüística general: elementos para un paradigma integrador desde la perspectiva de complejidad LinRed 1. [Online] Available: http://www.linred.es/numero1_articulo_1.htm. (September 1, 2011).

Bruner, J. (1991). *Actos de significado: más allá de la revolución cognitiva*, Madrid: Alianza Editorial.

Collins, A. (1977). Why Cognitive Science? *Cognitive Science (1)* p.1-2. http://dx.doi.org/10.1016/S0364-0213(77)80002-5.

Eco, U. (1990). *Semiótica y filosofía del lenguaje*. Barcelona. Editorial Lumen.

Garrafa V. (2004). Multi-inter-transdisiciplinariedad, complejidad y totalidad concreta en bioética. [Online] Available: http://www.bibliojuridica.org/libros/4/1666/9.pdf. (November 3, 2011).

Gomila (2011): Emergencia y explicación en sistemas complejos: El caso de la explicación social. In Pérez Chico D. & Rodríguez Suárez L.P. (eds.) *Explicar y comprender* (pp. 343-368). Murcia: Plaza y Valdés.

Harshbarger, B. (2008). Chaos, Complexity and Language Learning. *Language Research* Bulletin, 22, Tokyo, ICU.

Iglesias Martinez, L. (2006). La ciencia cognitiva: introducción y claves para su debate filosófico. Universidad de Navarra. [Online] Available: www.unav.es/gep/TesisDoctorales/TrabajoInvestigacionIglesias.pdf. (April 6, 2011)

Jakobson, R: (1974). *Ensayos de lingüística general*. (2nd ed). Barcelona: Seix Barral.

Juntsch, E (1979). Hacia la interdisciplinariedad y la transdisciplinariedad en la enseñanza y la innovación. In Apostel, Léo, G., Berger, A. & Michaud, G. *Interdisciplinariedad. Problemas de la enseñanza y de la investigación en las universidades* (pp.110-141) ANUIES.

Lakoff, G & M Turner (1989). *More than cool reason: A field guide to poetic metaphor.*

Chicago: University of Chicago Press.

Lakoff, G & R. Núñez (2001). *Where mathematics comes from: How the embodied mind brings mathematics into being.* New York: Basic Books.

Lakoff, G. & M. Johnson (1980). *Metaphors we live by*. Chicago: University Press.

Lakoff, G. & M. Johnson (1999). *Philosophy in the flesh: The embodied mind and its challenge to western thought* . New York: Basic Books.

Lakoff, G. (1996). *Moral Politics: What Conservatives Know that Liberals Don´t*, University of Chicago Press, Chicago.

Lee, R. (2002). La crisis de las estructuras del conocimiento: ¿hacia donde vamos? In: Florez-Malagón, A.G. Millán de Benavides, C. (Eds). *Desafíos de la transdisciplinariedad* (pp.198-220).Bogotá: Instituto Pensar.

Morin, Edgar (1980). *La méthode I: La nature de la nature*. Paris: Seuil.

Morin, Edgar (1981): *La méthode II: La vie de la vie*. Paris: Seuil.

Morin, Edgar (1987). *La Méthode III: La connaissance de la connaissance.* París: Seuil.

Morin, Edgar (1991). *La Méthode. 4: Les idées*. Paris: Seuil.

Morin, Edgar (2002). *La Méthode V: L'humanité de l'humanité, l'identité humaine*. Paris: Seuil.

Nicolescu, B. (2000). Manifiesto de la trasdisciplinariedad, Brasilia: UNESCO.

Norman, D.A. (1987). ¿Qué es la ciencia cognitiva?, en Perspectivas en Ciencia Cognitiva, Paidós, Barcelona.

Nubiola, J. y Conesa, F. (1999). *Filosofía del lenguaje*. (2nd ed.) Barcelona: Herder.

Nubiola, J. (2000). Perspectivas actuales en la filosofía de lo mental. [Online] Available: http://www.unav.es/users/Articulo45.html. (July 19, 2011).

Payrató, L. (1998). *De profesión, lingüista*. Barcelona. Ariel Prácticum.

Sanganeti, J.J. (2007). *Filosofía de la mente: un enfoque ontológico y antrpopológico*. Madrid: Palabra, colección albatros.

Schleiermarcher, F. (1987*). Hermeneutique*, Cerf, París.

Torre, S. De la & G. Sanz (2007): «*Transdisciplinariedad y educación»* en Torre, De la (dir) A. Pujol & G. Sanz (2007) *Transdisciplinariedad y Ecoformación: una nueva mirada sobre la educación* (pp.2-25), Madrid: Universitas.

Tusón, J. (2000). *¿Cómo es que nos entendemos (si es que nos entendemos)?* Barcelona: Península.

Varela, F., Thompson E. & Rosch E. (1991). *The Embodied Mind: Cognitive Science and*

Human Experience. Cambridge, MA: MIT Press.

Wilson, M. (2002). Six Views of Embodied Cognition, *Psyconomic Bulletin and Review*, 9 (pp. 625-636).

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