No Naturalization without Evolution

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Abstract

The advent of cognitive science has been characterized by the need to answer the traditional questions about the nature of the mind by inquiring about the actual elaboration processes that underlie it. This means that beyond the conceptual analysis traditionally pursued by philosophers, cognitive scientists claim the need to constrain the theoretical investigation to a key empirical criterion, namely the psychological plausibility of the interpretative models. In the case of human language, the application of this methodology leads to analyze the actual processes of comprehension and production that are implemented by speakers when they communicate.

Taking this into account, recently a transition from classical cognitive science to the so-called post-classical cognitive science has been characterized by the attention to evolutionary issues. In particular, the conceptual core of this transition is to adopt a new methodology that imposes constraints to evaluate the plausibility of a certain model of the mind and language in the light of its compatibility with the theory of natural evolution. The adoption of the constraint of evolutionary plausibility has been the heartland of the debate in cognitive science in the past years. In this contribution we propose to examine the implications of adopting the evolutionary constraint on discussions on the nature of language.

Cartesian versus Darwinian approaches

This paper is about the naturalization of the mind. We pursue an essentially methodological thesis: our idea is that naturalization is closely tied to the Darwinian paradigm. From this point of view, we argue that no naturalization of the mind is possible without evolution. To illustrate our idea about naturalization we analyze a specific aspect of human mind: the language faculty. The first step characterizing the naturalistic approach to the study of language in cognitive science is related to the question of "cognitive plausibility". There are many different ways to study human language. The peculiar character of analysis of language in the cognitive science is that language is a specific device of the cognitive system: language is one of the human mind-brain computing devices. From a methodological point of view, the idea that language is the product of the functioning of a physical device poses a severe constraint to the theoretical analysis: the models of language must be on the line to our knowledge about the functioning Cognitive Systems – in other words, the conceptual models of language must pass the test of psychological plausibility. This methodological criterion strongly contrasts with the thesis (typical of conceptual analysis) of the autonomy of philosophy from the empirical sciences.

The idea of cognitive science to observe the psychological plausibility is an important step towards a naturalistic analysis of language. In our opinion, however, cognitive plausibility is a necessary condition for naturalization, but it is not a sufficient condition for it. To naturalize language we need to go a step further the step taken by the neo-cartesian tradition of cognitive science: we need analyzing language in the frame of reference of evolution. In our opinion, in other words, the naturalization of language, besides the psychological plausibility, needs to observe the evolutionary plausibility of the model. It is in reference to this double bond that we are going to evaluate the prominent positions in the debate on the nature of language in cognitive science. Before presenting the *pars construens* of this paper we need to introduce the *pars destruens*. Our argument begins with the analysis of the Cartesian and Neocartesian tradition in cognitive science.

Shift of perspectives: From outside to inside the mind

The revolution in the way of understanding language put forth by Noam Chomsky in the mid-fifties of the twentieth century is first of all a revolution in the philosophical tradition of reference. In Cartesian Linguistics, one of the first books written by Chomsky (1966), he strongly criticizes the "environmentalism" of structuralism and behaviorism, shifting the focus from what is "external" to the mind (the socio-cultural linguistic practices) to what happens «inside» the mind (the comprehension-production processes). Rather than referring to the codes of expression used in certain linguistic community, analysis of verbal skills must be drawn to the "language faculty", that is a specific component of the mind-brain that processes linguistic information.

This new way to conceive language in terms of language faculty (the biolinguistic program) is the first clue to consider the Chomskyan paradigm in the frame of reference of Cartesian perspective. Two issues closely related are the consequences of this move: the first concerns the question of the innate nature of the organ of language (Pinker, 1994 refers to language as a form of "instinct"); the second concerns the nature of language considering the verbal skills as the product of the development of a specific "mental organ". The analysis of these issues shows that Chomsky's reference to Descartes depends not only on the idea that language is an innate component of mind, but also on the fact that language is a particular kind of innate component of mind able to elaborate a specific form of information.

2.1. The theory of the Establishment: The primacy of syntax

To understand what kind of information it is, we have to take into account a series of conceptual steps. The first is the critics to behaviorism: in the review of Skinner's Verbal Behavior (1957), Chomsky (1959) used the "poverty of the stimulus argument" to demonstrate that the analysis of verbal skills in terms of "response" and "reinforcement" is unable to account for what characterizes language specifically. The "poverty of stimulus argument" is at the foundation of the «structure dependency principle», one of the most

important principles of Universal Grammar. Chomsky takes many trials to support the fact that language acquisition cannot be explained in reference to the sequences (the serial order) of words that children heard in the community of speakers in which they live. The reason why the ability to construct such sequences cannot be explained with reference to the experiences acquired by the child is two-fold: first, the child is able to formulate correct sentences that he has never previously heard or produced; secondly, the seeming simplicity of the serial order of words experienced by the child hides a complex structure (a complex plan of hierarchies) that is not derivable from the sequence of expressions produced by the community of speakers. Now, if the "structure dependency principle" is not derivable from experience, what follows is that it must be an innate principle of the language faculty. Chomsky uses this kind of arguments to defend the idea that the cognitive system that governs the generation of sentences in the speech stream is an innate device governed by the abstract principles (mainly syntactic) of "Universal Grammar" (UG). It is in reference to this level of analysis that the Cartesian basis of Chomsky's proposal emerges quite clearly.

Chomsky has changed several times the way to intend the faculty of language, but his idea that language has to be understood as a complex innate device remained the same until the first stage of his thought. In spite of this fact, however, the harmony between Descartes and Chomsky depends on something more significant that the reference to the rich arsenal of the innate language faculty.

The deeper reason of Chomsky's reference to Descartes regards the specific type of information that the module of language is able to process. The primacy given by Chomsky to syntax, as we have already said, is one of the most important features of his proposal. The primacy of syntax, in effect, depends on a specific idea about the relationship between language and thought. In fact language must have a grammar (a syntax, specifically) in order to be an instrument of expression of thoughts. Commenting one of the arguments used by Descartes to distinguish humans from other animals, Savage-Rumbaugh and colleagues (Savage-Rumbaugh et al., 1998, p. 89) maintain that,

> given the nature of thought (whatever this might be), sentences can only serve as a vehicle for its communication if they are articulated. That is,

the ability to communicate thought verbally, and to understand someone else's utterances, requires the ability to produce or respond to "different arrangements of words". If we relate this point to Decartes' theory of cognition, we can say that he is saying that, without evidence that an organism possesses grammar, we have no reason to treat the organism's vocalizations as speech, as opposed to natural expressive behavior.

We totally agree with the interpretation offered by Savage-Rumbaugh and colleagues but with an important clarification to do: the constraint imposed by thought on language's grammar requires accurate assumptions about the nature of thought (it does not apply to whatever one means by thought). It is in reference to this specific assumption about the nature of thought, in fact, that is possible to connect Universal Grammar with the Cartesian tradition. Now, Chomsky is not quite explicit on this point (in the passages where he talks about the relationship between language and thought he never faces in detail what is meant by thought). The strongest example of the constraint imposed by the structure of thought on the structure of language is offered by Fodor (1983), an author who considers himself, more than Chomsky, the true depositary of the cartesianism in contemporary cognitive science. The idea of Fodor (1975, 1987) is that thoughts are represented in the "propositional" structures of the language of thought and that language can express thoughts because thought and language share a common form.

According to Fodor (1983) the interface between thought and language is supported by the «logical form», the constituent structure at the basis of both utterances and propositions. Since the way to process the logical form of thought expressed by language exploits the syntactic structure of utterances, it is clear that the primacy accorded to syntax is the way (used by neocartesian tradition) to give an account of the deep isomorphism between language and thought. It's only exploiting syntax, in fact, that abstract properties of the logical form become computationally tractable.

Now, the reference to this kind of form strongly constrains the type of cognitive architecture required to process linguistic information. From the standpoint of cognitive architecture, in fact, it is difficult to analyze the comprehension of language without assuming the existence of a specific processing system for the analysis of the logical form of utterances. The link between the logic form and the

computational device capable of processing it, furthermore, is supported by another characteristic of the functioning of the device: the automatic and mandatory character of its operation. Since the device is activated only by the presence of the appropriate stimulus (verbal sequences that exhibit a logical form), the understanding of an utterance takes place as a result of mandatory and automatic process guided by the logical form of language. Such an account of the mental processes implicated in the elaboration of linguistic information strongly constrains the model of human communication.

2.2. The code mode of communication

From the point of view of communication, cognitive science adhered to the classical "code model". According to this model - which has its strongest legitimacy in the mathematical theory of information proposed by Shannon and Weaver (1949) – thought (= the message) is coded by the speaker in a sequences of sounds that the listener decodes in order to share the thought that the speaker intended to communicate. In a conception of this kind, the linguistic information processing involves a precise idea about the nature of human communication. Fodor takes a clear position against the pragmatic theories of communication according to which context and speaker's intention are the frame of reference of communication. According to Fodor, indeed, in what the speaker says there is everything you need to understand the utterance - the information is entirely encoded in the literal meaning of utterances.

The proposal offered by Chomsky and Fodor represent a classical mode of presenting language in accord with the computational theory of mind (the prevalent way in cognitive science to evaluate the cognitive plausibility of the model). To appreciate the validity of this proposal, as we said at the beginning of this talk, we have to go a step further: we have to test the evolutionary plausibility of the model. To evaluate the model of language of the Cartesian approach to cognitive science, in other words, we have to answer the question: how much is plausible the universal grammar from an evolutionary point of view?

The need for evolutionary plausibility

The proponents of universal grammar maintain that language is a module: a specific computing device for the elaboration of a particular type of information. Now, the "domain specificity" is the aspect of modular theory on which evolutionary psychology has insisted more to support the adaptive nature of some mental devices. One of the main features of the devices governed by domain specificity is their extreme speed of processing. Given the high degree of speed of processing required, the language seems to be an ideal candidate to bring together modularity of the mind with the theory of natural selection. From this point of view the criterion chosen in this paper to assess the legitimacy of a theoretical model of language (the evolutionary plausibility) seems to be fully complied by Universal Grammar. End of the matter? Not at all.

Despite the arguments of evolutionary psychologists, Chomsky (and the same goes for Fodor) is not willing to consider language a biological adaptation due to natural selection. The detail of the reasons that lead Chomsky and Fodor to this position would lead us too far for the scope of this talk. Here we only discuss two closely related issues: a more specific, and a more general. The more specific issue concerns the idea of language as a complex device. The question of complexity has always been considered an element of difficulty of the theory of evolution: Darwin himself had faced criticisms by Mivart (1871) on the evolution of the "organs of extreme complexity", such as eyes or wings. Chomsky takes up the subject of Mivart: the universal grammar is too complex to be interpreted in terms of the «gradualism» that Darwin poses at the foundation of evolutionary process governed by natural selection.

The complexity of language is not the only reason that leaves Chomsky to reject the idea of language as a biological adaptation: his main case against the theory of evolution concerns the topic of human nature. Following Descartes, Chomsky argues that language is the basis of the "qualitative difference" between humans and other animals. The human ability to use verbal expression cannot be assessed in terms of "more" or "less": it is founded in principles totally different from those which underlie other forms of animal communication.

Pinker (1994) insists as well that language makes humans an entity "unique" in the world of nature. Now, the uniqueness of language is not a problem for the theory of evolution in itself: different species have unique characters (the elephant's trunk, for example). The problem arises when the idea of uniqueness of human beings is combined with the thesis of their qualitative difference. As Chomsky, Pinker argues that language responds to principles quite different from those governing other forms of animal communication: in so doing, he accepts the gradualism of Darwin without adhering to its continuism. The result of these moves is a hybrid hypothesis vitiated by a residue of Cartesianism: to insist on the difference in quality between humans and other animals is a way to confuse the idea of specificity of human with the thesis of his alleged "specialty" in nature. Something didn't go according to plan in Pinker's attempt to Darwinizing Chomsky.

According to Tomasello (1999), Pinker's idea to darwinize Chomsky failed because of the "top-down" approach to language typical of the proponents of universal grammar: when the language is intended to be the abstract and formal system of universal grammar, in fact, the danger of considering the stages of phylogenesis in terms of the "logical steps" that language must overcome to reach the current state of development, is a totally real danger. Criticizing the Platonic attitude of the reverse engineering applied to language (the idea to imagine the evolution of language starting from the actual state), Tomasello maintains that the primacy accorded to the complexity of the language is the typical error of «philosophical nativism», the attitude of those scholars who, guided by a formal and a priori model of language, «do not study directly the genetic processes involved but rather seek to infer them from logical considerations only» (Tomasello, 1999, p. 50).

The idea of Tomasello (1995) is that a priori conception of language like that carried out by the supporters of Universal Grammar leads to an interpretive model that, even if conceptually coherent, is totally wrong from the evolutionary point of view. He invites us to change model of interpretation: if universal grammar is not compatible with the theory of evolution, so much the worse for universal grammar. Much of contemporary reflection on language took very seriously this invitation: proponents of a new hypothesis on language evolution invite us to adopt a perspective in which, pro-

ceeding "Bottom-up", language is the product of a long evolutionary history.

From grammar to pragmatics

As argued previously, according to the classical model of communication, or "code model", communication is described by the twin acts of encoding and decoding. Speakers encode the meaning into a succession of sounds and then transmit the signal. Receivers then decode the message in order to be able to share the thoughts of the speaker. Against this model of communication, linguistic pragmatics has argued that the same expression can be used to communicate an indefinite number of different messages, which cannot be reconstructed by simply decoding.

Consider the following example:

1. The *chicken* crossed the road
2. Yesterday we ate *chicken*

The choice of the interpretation to be placed on the word "chicken" (referring to an animal or to food) depends on factors related to the context of enunciation. Examples of polysemy (namely, the existence of several meanings in a single word) are more pervasive than one might believe. In fact, even the meaning of words like "good" or "red" is modulated according to the context in which the words appear: a steak is good in a different way in respect to a good review or a good friend; the same goes for the word "red", which can be used to describe a wine, a type of meat, the face of an embarrassed man or the hair of a woman, identifying very different things. Generally we pass from one to another meaning of a polysemic term without paying too much attention, unless we feel the meanings conflict, such as in word games, for example Lady Bracknell in The Importance of Being Earnest says: «To lose one parent, Mr. Worthing, may be regarded as a misfortune. To lose both looks like carelessness» (Oscar Wilde).

These examples are a major obstacle to the code model, as they demonstrate that the context of enunciation is a decisive element to correctly interpret a linguistic expression. It follows that the simple

decoding is not enough. By the contrary, communication has essentially an inferential nature. Verbal expressions are only clues, often approximate and incomplete. The process of comprehension consists of inferring from these clues what the speaker intends to say. The British philosopher Paul Grice (1957) was the first person to stress the distinction between the *meaning of the expression*, namely its conventional meaning, and the *meaning of the speaker*, namely the meaning of the expression in a real communicative exchange. According to Grice's analysis, speaker's meaning is a complex communicative intention that has to be recognized by the listener in order to be satisfied. It is, in fact, the intention to obtain a certain effect on the mind of the listener through its recognition of speaker's intention to achieve this effect. Following Grice, Sperber and Wilson (1986) have interpreted the notion of speaker's meaning according to modern acquisitions on the functioning of mind.

4.1 Relevance Theory

The theory of relevance (Sperber, Wilson, 1986, 2004) inherits from Grice two central ideas: first, the idea that comprehension is a process of recognition of the speaker's intentions, realized by inference; and second, the idea that the process of interpretation is oriented by the receiver's expectations on the speaker's intentions. In spite of this debt, the formulation of the principle of *relevance* and the attention to the cognitive processes underlying communication constitute a clear break with Grice.

The relevance is, according to Sperber and Wilson, an essential feature of human cognition, besides being a key trait of communication. This is a property of the inputs of cognitive processes. A stimulus is relevant to a person when its elaboration produces positive cognitive effects, namely allows the person to change her representation of the world acquiring new beliefs, reviewing the old ones, strengthening them, reorganizing them or abandoning them. Since a person can pay attention to limited information at the same time, and considering that only a fraction of knowledge in memory can be processed at any given time, cognitive systems face the problem of prioritize the flow of information. The notion of relevance offers a solution.

A cognitive system is efficient if it recognizes the stimulus from time to time more relevant, namely the one that allows obtaining the best balance between the *cognitive effects* and *processing cost*. Since there are many inputs in competition to get the individual's attention, relevance is a matter of degree, and a stimulus is appropriate in relation to other stimuli. Let's look at the example: What time does the train leave?

1. The train leaves after 3 pm
2. The train leaves at 3:24 pm (three twenty-four)
3. The train leaves at 36 to 4 pm (thirty-six to four)

The answers are all relevant in terms of cognitive effects, but 1. produces less effects than 2., while the answer 3. is more expensive to process compared to 2. (even though 2. and 3. are equivalent in terms of effects). Following the strategy of the least effort in computing the cognitive effects, the interpretive process stops when the individual's expectations of relevance are satisfied. In fact, speaker and listener do not share *nor* have to share the same representation of the meaning: in order that communication is effective, it is sufficient that their representations are similar, namely that they are partially overlapping.

In these terms, the linguistic meaning is modulated according to the aims of the individuals within specific contexts of use, drawing on what they know about the world and their interlocutors in an opportunistic way, in order to achieve the more likely interpretation of the message conveyed by the speaker in a given situation. From this point of view, linguistic meaning is based on the notion of *ad hoc concepts* (Barsalou, 1983, 2008). The study of the construction of ad hoc concepts produced the new field of *lexical pragmatics*.

Pragmatics, cognition and action

Words encode mentally represented concepts. Many pieces of information are activated by a concept, but on different occasions we will need only a fraction of that information. Therefore, when we interpret a sentence, its meaning is determined on the basis of the contextually appropriate interpretation, which is derived

through the construction of an ad hoc concept. These concepts are activated voluntarily by a person to accomplish a particular purpose in a particular situation. Consider this example:

Lisa wants to know a BACHELOR*.

The conventional meaning is UNMARRIED ADULT MALE. But an octogenarian, a priest, a man who lives with another woman or a man who has different sexual preferences, although literally bachelors, would not be considered appropriate in the imagined context. The appropriate interpretation requires that the lexical concept BACHELOR may be narrowed to the *ad hoc concept BACHELOR**.

These are new concepts because they are not stored in long-term memory but are made spontaneously by the subject in the working memory in a certain occasion, for some particular purpose. The notion of ad hoc concept embodies, therefore, the idea that the thought is closely related to the action in a given context - a perspective that has profound implications on language as well.

The idea that linguistic meanings are based on ad hoc concepts sheds light on a key fact, namely that communication exploits the ability of the speakers to constantly carry on a *mutual adjustment*, by which they construct the appropriate interpretation. The lexical modulation is just a special case of a general strategy of tuning between language and context on which the processes of comprehension and production are based. We are stressing the role of mutual adjustment for two reasons.

First, because so doing we are shifting the attention from the linguistic code to the mental operations and devices that allow speakers to gain the communicative balance: we maintain that this strategy opens a new way to investigate both the origin of symbolic communication and the continuity between humans and other animals, within a conceptual framework no more focused on the relation between human language and animal communication but on the relation between language and cognition.

Second, shifting the focus to ad hoc concepts we emphasize the link between language, mind and practical goals of individuals, so that it becomes possible to account for linguistic behavior in terms of a general strategy of grounding to the environment that allows

the organism to survive. These two reasons are enough to question the classical cognitive science's assumption that mental processes are separated from any external factors. The giving out of this assumption is a key step to put the language issue into the agenda of the evolutionary theory. Now let's consider the first point, namely the issue of which mental devices implement the mutual adjustment between speaker and listener.

5.1 Communication and mindreading

According to Sperber and Wilson (1986, 2004), human intentional communication is characterized by two levels of intention: the informative intention and the communicative intention. The first is the intention to inform the receiver of something (for example, you leave your car key on the table to inform the other person that you are going out on foot); on the other hand, the communicative intention is the intention to inform the receiver of your intention to inform her of something (you raise your key and shake it in front of the other person before you place it on the table). Human beings can process this dual level of intentions because they have a mental mechanism which allows them to process *metarepresentations*, namely mental representations of the representations of other people, such as beliefs, desires, and so on.

This "mindreading mechanism" is the basis of naive psychology (or common sense psychology), namely the ability to explain and predict the behavior of others by attributing them mental states that motivate actions. Many scholars agree about the hypothesis that the pragmatic processes that depend on this type of skills have a major role in communication, especially following the discovery that people with autism, which have a selective damage to the "mindreading mechanism", have serious communicative difficulties as well (Baron-Cohen, Leslie, Frith, 1985; Ferretti, 2003). The role of the mindreading mechanism in pragmatics has an important effect on the question of language evolution. Let us briefly examine the issue.

5.2. Pragmatics and evolution

From a pragmatic point of view, communication is based on providing clues to the listener of the meaning you want to transmit, and all sorts of clues can be useful: gestures, sounds, facial expressions and so on. Above all, the evidence offered to the interlocutor can be encoded or not - an option that is particularly relevant when the question is the evolution of language and, therefore, we are projected toward an ancestral situation in which the expressive code is missing or not fully developed yet. From this point of view, coded communication works better when the communicators share exactly the same code, because any not shared expressive changes may threaten the communication. By contrast, in the inferential perspective, also a fragmentary, ambiguous and poor code is enough, within a certain context, to convey a not ambiguous and complete meaning. Let's imagine the following scenario (Sperber, Origgi, 2000, p. 168):

> Imagine two individuals of this ancestral species walking in the desert. One points to the horizon and utters "water". The other correctly infers that the speaker means *here is some water*. They reach the edge of the water, but one of them collapses, exhausted, and mutters "water". The other correctly infers that the speaker means *give me some water*. To the best of our knowledge, there is no evidence that the signals of animal communication ever permit such an open range of quite diverse interpretive elaborations.

Sperber and Origgi (2000; 2010) argue that only in the inferential framework of communication you can think of the evolution of language, because in a hypothetical evolutionary scenario in which a mutant gives rise to a linguistic innovation, this innovation could take root only thanks to the listener inferential resources that allow him to understand and transmit the innovation.

Taking a pragmatic perspective has clear implications also on the question of the continuity between human language and animal communication. In fact, although the two systems are certainly different, according to the inferential model this difference does not mean that language marks a clear break between humans and other animals. In fact, the question of the evolutionary continuity should not be approached looking for similarities in the expressive codes,

but rather looking at the capacities and cognitive devices underlying communication (Cosentino, 2011; Ferretti, 2010).

From this point of view, a famous article by Premack and Woodruff (1978) opened the debate about the ability of other animals to read other minds. We are not interested here in going into the evolutionary and compared studies on mindreading, but these remarks are enough to conclude that in order to clarify the question of the origin and evolution of language we have to take into account a pragmatic perspective. Besides, adopting a pragmatic point of view entails emphasizing language's traits that depend on the grounding of organisms in their environment. In fact, the idea of language that emerges here is the idea of a system built on the basis of cognitive devices that allow organisms to respond appropriately to the challenges of the external environment.

The point of convergence between pragmatics and evolutionary theory is a new model of the mind, based on the assumption of the relation between thought, environment, body and action. Thought is finalized to action and this means that the grounding to the environment is the basic condition of both thinking and speaking. From this point of view, the reflections on language are part of a totally new rethink of the model of mind.

Language and Grounded mind

The idea of language that emerges from the framework just outlined leads to a notion of mind that recognizes, unlike the classical cognitive science, the grounding of cognition in the external environment. Although until some time ago a convincing argument in support of the abstract model of the mind was the virtual absence of alternatives, nowadays the situation is completely changed. The models of the mind that emphasize the priority of perception, motor skills and, more generally, the individual's experience during interaction with the environment are becoming predominant. The theories that highlight these aspects are subsumed under the expression of "theories of grounded cognition". These theories can take several forms, what they have in common is the rejection of the standard perspective that looks at the mind as a disembodied device

separated from the external environment, and the vindication of the grounded character of cognition (Cosentino, Ferretti, 2011).

Since the abstract nature of thought is imposed by the classical computational model, in rejecting this model is involved a rejection of a form of dualism between the mind and the world. The notion of grounded mind provides an overview of cognition less formal and more practical - linked to the action - and, by virtue of this, even more plausible from a biological and evolutionary point of view. In fact, the grounding to the environment is the condition of organisms' survival as their ability to act effectively in a given situation is determined by the convergence between their representations of the external environment and their actions in that situation. The most interesting aspect for us is that the connection between cognition and action is the foundation of a new approach to meaning, based on the idea that comprehension involves the ability to take into account the possible actions in a given situation. The link between action and cognition is the fulcrum around which to build a new model of language "from below", which assumes as a basic condition the grounding in the environment.

Conclusion

In the light of the considerations raised in this paper, contextual factors cannot be ignored: the meaning assigned to a linguistic expression is the result of a process of tuning between speaker and listener, bound by the external environment and the goals of the individuals, and governed by certain principles (such as relevance). Overcome the abstract de-contextualized idea of language which has characterized the classical cognitive science means questioning a solipsistic vision of the mind as separate by the world. Besides, it means to bring to an end the process of emancipation from the Cartesian intellectualism that classical cognitive science has reached only halfway. A pragmatic and *grounded* perspective on language and cognition is a far-reaching alternative to the classical cognitive science and its residual dualism. A vision of this type, bridging the gap between mind, body and world, offers a model of language fully integrated into the evolutionary explanation.

References

S. Baron-Cohen, *Mindblindness: An Essay on Autism and Theory of Mind*, MIT Press, Cambridge-MA 1995.

L.W. Barsalou, *Ad Hoc Categories*, «Memory & Cognition», 11 (1983) pp. 211-227.

L.W. Barsalou, *Grounded Cognition*, «Annual Review of Psychology», 59 (2008) pp. 617-645.

N. Chomsky, *A review of B.F. Skinner's Verbal Behavior*, «Language», XXXV n. 1 (1959) pp. 26-58.

N. Chomsky, *Cartesian Linguistics*, Harper and Row, New York 1966.

E. Cosentino, *Self in time and language*, «Consciousness and Cognition», 20(3) (2011) pp. 777-83.

E. Cosentino, Ferretti, F., *Avviso ai naviganti: la coscienza orienta il linguaggio*, in M. Marraffa (a cura di), *Filosofia e scienze cognitive*, «Sistemi Intelligenti» 1 (2011) pp. 93-112.

F. Ferretti, *Alle origini del linguaggio umano. Il punto di vista evoluzionistico*, Roma-Bari, Laterza 2010.

F. Ferretti (a cura di), La mente degli altri. Prospettive teoriche sull'autismo, Editori Riuniti 2003.

J. Fodor, *The Language of Thought*, Crowell, New York 1975.

J. Fodor, *Modularity of Mind: An Essay on Faculty Psychology*, MIT Press, Cambridge - Mass. 1983.

J. Fodor, *Psychosemantics: The Problem of Meaning in the Philosophy of Mind*, MIT Press, Cambridge – Mass. 1987.

P. Grice, *Meaning*, «The Philosophical Review», 66 (1957) pp. 377-388.

St.G. Mivart, *On the Genesis of Species*, 2ª ed., Macmillan, London 1871.

S. Pinker, *The Language Instinct*, Morrow, New York 1994.

D. Premack, G. Woodruff, *Does the chimpanzee have a "Theory of Mind"?*, «Behavioral and Brain Sciences», 4 (1978) pp. 515-526.

S. Savage-Rumbaugh, S.G. Shanker, T.J. Taylor, *Apes, Language and the Human Mind*, Oxford University Press, Oxford 1998.

C.E. Shannon, W. Weaver, *The Mathematical Theory of Communication*, The University of Illinois Press, Champaign 1949.

B. F. Skinner, *Verbal Behavior*, Copley Publishing Group, Acton-Massachusetts 1957.

D. Sperber, G. Origgi, *A pragmatic perspective on the evolution of language*, in R. K. Larson,V. Déprez, H. Yamakido (eds.), *The Evolution of Human Language: Biolinguistic perspectives*. Cambridge U.P. 2010, pp. 124-132.

D. Sperber, G. Origgi, *Evolution, communication, and the proper function of language*, in P. Carruthers and A. Chamberlain (eds.) *Evolution and the Human Mind: Language, Modularity and Social Cognition*, Cambridge University Press, Cambridge 2000, 140-169.

D. Sperber, D. Wilson, *Relevance: Communication and Cognition*. Harvard University Press, Cambridge – Mass. 1986.

D. Sperber, D. Wilson, *Relevance Theory*, in L. R. Horn, G. Ward, (eds.), *The Handbook of Pragmatics*, Oxford, Blackwell 2004, pp. 607-32.

M. Tomasello, *Language is not an instinct*, «Cognitive development», 10 (1995) pp. 131-156.

M. Tomasello, *The Cultural Origins of Human Cognition*, Harvard University Press, Cambridge 1999.