



## Stories without Words: Narratives of the Brain

Massimo Salgaro \*

\* Università degli Studi di Verona, Dip. di Anglistica, Germanistica e Slavistica, Lungadige  
Porta Vittoria 41 - Verona  
massimo.salgaro@univr.it

The task of the present essay is to outline the neural processes entailed in the making and consumption of stories in three spheres: 1) in the foundation of subjectivity, 2) in the interaction between subject and object, and 3) in the relationship with ambiguous, absent or possible objects. The neural narratives related to the foundation of subjectivity are insightfully described in the researches of Daniel Dennett, Israel Rosenfield and Antonio Damasio (1). During the last ten years researchers at the University of Parma, like Giacomo Rizzolatti, Vittorio Gallese and others have shown that when we observe objects or someone interacting with an object we evoke the most suitable motor program required to interact with them. Looking at objects means to unconsciously 'simulate' at a neural level a potential action. Consequently our brain "writes" stories before we act, or even if we do not act at all (2). The neural narrations do not concern only a mere relation between subject and object wherein the object is present and handy. Infact, the researches of Semir Zeki have proven that "ambiguity" is not only a feature of a literary text and a tool of literary criticism, but, more importantly, "ambiguity" indicates the capacity of the brain to allow multiple perceptual interpretations of an object (3).

Evolutionary aesthetics place great emphasis on the genetic influences in our relationship with art. Among these genetic influences there is also the architecture of the mind which enables us to perform those intellectual operations required by the artistic dimension. Many studies on evolutionary aesthetics neglected the neural dimension and consequently have collected a good share of negative criticism, due to the lack of documentation and consistency showed by many of their contributions (Fuksas 2008a). The modern neurosciences have shown that there are "neural narratives" involved in the foundation of subjectivity and in the link between subject and object. From my viewpoint the oral and textual stories reproduce the process of the telling at neural level which allows us an effective interaction with the world.

The task of the present essay is to outline the neural processes entailed in the making and consumption of stories in three spheres: 1) in the foundation of subjectivity, 2) in the interaction between subject and object, and 3) in the relationship with ambiguous, absent or possible objects. Moreover, I will also provide some examples of literary works that not only deal with these issues, but actually develop a poetics about them.

The first type of neural narratives is insightfully described in the research of Daniel Dennett and Antonio Damasio, which explores the cognitive foundation of literary production. Both use the metaphor of the tale in order to explain the moulding of awareness.

In *Consciousness Explained*, Dennett introduces "heterophenomenology" as a link between objective physical science and its insistence on the distanced third-person point of view, and descriptions of private and ineffable subjective experience (Dennett, 72). The

heterophenomenologist's task of interpreting subjects' behaviour and their consciousness can be compared to the reader's task of interpreting a work of fiction. In fact, both project an interpretation over their objects of study. But the interpretations of awareness can be erroneous: In Dennett's opinion most of us have a wrong conception of consciousness because we think, like Descartes, that there is a "central observer" or headquarters in the brain. Instead, Dennett introduces a "multiple draft model." According to this model, the mind's activity is accomplished in the brain by parallel, multitrack processes of elaboration of sensory inputs. Dennett describes this activity with a literary metaphor when he claims that the information entering the nervous system is under continuous "editorial revision" by multiple editors (Dennett, 111). Consciousness, however, is only a temporary effect of these processes which function to create a stable identity of the self. The conscious self, Dennett suggests, is merely the result of this principle of organization. Human beings, in this sense, are constantly engaged in presenting themselves to others and more importantly, to *themselves*; weaving "self-protective strings of narrative" (Dennett, 417). However, these narratives are not spun by a conscious self, but rather, they spin us. Our human consciousness and our sense of selfhood are the product of these narratives, not their source. As a result we have what Dennett calls "the center of narrative gravity" - - in essence an attempt to unify our multiple mental activities.

In *The Self as the Center of Narrative Gravity*, Dennett takes up the discussion launched in *Consciousness Explained*, posing the self as an abstract object; a theorist's fiction. Expanding on his contention that we posit selves for *ourselves*, Dennett tries to elucidate this concept through a literary metaphor. To show that fictional selves are not dependent on the existence of "real" selves, he proposes a thought experiment about a "novel writing machine." For example, Dennett explains, page one of *Moby Dick* says: "Call me Ishmael". Who is saying "I" in this situation? This indeterminacy is a fundamental property of fictional objects, but in Dennett's view, equally so for a thinking individual. Now, suppose the existence of a computer programmed to write novels. "Call me Gilbert", the novel begins. What follows is the apparent autobiography of some fictional Gilbert. Gilbert is a fictional, created self but its creator has no self. There were humans of course who designed the machine, but they didn't design Gilbert. The adventures of Gilbert, the fictional character, might even bear a striking and presumably non-coincidental relationship to the adventures of a robot rolling around in the world. But who is Gilbert? Is Gilbert the robot, or merely a fictional self created *by* the robot? This situation has strong analogies to ours, Dennett claims: "...it does seem that we are virtuoso novelists who are engaged in all sorts of behavior, more or less unified, but sometimes disunified, and we always put the best "faces" on if we can. We try to make all of our material cohere into a single good story and this story is our autobiography" (Dennett, 114).

In some cases the establishment of a sense of self can be a problem, for example for people who suffer of Multiple Personality Disorder (MPD). Dennett quotes the studies of Michael Gazzaniga on "split brain subjects", whose *corpus callosum* has been surgically severed, creating two largely independent cortical hemispheres. After the operation, patients normally exhibit no signs of psychological splitting because the self is a fiction that permits us to put the different parts of the brain in communication.

On this specific issue, Dennett also agrees with Israel Rosenfield, who is both a novelist and scholar of neuroscience. In Rosenfield's novel *Freud's Megalomania* (2000), he introduces a concept called "self-deception" which shares some aspects with Dennett's "center of narrative gravity". Like Dennett, Rosenfield believes that our awareness of ourselves is only a useful invention aimed at giving a semblance of unitariness to us and the others. His novel

proposes a fictive posthumous text by Freud, the theory of “self-deception” . What is new and startling about this manuscript is its claim that human psychology would not be possible without self-deception, double-dealing and lying. “Since the limits of our knowledge make it impossible to tell us who we are and what to do, our emotions deceive us into believing in the rightness of our actions” (19). This behaviour can assume pathological scale in megalomaniac personalities like those described in the novel: Sigmund Freud, Moses, Gustave Eiffel, Julius Wagner-Jauregg. The consequence of this pathology is:

Indeed, it is not honesty about ourselves that we are seeking, but a vague recognition that if we cannot really control ourselves, if we can only in retrospect understand what we are all about (and than even our retrospective view is hardly reassuring, since it is inevitably distorted by oversights that we try to fill in to create a coherent view of ourselves), we can hardly claim to understand the motives and actions of those around us. It is our failure to be reassured about others, our recognition that whatever explanations others might give us must also be distorted by the same mechanisms that seem so beyond our control – that is what is truly disturbing. Because if we are constantly deceiving ourselves concerning our own motives and actions, certainly those deceptions are ultimately turned to our own benefit. But we know that we are doing likewise with family, friends and acquaintances and that therefore they must be doing the same. (62-63)

Included in a novel these statements take on a nearly literary peculiarity. If self-deception is a feature of the human psyche forcing us to invent and tell stories about ourselves then it represents the leading pattern for every kind of tale and fiction. In this instance the novel is not only considering human psychology but also the status of literature as a fictional construct.

Similar to Dennett, Antonio Damasio, in *The Feeling of What Happens*, proposes a “cerebral wordless narration” to explain the perception of a self at any given moment. Consciousness, Damasio explains, arises in the awareness that the organism’s own state has been changed by an object. This relationship has the features of a “narration without words”: “It does have characters (the organism; the object). It unfolds in time. And it has a beginning, middle, and an end. The beginning corresponds to the initial state of the organism. The middle is the arrival of the object. The end is made up of reactions that result in a modified state of the organism” (168). According to this model, we know that we exist, because the narrative places us as protagonists in an act of knowing.

This encounter between subject and object takes place on a level called the proto-self. The proto-self is a coherent collection of neural patterns, which constantly map the state of the physical structure of the organism in its many dimensions. Language is not part of the structure of the proto-self, as memory is not included in this knowledge. Only at the level of the “core self” and the “autobiographical self” do we become aware of our experiences and can traduce them into language. While the proto-self is transitory, the function of the autobiographical self is the creation and the stabilization of the self (174). This relationship, Damasio suggests, is like a movie-in-the-brain:

Let me make clear what I mean by making a narrative or telling a story. The terms are so connected that I must ask you again not to think of them in terms of words. I do not mean narrative or story in the sense of putting together words or signs in phrases and sentences. I do mean telling a narrative or story in the sense of creating a nonlanguage map of logically related events. Better to think of film (although the film medium does not give the perfect idea, either) or of a mime. (184-5)

For Damasio, the wordless narration of the proto-self precedes the linguistic narration of the autobiographical self. As we have seen, Antonio Damasio expands the perspective from the subject to the encounter between subject and object. It is just such relation which stands in the core of the second passage of my essay. The current neurosciences show that when a subject establishes contact with an object he simulates on a neural level a possible interaction. However, such a neural narration is never an ultimate purpose representation but it is always aimed at playing a possible action over the object.

In fact during the last ten years researchers at the University of Parma, like Giacomo Rizzolatti, Vittorio Gallese and others, have shown that our brain contains “canonical neurons” and “mirror neurons.” Canonical neurons discharge when we see a particular object or perform some movements directed toward the object. Mirror neurons discharge when we see someone else interacting with an object or even a representation of someone interacting with the object. In these situations the brain is simulating our interaction with the observed object. Vittorio Gallese proposes in his essay *The Inner Sense of Action* that representation is intrinsically related to action control. He claims that until now, neuroscience has tended to privilege, on one side, the study of sensory processes and, on the other, the study of motor processes.

Gallese asserts that these previous formulations neglected such “mental events” as desire and intentionality which were conventionally “the traditional playground of philosophy and, more recently, of the cognitive sciences.”(27) Historically perception and action were considered two different and distinct mental events. His findings “show the impossibility of drawing a sharp line between acting and perceiving.”(28) A series of experiments during the 1980s led to the discovery of neurons that become activated not during the execution of simple movements, but during the execution of motor acts aimed at the achievement of a specific task. Certain objects were shown to some monkeys during these experiments: The experiments showed that some specific neurons discharged any time the monkey was grasping a given object, regardless of which was the effector employed, for example the right or the left hand or the mouth. Gallese and his team discovered that these so-called canonical neurons were also selectively activated when the monkey observed the same objects in the absence of any active movement. Therefore:

Object observation, even within a behavioural context not specifically requiring an active interaction on the side of the observer, determines the activation of the motor program that would be required were the observer actively interacting with the object. To observe objects is therefore equivalent to automatically evoking the most suitable motor program required to interact with them. Looking at objects means to unconsciously ‘simulate’ a potential action. In other words, the object-representation is *transiently integrated* with the action-simulation (the ongoing simulation of the *potential* action). (31)

Gallese refuses a symbolic or abstract conception of representation and imagination, because, as we have seen, perceptual processes are part of motor processes. “A large portion of the reality we live in and represent must inevitably be conceived of as literally being constituted by actual and potential (simulated) bodily motions, behaviours, and actions” (27). Thus, our mind produces literature, namely possible worlds, by creating images in order to interact with objects of the external world. Consequently our brain “writes” stories before we act, or even if we do not act at all. These “stories” should be understood simply as a change in the specific situation elicited by the main character of our stories: ourselves.

Furthermore, quite the same mechanisms seem to be involved when we try to understand and anticipate also the “stories” of the others: Both canonical and mirror neurons seem

sensitized for the planning or *intending* of activities, activating when an action is observed. They also discharge if the observed activity is only partially executed, but the intention is clearly expressed. Recent studies on monkeys have shown that mirror neurons become active when the final result of an interaction is not displayed and thus the action can only be inferred by the monkey (Umiltà, 2001). Accordingly, these neurons deal directly with our imagination and the dimension of possibility.

The production and reception of literature entail similar processes. When we read or listen to stories we picture an environment in which we might act ourselves. Reading fiction also sets the neural narratives going, that are ultimately aimed at coordinating the movement and the activities of our body. On a neural level, also a described or imaginary reality makes the same processes activated vis-à-vis a solid reality. Michael Spivey and other scholars have recorded the eye movements of subjects listening to 10 short stories. Their results demonstrate that even when participants' eyes were closed, they tended to move their eyes in directions that accord with the directionality of the scenes described in fiction. They conclude that "in a sense, one may say that *thinking* of something often involves *pretending to look at it*" (Spivey, 487). In fact:

In such an embodied view of the mind, action determines cognition as much as perception does. Indeed a number of researchers have suggested that an important aspect of perceiving an environment is *how to interact* with it [...] Perhaps we can add to this embodied view of perception that part of perceiving a scene is also knowing *how to look at it* – even when it's not there. (Spivey 492)

Gallese's and Spivey's experiments force an embodied conception of the mind and of our imagination. As we have seen, both the canonical neurones and listening to stories make us anticipate possible actions. The neural activity drives us to project ourselves always beyond a certain moment seized by a representation. That's why anticipation is an important component of the literary reading process. When we start to read a novel, or better: a detective story, we are intensely committed to anticipate what the characters will do, where the story is going and to understand what the meaning of the text might be. Conversely, during the reading of essays we try to link the informations to what we have already read and make few anticipations. The anticipatory function of literature is paralleled by the activity of the canonical and mirror neurons.

Our neurones do not start into action only when we see or picture an object, as has just been said, also when we observe someone interacting with an object the mirror neurons discharge. And also while reading we "understand" the characters internally simulating their actions. In fact, recently it has been proved that canonical and mirror neurons are activated during reading. This is a completely new understanding of old critical concepts like empathy and identification. Lisa Aziz-Zadeh and other researchers at the University of Parma observed subjects reading phrases relating to foot, hand or mouth actions. These experiments showed a congruence between the cortical sectors activated by observing actions and by their verbal description (Aziz-Zadeh et al., 1821)ii. Consequently the language makes use of the same embodied representations that are involved in social cognition of the actions and intentions of others. In other words, when engaged in the act of reading, people mentally re-create a scene or event as if they were carrying out the actions that are described in the text. For Aziz-Zadeh and these scholars comprehension is already part of a motor process. These findings explain not only the way we empathize with others, but why readers of fiction seem to have feelings similar to those of the characters described in a novel. These researches support the thesis of embodied semantics, maintaining that conceptual representations accessed during linguistic processing are partially equivalent to the sensory-motor

representations required for the enactment of the described events (Fuksas 2008b). Thanks to the mirror neurons we can share experiences and emotions with fictional figures; we can link what they do and feel with our inner world. If literature is the food for our imitation instinct, which permits us to understand and communicate with others (Lauer, 2007), then the mirror neuron system can easily be linked to traditional literary reader-response-theories.<sup>iii</sup>

Since reading is based on the neural narratives which govern the relationships between subject and object it also must show necessarily some rebounds on our relation with the real world and others. This thesis is confirmed by psychological experiments on reading that demonstrate that the more fiction a person reads, the better they perform on tests of social understanding and awareness (Mar et al). Comprehending characters in a narrative fiction appears to parallel the comprehension of peers in the actual world. Also the tendency to become absorbed in a story indicates a high capacity of empathy. Frequent readers of narrative fiction, the so-called "bookworms" may maintain social skills while reading stories, although they are removed from actual social contact during reading. Conversely, frequent readers of non-fiction texts have fewer social abilities. Thus, one of the possible answers for the success of fiction is: narrative structures are based on a neural system that allows us to establish relationships with our surroundings and with others.

The neural narrations do not concern only a mere relation between subject and object wherein the object is present and handy. Infact, we may refer to ambiguous and complex objects and imagine possible or impossible objects and situations. Just these types of objects are the more peculiar as far as the artistic and literary sphere is concerned. The relation with this kind of objects stands in the core of this passage of my essay. In *The Neurology of Ambiguity*, Semir Zeki, the father of neuroaesthetics, tries to explore the neurobiological foundations of visual ambiguity in particular. In his opinion a neurobiologically-based definition of ambiguity is the opposite of the dictionary definition: "it is not uncertainty, but certainty – the certainty of many, equally plausible interpretations, each one of which is sovereign when it occupies the conscious stage" (245). There are many different visual areas in the brain, each one of which receives visual input in stages, each stage constituting a node. Every node is therefore a processing site as well as a perceptual site. There are conditions where the brain has to choose between two or more equally possible interpretations in its interpretation of the signals that it receives, for example when it is confronted with tricky figures like The Kanizsa triangle, The Kanizsa cube or the Rubin Vase. The perception of these figures implies that the physiology of a single visual area allows multiple perceptual interpretations of incoming signals. But only one interpretation can occupy the conscious stage at any given moment. That interpretation is nevertheless strictly circumscribed by the basic physiology of the cells in the visual area, without involving factors such as memory and learning (the so-called top-down mechanisms). When the brain retains the options of interpretation, ambiguity is stabilized by the brain itself, even if the ambiguity is indelible. After having discussed these "lower" types of ambiguity Zeki focuses on higher levels of ambiguity in artworks like *The Pearl Earring* by Vermeer; the depicted girl is "at once inviting, yet distant, erotically charged but chaste, resentful and yet pleased" (262). This single image allows several interpretations of equal validity-- like the works of Dalì, Arcimboldo or the *Belvedere Hercules*. Zeki considers ambiguity to be a characteristic of great art, an attribute that substantially heightens the artistic and aesthetic merit of a work.

The mechanisms described by Zeki also suggest a paradigm for written representation; they explain why fictional texts can describe possible worlds or be semantically ambiguous and still be appreciated. In fact, recent studies have shown that "semantic disambiguation" is a specific capacity of some region of our brain (Rodd 2005). Volunteers heard sentences

containing ambiguous words (e.g. “the shell was fired towards the tank”) and sentences with low ambiguity (e.g. “her secrets were written in her diary”). Although these sentences had similar acoustic, phonological, syntactic and prosodic properties the high ambiguity sentences required additional processing by those brain regions involved in selecting contextually appropriate word meanings. These sentences produced increased activity in left posterior inferior temporal cortex and inferior frontal gyri bilaterally. The scholars conclude that these brain regions form an important part of the network involved in comprehension of literary texts of “high ambiguity”, for example, poems. In fact ambiguity is a main feature of literature and refers to the fact that words can have several meanings, and leave room for alternative readings. Ever since William Empson published *Seven Types of Ambiguity* (1930) this term had some weight in critical evaluation. Criticism acknowledges the complicating effect of imagery and the levels of ambiguity that can exist in a text. Ambiguity is a necessary result of the autoreference of literary works which decontextualize words with their literal meanings using them in new combinations (Bode). The figurative language of literature is always ambiguous and gives room to semantic richness and never ending interpretation of its texts. This term is essentially a synonym for more technical terms like plurisignation and indeterminacy. With the concept of indeterminacy the deconstructionists spread the range of ambiguity by making interpretations of literature, as well as literature itself, uncertain (Graff).

“Ambiguity” is not only a feature of a literary text and a tool of literary criticism, but, more importantly, “ambiguity” indicates the capacity of the brain to allow multiple perceptual interpretations of an object or to contextualize a word or an utterance. “Ambiguity” as a feature of literary texts is based on the capacity of the brain and on our physiology.

The existence of neurological structures dedicated to ambiguity suggests that literature as an ambiguous construct has a specific evolutionary function. John Tooby and Leda Cosmides propose that humans’ capacity for fictional activities contributed to the survival of our ancestors. They think that the properties of aesthetic experience “function as test patterns to tune our perceptual machinery” (17). But humans are confronted with complex information that comes from their external environment. The success of the human being depends on the capacity to discriminate locally or temporally relevant information. We have to know if information about an object is useful to a certain context, or false and misleading outside the scope of these conditions because as we saw in the second part of this essay we seek always to grasp the possibility of interaction with the objects. This is “the struggle for coherence and sanity amidst radical uncertainty” (19) typical of the human condition:

As a result, humans live with and within large new libraries of representations that are not simply stored as true information. These are the new worlds of the might-be-true, the true-over-there, the once-was-true, the what-others-believe-is-true, the true-only-if-I-did-that, the not-true-here, the what-they-want-me-to-believe-is-true, the will-someday-be-true, the certainly-is-not-true, the what-he-told-me, the seems-true-on-the-basis-of-these claims, and on and on. Managing these new types of information adaptively required the evolution of a large set of specialized cognitive adaptations. For example, it involved the evolution of new information formats, based on what we call scope syntax, that tag and track the boundaries within which a given set of representations can safely be used for inference or action. (20)

For Cosmides and Tooby, art as literature challenges the “sense of possibility” (Robert Musil) for an audience. The “sense of possibility” (*Möglichkeitssinn*) is one of the features of Ulrich, the main character of the novel *The Man without Qualities* by Austrian author Robert Musil. According to Musil, people who have a “sense of possibility” take potential events just as seriously as actual ones:

But if there is a sense of reality, and no one will doubt that its existence is justified, then there must also exist something which can be called a sense of possibility. Whoever possesses a sense of possibility does not, for example, say: here this or that happened, will happen, or is bound to happen; rather he fantasizes that here something could, might or should happen. And if someone explains to him of something that it is thus, and how it is, then he thinks: now it could probably be otherwise. Thus the sense of possibility may be defined practically as the ability to think of what could just as well be the case, and not to take that which is as more important than that which is not. One sees that the effects of such a creative talent can be remarkable, and regrettably they may sometimes allow that which people admire to appear as false, and that which they forbid to appear as permissible. (16)

Consequently, Ulrich is also *the Man without Qualities*, a man who understands that he and others could always do and be otherwise. For Musil, literature is a dimension of potentialities and new meanings, because in the world of fiction elements of reality are combined in an unusual manner. In his essays he stated that literature could only express potentiality and novelty if it maintained a link with the real world (982, 1154). As a writer with extensive psychological knowledge, Musil believed he could modify not only readers' emotions but their ways of thinking. He claimed that literature could offer to the reader an escape from a stereotyped way of thinking and behaving (1137-1154). I will not expand on the details of his novel at length, but even these few quotations suggest that *The Man without Qualities* could be a productive site for the exploration of the complex subject-object relation described in this part of the essay. Musil bestows upon the literature the the task to put us in touch with possible objects and realities and to demolish our perceptive practices. He seems to be aware of the neural narratives we talked about and he moulds his conception of literature in relation with them. I also propose that Musil's reflections on reading seem to anticipate the theory on mirror neurons in his contention that the reader had to be empathetic with the text and feel it "as if it's a part of his own" (1321).

Reading has often been treated as if it were something other-worldly, governed by its own mysterious rules. Now we've discovered that this travel into another dimension actually fits the specific mechanisms of our body and the demands from our environment which govern the relationship between subject and object. Acting in the "real" world demands "neural narratives" a mix of reality and fiction, as expressed within our neurological activity. Aesthetic terms like "ambiguity"-- previously considered within intellectual and abstract dimension are also essential qualities of our neurological and bodily systems. Surely this new approach will not change our ways of and our delight in reading, but it should change our way of understanding the reading process, imagination, and finally literature.

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<sup>i</sup> Though Katja Mellmann recognizes the role of mirror neurons in empathy mechanisms she observes properly that the domain of neural simulation and empathy is anything but clear at the moment and declares to be sceptical about the inference of a generical principle of neural mirroring which could suggest an allpurpose mechanism mirroring whatever kind of information about whatever kind of another's activity or experience (Katja Mellmann).

<sup>ii</sup> Antonio Damasio presents his "as-if-body-loop" as a variant of the mirror neuron system described by the team of neuroscientists of Parma. The "as-if-body-loop" is an internal brain simulation that take place while there are no actually incoming signals from the body and is considered to be crucial for any process of mental simulation, including empathy (Damasio, "Looking for Spinoza, Joy", 115).

<sup>iii</sup> Forthcoming.



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**References:**

- A. Zadeh, L. S. M. Wilson, G. Rizzolati, M. Iacobini, *Congruent Embodied Representations for Visually Presented Actions and Linguistic Phrases Describing Actions*, in «Current biology» 16 (2008), pp. 1818-1823
- C. Bode, *Ambiguität*, in *Reallexikon der deutschen Literaturwissenschaft*, K. Weimar (ed.), Walter de Gruyter, Berlin-New York 2007, pp. 67-70
- A. Damasio, *The Feeling of What Happens. Body and Motion in the Making of Consciousness*, Harcourt, New York et al. 1999
- A. Damasio, *Looking for Spinoza, Joy, Sorrow and the Feeling Brain*, Harcourt, Orlando et al. 2003
- D. Dennett, *Consciousness Explained*, Little, Brown and company, Boston et al. 1991
- D. Dennett, *The self as the center of narrative gravity*, in *Self and Consciousness: Multiple Perspectives*, F. Kessel, P. Cole, D. Johnson (eds.), Erlbaum, Hillsdale 1992, pp. 103-116
- A. P. Fuksas, *The Descent of the Novel*, in «Cognitive Philology» 1 (2008)
- P. Fuksas, *The Embodied Novel*, in «Cognitive Philology» 1 (2008), translated in Italian *Il romanzo nel corpo: una teoria ecologica della referenza narrativa*, M. Salgaro (ed.), *Verso una neuroestetica della letteratura*, Aracne, Roma 2009, pp. 71-107
- V. Gallese, *The Inner Sense of Action. Agency and Motor Representations*, in «Journal of Consciousness Studies» 7.10 (2000), pp. 23-40
- J. J. Gibson, *The Ecological Approach to Visual Perception*, Erlbaum, Hillsdale (NJ) 1986
- G. Graff, *Determinacy/Indeterminacy*, in *Critical Terms for Literary Study*, F. Lentricchia, T. McLaughlin (eds.), University of Chicago Press, Chicago 1995, pp. 163-175
- G. Lauer, *Spiegelneuronen. Über den Grund des Wohlgefallens an der Nachahmung*, in *Im Rücken der Kulturen*, K. Eibl, K. Mellman, R. Zymner (eds.), Mentis Verlag, Paderborn 2007, pp. 137-165
- R. A. Mar, K. Oatley, J. Hirsh, J. De la Paz, J. B. Peterson, *Bookworm versus Nerds: Exposure to Fiction versus Non-fiction, Divergent Associations with Personality, Ability, and Achievement*, in «Journal of Personality» 74 (2006), pp. 1047-1078
- K. Mellman, *Objects of Empathy. Characters (and other such things) as Psycho-poetic Effects*, in *Characters in Fictional Worlds*, J. Eder, F. Jannidis, R. Schneider (eds.), De Gruyter, Berlin-New York (forthcoming)
- W. Menninghaus, *Kunst als Beförderung des Lebens. Perspektiven transzendentaler und evolutionärer Ästhetik*, Carl Friedrich von Siemens Stiftung, München 2008
- R. Musil, *Gesammelte Werke in 8 Bänden*, Reinbek, Rowohlt 1978
- J. M. Rodd, M. H. Davis, I. S. Johnsrude, *The Neural Mechanisms of Speech Comprehension: fMRI Studies of Semantic Ambiguity*, in «Cerebral Cortex» 15 (2005), pp. 1261-1269
- Rosenfield, *Freud's Megalomania*, W.W. Norton & Company, New York-London 2000

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- M. Salgaro, *L'opera letteraria si realizza nella coscienza del lettore. Estetica della ricezione psicologia cognitiva e neuroscienze*, in *Verso una neuroestetica della letteratura*, M. Salgaro (ed.), Aracne, Roma 2009
  - M. J. Spivey, M. J. Tyler, D. C. Richardson, E. Young, *Eye Movements during Comprehension of Spoken Scene Descriptions*, *Proceedings of the twenty-second annual meeting of the cognitive science society*, Erlbaum, Hillsdale (NJ) 2000, pp. 487-492
  - J. Tooby, L. Cosmides, *Does Beauty build Adapted Minds? Towards an Evolutionary Theory of Aesthetics, Fiction and the Arts*, in «Substance. A review of the theory and literary criticism» 30.1-2 (2001), pp. 6-27
  - M. A. Umiltà, V. Gallese, L. Fogassi, L. Fadiga, C. Keysers, G. Rizzolati, *I Know What You Are Doing. A Neurophysiological Study*, in «Neuron» 31 (2001), pp. 155-165
  - S. Zeki, *The Neurology of Ambiguity*, in *The Artful mind, Cognitive science and the Riddle of Human Creativity*, M. Turner (ed.), Oxford University Press, Oxford 2006, pp. 243-275