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The Text as a Manual.
Some Reflections on the Concept of Language
from a Neuroaesthetic Perspective

I would like to summarize the debate so far: Kilian Koepsell and Carlos Spoerhase discuss the problem of knowledge transfer from one discipline to another and the legitimacy of knowledge transfer into literary studies in their position paper ›Cognitive Science and the Study of Literature. Some Thoughts on the Possibility of Transferring Knowledge‹. They admit that, in principle, cognitive processes play a central role, for example, in the reading process. However, the knowledge borrowed from the cognitive sciences should also be of use to literary theory, which means it should ›yield results that would not have been readily obtainable there without the transferred knowledge. In this case, the legitimacy of a knowledge transfer would depend on whether it leads to innovation in the receiving discipline‹ (Koepsell/Spoerhase, 372). They refer to Gerhard Lauer's essay ›Spiegelneuronen: Über den Grund des Wohlgefallens an der Nachahmung‹ [Mirror Neurons: Why We Like to Imitate] (2007). The essay attempts to show how the theory of mirror neuron systems can be fruitful for literary studies.

Koepsell and Spoerhase's first objection against Lauer's essay refers to the *explanatory achievements* of researching mirror neurons, their second objection to the *explanatory scope* of Lauer's suggestion to ground literary studies in the human sciences. Because mirror neurons fire when we perform an action, as well as when we see or hear an action, they are the foundation of all our comprehension and imitation processes. According to Lauer, literature also takes part in these processes because it is ›food for our imitation instinct‹ (›Nahrung für unseren Nachahmungsinstinkt‹) (Lauer 2007, 152).

Kilian Koepsell and Carlos Spoerhase correctly observe that it is not clear yet why the neurons fire. We cannot draw any conclusions about their causes or their mechanisms. Studies on mirror neurons could therefore not explain how empathy is conveyed in literary texts; at the most, they are *consistent* with theories of empathy or imitation, respectively. Koepsell and Spoerhase thus also dispute Lauer's provocative claim that a ›theory of interpretation [...] [has to] presuppose findings from developmental psychology, evolutionary psychology, and cognitive sci-

ences, if it wants to call itself scientific«. ¹ The discovery of mirror neurons therefore, according to Koepsell and Spoerhase, does not require a fundamental restructuring of the current framework of literary theory and does not explain at all the specifics of a literature potentially based on the imitation instinct. Koepsell and Spoerhase argue that Lauer neglects to legitimize the knowledge transfer from a literary studies perspective since »the knowledge transfer has no bearing on the normative question of how texts should be treated in the context of the study of literature as an institutionalized and methodologically informed discipline« (Koepsell/Spoerhase, 370). I very much appreciate Koepsell's and Spoerhase's reply and I share most of their doubts about the mirror neuron theories and their careful, balanced position in this discussion. It does not make sense to them to take a position for or against literary studies based on the cognitive sciences or the neurosciences at the moment. ² Rather, it would be necessary to examine in detail whether and in what form a knowledge transfer is useful. I also appreciate the tone of their response to Lauer, which is very objective and fair.

However, I do think that Koepsell and Spoerhase have overlooked some central passages in Lauer's essay. It seems to me that exactly these passages legitimize the knowledge transfer from the neurosciences into literary studies or at least suggest it. Incidentally, the insights and most recent research results in the area of mirror neurons that Lauer introduces would be sufficient to fulfill the criteria for usability that Koepsell and Spoerhase demand. Namely, they should »produce results suggesting that accepted accounts of the reception of literary texts based on poetics or rhetoric are misleading, or that the accepted terminological distinctions of literary theory are imprecise« (Koepsell/Spoerhase, 371). The transfer depends on the current state of research in the cognitive sciences and on philological research as well as the applicability of this knowledge.

¹ The German original reads as follows: »eine Theorie der Interpretation muss daher die Erkenntnis der Entwicklungspsychologie, Evolutionstheorie und Kognitionswissenschaften voraussetzen, will sie sich eine wissenschaftliche nennen« (2007, 157).

² Andrea Pinotti (2008) has recently made valuable suggestions for a fruitful dialogue between the neurosciences and aesthetics. Both knowledge areas, the field of *neurosciences* and the *humanities*, should refrain from reductionisms. The common ground for neuroaesthetic research would be to examine *aisthesis*, the (conditions for) the possibilities of our perception. In neuroaesthetics, the following issues need to be discussed: What happens when we make an aesthetic experience via an art object or a text? How does this experience differ from (aesthetic) experiences with other objects? On this common ground, we could bring together phenomenological descriptions of experiences with art objects with findings in the neurosciences. Both fields would profit from such collaboration. To enable this desirable dialogue, Pinotti argues, the neurosciences should not understand the art object as a simple product of the brain and, vice versa, aesthetics should not define the art object as a product of culture alone and thus guard it from any analysis.

1.

Language is certainly an unavoidable aspect of literature. Thus, it is surprising that Koepsell and Spoerhase have overlooked Lauer's comprehensive summary of the understanding of language from a neuroscientific perspective (Lauer 2007, 149–151), or at least did not deem it worthy of comment. I would like to quote from a passage relevant to my argumentation here:

The mirror neurons of the premotoric system that controls actions are in an area of the brain which partly overlaps with the Broca's area, a group of nerve cells that is also responsible for the production of language (Heiser et al. 2003). The Broca's area is considered to be homologous to the F5 areas of macaque monkeys. It is possible now to show very precisely in experiments how language triggers resonance phenomena in the neurally mirrored projections of actions similar to the performed actions. Even just talking about an action leads to a resonance of those nerve cells that would also fire if the same action was actually performed. Talked-about actions are thus spontaneously simulated in ourselves and in the process tested for their inner plausibility. That enables us to intuitively comprehend the utterances of others in mostly unconscious inferences and to create inner images from mere words. The system of mirror neurons in connection with language allows us to ascribe consciousness and physical awareness to others similar to our own.³

Since Lauer demands of literary studies that their hypotheses be exposed to an empirical examination (Lauer 2007, 158), it is significant to note that experimental findings in the meantime have shown what Lauer suggested speculatively: Mirror neurons are active in the reading process. A research team around Lisa Aziz-Zadeh has documented the neuronal activity of readers who read sentences that describe hand or mouth movements. In both cases, the activity of mirror neurons could be observed (Aziz-Zadeh et al. 2008). Discoveries in the neurosciences and neuro-linguistics force us to deviate from established reader models; the reader is now *embodied*. This new conception postulates that the neuronal structures which are active when performing an action also play a role in the semantic dimension of language. The *ACE* (*action sentence compatibility effect*), introduced by Glenberg and

³ »Die Spiegelneuronen des handlungssteuernden prämotorischen Systems liegen in einem Hirnareal, das sich teilweise mit den Nervenzellgruppen überlagert, die auch für die Produktion der Sprache zuständig sind, den Broca-Feldern (Heiser et al. 2003), das homolog zu den F5-Arealen der Makaken sein dürfte. Man kann inzwischen experimentell sehr genau zeigen, wie Sprache ähnliche Resonanzphänomene in den neural gespiegelten Handlungsvorstellungen auslöst, wie es auch die vorgemachten Handlungen tun. Auch das bloße Reden über eine Handlung führt zu einer Resonanz derjenigen Handlungsnervenzellen, die auch feuern würden, wenn die gleiche Handlung selbst vollzogen würde. Gesprochene Handlungen werden so in einer Art spontaner Simulation in uns selbst vollzogen und damit auf ihre innere Plausibilität geprüft. Das ermöglicht es uns, in zumeist unbewusst ablaufenden Inferenzen die Äußerungen anderer intuitiv zu verstehen und aus bloßen Worten innere Bilder zu machen. Das System der Spiegelneuronen in Verbindung mit der Sprache erlaubt es uns somit, dem anderen ein uns ähnliches Bewußtsein zuzuschreiben und ein uns ähnliches Körpergefühl.« (Lauer 2007, 149–150).

Kaschak, proves that an action described in a sentence may hinder or facilitate a subsequent real action (Glenberg/Kaschak 2002).

Additional experiments have shown that listening to words increases the excitability of the muscles of the tongue (Fadiga et al. 2002). Other studies have shown how the processing of linguistic input activates the neuronal structures that are responsible for hand movements (Flöel et al. 2003). For some neuroscientists, these results should be sufficient to determine the origin of language in gestures (Rizzolatti/Arbib 1998; Fadiga et al. 2006). Still other experiments have shown that the reception of words which describe actions of the arms, legs or the mouth activates the same neuronal zones that are involved during actions with the described body parts (Pulvermüller et al. 1999; 2000; 2002). The neurons of the premotoric system that controls actions are in an area of the brain that partly overlaps with the area that is also responsible for the production and processing of language.

As we have seen, mirror neurons are not only activated by observed but also read actions. This is not just true for actions, but also for ›abstract‹ or symbolic terms, states of mind, and emotions, whose importance has been stressed in current neuroscientific research. Accordingly, we are able to »grasp a thought« / »einen Gedanken erfassen« / »afferare un concetto« in English, in German, and in Italian, and may understand the phrase literally in all three languages. Gallese and Lakoff argue:

Thus, the sentence *He grasped the idea* should activate the sensory-motor grasping-related regions of the brain. Similarly, a metaphorical sentence like *They kicked him out of the class* should activate the sensory-motor kicking-related regions of the brain. A series of brain imaging experiments are currently being carried out to test this prediction. (Gallese/Lakoff 2005, 18)

This proves that the motor system is inseparable from the human cognitive system and that it also has effects on language. In *The Inner Sense of Action*, Vittorio Gallese explains that research in mirror neurons »show[s] the impossibility of drawing a sharp line between acting and perceiving« (Gallese 2000, 28). Gallese criticizes an abstract or symbolic understanding of our imagination because the presented actions preactivate our body's motor functions. In this case, the canonical neurons play an important role. In contrast to the mirror neurons, they are already active when someone touches an object or only sees it; no other monkey or human being who actually reaches for the object is necessary. These canonical neurons – unlike the mirror neurons – fire only with object types which require a particular kind of grip. Here, motor function and cognition are closely interlocked because it makes a difference for these neurons if one places a pencil between thumb and index finger or a heavy book in the whole hand. In each case, different cells are fired. The cells seem to represent a different motor program in each instance, which is why:

Object observation, even within a behavioral context not specifically requiring an active interaction on the side of the observer, determines the activation of the motor program that *would be* required when the observer is 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). (Gallese 2000, 31)

These studies demand a new understanding of the reader who comprehends linguistic expressions while reading by simulating the actions ascribed to them neurologically. In *Embodied Semantics* (Fuksas 2009) it is also stressed that we comprehend because of our ›motor vocabulary‹ (a term also used by Rizzolatti 2006). Lakoff and Gallese synthesize this new attitude towards language in seven items:

1. Language makes direct use of the same brain structures used in perception and action.
2. Language is not completely a human innovation.
3. There is no such thing as a ›language module‹.
4. Grammar resides in the neural connections between concepts and their expression via phonology. That is, grammar is constituted by the connections between conceptual schemas and phonological schemas. Hierarchical grammatical structure is conceptual structure. Linear grammatical structure is phonological.
5. The semantics of grammar is constituted by cogs-structuring circuits used in the sensory motor system.
6. Neither semantics nor grammar is modality-neutral.
7. Neither semantics nor grammar is symbolic, in the sense of the theory of formal systems, which consist of rules for manipulating disembodied meaningless symbols.

(Gallese/Lakoff 2005, 19)

2.

It is essential that we define more precisely where the knowledge called upon by Lauer and also by me here can be ›applied‹ in literary studies. It seems to me that Wolfgang Iser's reader response theory could serve as a starting point. I have shown elsewhere that Roman Ingarden's and Iser's reader response theories could engage in a fruitful dialogue with mirror neuron theories because of their common phenomenological background (Salgaro 2009). Upon closer inspection of their work, the neurologists from Parma who discovered the mirror neurons turn out to be well-read experts in phenomenology: Besides Husserl, they have, of course, a liking for Merleau-Ponty because his reflections circle primarily around the somatic dimension of phenomenology. If I quote Iser now, I do so with the same intention in mind as Iser who referred to Ingarden in *Der Akt des Lesens* (*The Act of Reading*): ›I remain [...] fully aware that it was Ingarden's elucidation of the concretization of literary works that first brought about the level of discussion which has enabled us to gain so many fresh insights – even if many of these run counter to his own ideas‹ (Iser 1976, 10). The aim of Iser's reader response theory is to study the effects of literary texts, the structures of which put in motion processes in the

reader and also control these processes to a certain degree. This aim can be summarized in three questions: »1. How are texts received? 2. What kind of structures direct the processing of texts in the reader? What functions do literary texts fulfill in their specific context?« (Iser 1976, IV). For this purpose, Iser introduces the concept of the implied reader who does not exist in reality »since he embodies the entirety of preorientations which a fictional text offers to its possible readers as conditions for a response« (Iser 1976, 60). The central interaction between structure and its receiver happens only in the actual reading process, which gets started by the »blank space« of the text. Continuing the phenomenological tradition, Iser understands the work of art as intentional object which does not have any autonomy and only becomes concrete through the reader. In *Der Akt des Lesens*, he explains that »what makes the text a work of art is that it constitutes itself in the consciousness of the reader« (Iser 1976, 39).

This is not the right place to give adequate credit to Iser's rich analysis of the effects of literary texts which has secured him an honorable position in the history of twentieth century literary theory. This essay intends to foster a dialogue. Iser claims the implied reader is »implicated in the structure of the text« (Iser 1976, 60). Although he denies the implied reader any existence in reality (ibid.), she seems more than just the realization of a literary work. When Iser brings into play the consciousness and imagination of the reader, he continually »overshoots« the frame of the text – exactly into the direction of the neurologists from Parma. These »failures« of Iser are, I think, unavoidable since any reading act requires the cognitive and emotional ability of the reader, which every reader response theory has to take into account and of which Iser is also aware (Iser 1972, 9).⁴ Against his own premises, Iser demands abilities from his implied reader which can only be anchored in the »empirical substratum« (Iser 1976, 60), which means in the physiology of the reader. And this is exactly the point where we can find a link to Lauer's essay:

Texts do not have a meaning by or in themselves, but only gain meaning in the interaction with our mirror neuronal facilities and therefore do not have a specific structure. The intended meaning is not a code which is in the text and would then be deciphered by us. We also understand literature only through mirror neuronal simulation inside us. Reader models based on inference theories are the most exact so far in describing this process (Origg/Sperber 2005), because, to them, text and cognitive reading go together [...]. Without the processes in our brain, the text has no meaning.⁵

⁴ Maybe that is the reason why Iser is concerned with theories of literature that focus on psychoanalytic effects. Their major flaw is that »they align aesthetic with everyday experiences. That also means that the particular character of fictional texts only serves to illustrate the functioning or non-functioning of our psychic dispositions« (Iser 1976, 69). It does not make much sense to continue the extensive debate on the implied reader here. But the implied reader is much closer to the empirical reader than Iser is willing to acknowledge.

⁵ »Texte haben danach keine Bedeutung an sich, sondern gewinnen sie im Zusammenspiel mit unserer spiegelneuronalen Ausstattung und haben deshalb auch eine spezifische Struktur. Die intendierte

Looking at Iser's description of the implied reader, we can conclude that Lauer's reflections are justified: In some passages, it does not seem that we are facing a virtual entity in which the literary text is realized (Iser 1976, 38), but are encouraged to envision a human being in flesh and blood. It appears as if there is a mirroring mechanism between the theorist of the Constance School of Reception Aesthetics and his implied reader. Often, Iser goes even as far as to attribute his own reactions to a text to the implied reader via »inner simulation.«⁶ As we know, that only happens because phenomena such as intersubjectivity and empathy are put in motion by the activity of the mirror neurons. Exactly these concepts, which are introduced by phenomenology and phenomena activated by the reading process, are confirmed in mirror neuron research (Esken 2006; Petit 1999). In light of our discussion, it gets even more interesting when Iser talks about the reader of *Pilgrim's Progress*: »He mirrored the moral struggles of the Puritan reader« (Iser 1972, 29). Also note what he says about the reader of *Joseph Andrews*: »He looks at the world through the eyes of the protagonist in the same way as he looks at the protagonist in empirical situations« (ibid., 74). Also on *Waverley*: »The protagonist is thereby understood to be the representative point of view for the reader. He creates the optics which determines how the events are considered. The events become real for the reader because his perspective coincides with that of the protagonist« (ibid., 156–57).⁷

3.

These examples may suffice to show that Iser's concept is concerned with describing empathy, identification, and sensitivity, which are typical phenomena of literary reading. The first question that comes to mind is whether Iser is in the position to make statements about the actual reactions of real readers after his claim to focus solely on the implied reader. Is Iser with his methodologies able to draw any conclusions about the reader or does he maybe refer only to textual structures? In classic reader response theory, the reader would then only be a ghost of the text. The second question is whether a hermeneutically founded reader response theory

Bedeutung ist kein Code, der im Text steht und dann wieder herausgelesen würde. Wir verstehen auch Literatur nur durch spiegelneuronale Simulation in uns. Diesen Vorgang beschreiben die inferenztheoretischen Lesemodelle bisher am genauesten (Origgi/Sperber 2005), weil sie Text und kognitives Lesen zusammen sehen. [...] Ohne die Vorgänge in unserem Kopf hat der Text keine Bedeutung.« (Lauer 2007, 157).

⁶ I would like to provide some examples here: »The attentive reader, however, will not be completely unprepared for the closing sentences« (Iser 1972, 254); »The reader is confused, and not just because a reflector figure in a novel produces different expectations than the result Stephen offers« (Iser 1972, 318).

⁷ Ingarden, Iser's theoretical ancestor, also observes the empathy between reader and text which can be expressed in »shared joy, shared admiration, shared hate«. The relationship between reader and reading matter also implies »sympathy« and »compassion« (Ingarden 1968, 211, 245–46).

can completely forego the real reader – and whether it wants to hand over the real reader to empirical research in reader response and its methods.⁸ I do not think so. This is why Gerhard Lauer's essay is so significant at this point. It is not relevant whether the mirror neurons are responsible for processes of empathy and imitation or only describe the state of current research. By combining Iser's and Lauer's approaches, *The Act of Reading* certainly becomes clearer, more precise, and still fulfills parameters of literary studies. There is no rift or opposition between Iser's phenomenological descriptions of reader response processes and Lauer's neurologically founded analysis of the reader. Several recently published essay collections on *neuropsychology* have pointed out the links between these knowledge areas (Petitot et al. 1999; Fonfara et al. 2006; Cappuccio 2006). Lauer works with conventional literary studies concepts such as imitation and identification and seeks to back these up with findings in the sciences. While Iser, on the one hand, studies textual structures that constitute the appeal structure of a text, Lauer, on the other hand, focuses his attention on the cognitive and emotional achievements, which these texts are expected to trigger in the reader. In addition, Lauer attempts to answer the question why we read at all and suggests an (evolutionary) answer in our imitation instinct. Thus, Lauer extends Iser's perspective and fills the blanks in Iser's theory. The model of integration suggested here gets even more urgent in the case of a poet like Durs Grünbein who bases his reader response theory on neurological findings (Grünbein 1996). Only by combining these approaches will literary studies be able to transform their abstract concept of the reader into an *embodied* reader (cf. Gallese/Lakoff 2005).

Yet, Koepsell and Spoerhase demand of this knowledge transfer that it exposes the deficiencies of literary theory. The transfer is supposed to show that poetological or rhetorical descriptions of the reception of literary texts up to now were misleading or that the conceptual differentiations, which literary theory has used so far, are imprecise. I think I have shown this already in part with the example of Iser, but we can also go further. In particular, I believe that these neurological findings suggest to us a new concept of text. Giacomo Rizzolatti and his team have shown, among others, a particular interest in Gibson's concept of *affordance* (Gibson

⁸ Koepsell and Spoerhase correctly draw the line between professional and non-professional reading, between *intelligere* and *interpretari*, between hermeneutics and empirical research in reader response. Nevertheless, we have to admit that a professional reader also resorts to her »lifeworldly understanding« to a certain degree, whenever that involves identification and empathy which are undoubtedly aesthetic categories. Moreover, every text presupposes knowledge in particular lifeworlds. Just because hermeneutics and empirical research in reader response have two separate methodologies, it does not mean that empirical knowledge can be fruitfully integrated in a hermeneutic approach. In addition, I have to say that the method of current research in reader response is not compatible with studies of the mirror neuron system. Empirical research in reader response gains its insights by analyzing questionnaires which ask for conscious knowledge. The system of mirror neurons in contrast reacts to *embodied simulation*, which is below the threshold of consciousness and partially pre-verbal.

1966; 1977). According to this, the human being does not perceive primarily the characteristics of objects such as color, size, or material, but the possibilities for action and interaction that every object may suggest. Every object therefore offers various *affordances* to humans. We cannot assume separate concepts of subject and object because an object always offers an *affordance* only for a particular subject. Mirror neurons detect possible actions in the environment. They constitute an appeal to action.

Recently, Anatole Fuksas (2009) has attempted to show what a literary theory based on the concept of *affordances* could look like. As we have seen, the act of reading and the hearing of words neuronally pre-activate motor reactions. Also, the readers are involved in events in which literary characters interact with their environment. From a perspective based on *affordance*, the environment does not just serve as a pale backdrop but as a space that offers possible actions. Thus, a literary text fulfills the same functions as reality by providing possible spheres of action to us. Fuksas also comes up with a key for the literary assessment of texts: The reader is going to assess the literary text by evaluating whether the actions of its characters are more or less compliant with their *affordances*. A successful text provides the balance between describing spaces of action and the personal motivation of its characters with which the reader identifies.

Imagination gains a completely new function in this context. The theory of *affordance* is confirmed by the discovery of the so-called »canonical neurons«: They scan the environment for possible interactions with the environment and prepare the organism for possible interactions. Thanks to this discovery, Koepsell and Spoerhase could be more precise now when it comes to describing the mechanisms of the imagination. They however settle for the following, very general description: »It was already known that people imagine actions, that is to say, that they are able to represent them in their brains in some way or another« (Koepsell/Spoerhase, 365). We need to understand the »some way or another« more precisely than before. The knowledge that comprehension processes – as has become evident by now – are always anchored in motor functions is a necessary step for better explaining »in some way or another«.

A recently published essay in *Science* (Vittorio Caggiano et al. 2009) shows that the reactions of the mirror neurons are also dependent on the distance from, or rather the potential scope for action of the involved organism. The experiments make plausible that the distance between the observing monkeys who participate in the experiment and the executed actions is also relevant for comprehending actions: Some mirror neurons fired when the action took place in the peripersonal space of the animal, another group was fired when the observed actions were outside of its reach in the extrapersonal space of the monkey. This means that the mirror neurons not only code what others do, but also whether one is able to influence the observed action. Moreover, they contribute to selecting a behavioral answer appropriate to the observed action. The mirror neuron system is therefore always en-

gaged in a possible interaction with the environment. This confirms that our organism is always already socially aligned to action. These progresses in research move the understanding of what it means to simulate a read action inside us considerably beyond the »in some way or another.«

We should not be misled by the image of the reader on the couch. This reader interacts with the environment and her fellow humans.⁹ In her hands, she is browsing through the manual for future or possible actions.¹⁰ Consequently, the literary studies scholar should also be mobile with regard to the achievements in other knowledge areas. As Koepsell and Spoerhase argue: »It will always be necessary to determine on a case-by-case basis whether, and in what form, knowledge transfers are sensible by considering the (constantly changing) state of research, the problem at stake, and the category (or categories) involved« (Koepsell/Spoerhase, 372) – and this is exactly what I have just attempted here in this essay.

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⁹ This has been proven empirically recently. R. A. Mar (Mar 2006) and others have shown that avid readers of fictional literature are more socially competent than readers of non-fiction. Thus, the commonplace idea that bookworms are isolated loners or outsiders needs to be revised. Other experiments have observed a direct relationship between social competences and the activity of mirror neurons in children (Pfeiffer 2008).

¹⁰ The idea of the active reader is based on the *philosophy of action* which distances itself from the older *philosophy of representation*. J.L. Petit had correctly predicted that movement would be a dominant topic in the neurosciences after it had been the stepchild of philosophy for a long time (Petit 1997, 1). The philosophy of action understands the human being as characterized by a profound sense of movement (Berthoz 1997). The philosophy of representation and the philosophy of action differ most of all in their distinction between subject and object, human being and environment. In the philosophy of action, the human being is intensely involved in his/her environment which s/he in a sense brings into existence through his/her own actions and thoughts, through which s/he constitutes him/herself, onto which s/he projects his/her own desires and goals and whom s/he co-experiences intersubjectively (Petit 1975, 5). The philosophy of representation, on the other hand, makes much stronger distinctions between the media of representation (the eye, the brain) and the objects of representation (the body, the environment, the things). The philosophy of action understands Husserl's and Merleau-Ponty's phenomenologies to be their ancestors since they understand the body to be »lived.« It attempts to establish a dialogue between these two phenomenological approaches and recent neurophysiological findings (Petit 1997, 18).

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