Thinking about the Content of Thoughts: Advance or Regression?

Pensando Sobre o Conteúdo de Pensamentos: Avanço ou Retrocesso?

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Abstract: In this paper I analyze recent neo-pragmatic views that have followed Wittgenstein's anti-representationalist perspective on meaning. One can find a bifurcation in recent literature on the question of how human understanding and communication actually take place in society. Some are convinced that natural science can explain all our communicative capacities. Others still believe that there is something special about meaning. On both sides we find representationalists and anti-representationalists. I present here the main features of this bifurcation so as to argue in favor of a neural-pragmatic semantic, that still has a Wittgensteinian flavor, but that incorporates lessons received from embodied cognition theories and from biosemantics.

Keywords: Meaning. Representationalism. Wittgensteinian pragmatism. Embodied cognition. Neural-pragmatism.

Resumo: *Neste artigo analiso visões neo-pragmáticas recentes que se seguiram à perspectiva anti-representacionalista de Wittgenstein sobre o significado. Pode-se encontrar uma bifurcação na literatura recente acerca da questão de como a compreensão e a comunicação humanas de fato acontecem em sociedade. Alguns estão convencidos de que a ciência natural pode explicar todas as nossas capacidades cognitivas. Outros ainda acreditam que há algo especial sobre o significado. Em ambos os lados encontramos representacionalistas e anti-representacionalistas. Apresento aqui as características principais dessa bifurcação, para argumentar em favor de uma semântica neuro-pragmática, que ainda tenha um sabor wittgensteiniano, porém que incorpore lições recebidas das teorias da cognição corporificada e da biosemântica.*

Palavras-chave: *Significado. Representacionalismo. Pragmatismo wittgensteiniano. Cognição corporificada. Neuro-pragmatismo.*

1. The Debate

Based on recent views about embodied cognition, and the analysis of possible criticisms of computational perspectives in the cognitive sciences, complemented

by classical approaches in the philosophy of language such as Wittgenstein's critique of an understanding of language as expression of thoughts, I will discuss the need for discourse about representations as something essential to a full understanding of communication—more specifically, to a full understanding of the meaning we assume to be present in communication and to be part of what we call representations. In order to reach a clear view of this debate and simultaneously seek a solution—even if it is only partial—I think we should ask to what extent Wittgenstein (*Philosophical Investigations*, [1953]) was right in his analysis of meaning. If meaning is a social phenomenon, and isn't something that can be captured exclusively by an investigation into humans minds, and if, at the same time, it is admitted that following rules is linked to some extent to mental states, then why should we disagree with a theory of communication that seeks to capture meaning partially through an investigation of mental activities? One has, at least, two choices in holding a Wittgensteinian view, viz. in claiming that meaning isn't strictly speaking mental but has a mental component: (a) Trying to understand the linguistic rules we use when communicating as something related to mental activities, but detached from biological determinations. In this case, one has to explain how a Wittgensteinian social interpretation of meaning leaves room for a rationalistic explanation of beliefs (see, for example, McDOWELL, 1994); or, (b) Overcoming Wittgenstein's logical behaviorism[1] and explaining meaning from a biological point of view, and seeing representations as an important part of our rule-following (see MILLIKAN, 1984; PRINZ, 2002). If one takes the latter option, one must say that Wittgenstein's behaviorism is limited in its capacity to explain meaning. This return to a classical discussion in philosophy of language should help us to reevaluate the disagreements between representationalists and theorists of embodied cognition who see empirical knowledge, communication, and action as not dependent on assuming an individual's possession of mental representations.

2. Logical Behaviorism

Although most of the time we assume that we can "read" other people's minds, what we actually do, according to Sellars (1997 [1956]), is to elaborate a kind of theory of other people's minds that also serves to explain our own mind. The Myth of the Given claimed that we have the power to access individually our own mental states and that they are mostly transparent to us. The main problem, as Wittgenstein and Sellars identify, is that in order to describe our own thoughts in an apparently veridical way, we need a conceptual vocabulary learned in a social practice. So what at first glance would be a simple question of accessing our own thoughts proves to be a complex mechanism closely related to how society teaches us to speak, or to use words and sentences in appropriate circumstances. Therefore, "our use of the terms *feel*, *perceive*, *think*, and *intend* is a result of a public practice, and this shows that we only know how to refer to our internal states once we have learnt how to use these terms publically" (STEIN, 2012b: 168). From this we can infer that:

1 I will presuppose that one can interpret Wittgenstein as adopting a sort of behaviorist point of view, although perhaps not in a strict sense.

> […] there is a certain *indeterminacy* in the references we make to our own mental states and to those of others. This is because the language we use to describe these states is, and possibly always will be, common psychological language (*Folk Psychology*), with no scientific foundation, and it does not identify mental or physicochemical objects that can be individualized. This is one of the main conclusions of the philosophy of mind, which takes into account the teachings of Wittgenstein. There is, therefore, a gap between common, natural, ordinary language and scientific language. This gap first manifests itself when we analyze ordinary discourse concerning mental content, mental states and mental processes. This discourse is rooted in socially acquired language with practical aims that do not require an exact reference to mental objects or to corporeal or cerebral processes. However, as part of our social practices, we are still able to successfully express our desires, thoughts, and intentions in this ordinary language, even though it is not exact. The gap between this way of describing the mind and more scientific descriptions is one of the greatest difficulties we face in current reflections on the human mind. (STEIN, 2012b: 168.)

In §435 of the *Philosophical Investigations* (1990 [1953]), we find an astonishing clarification of the illusory philosophical problem we can fall into if we aren't aware of the illusions common language can generate. Wittgenstein states that:

> —If it is asked: "How do sentences manage to represent?" —the answer might be: "Don't you know? You certainly see it, when you use them." For nothing is concealed.
>
> —How do sentences do it? —Don't you know? For nothing is hidden.
>
> —But given this answer: "But you know how sentences do it, for nothing is concealed" one would like to report "Yes, but it all goes by so quick, and I should like to see it as it were laid open to view."

And in what follows the above aphorism, Wittgenstein "enlightens" us:

> 436 Here it is easy to get into that dead-end in philosophy, where one believes that the difficulty of the task consists in our having to describe phenomena that are hard to get hold of, the present experience that slips quickly by, or something of the kind. Where we find ordinary language too crude, and it looks as if we were having to do, not with the phenomena of every-day, but with ones that "easily elude us, and, in their coming to be and passing away, produce those others as an average effect". (Augustine: *Manifestissima et usitatissima sunt, et eadem rusus nimis latent, et nova est inventio eorum.*)
>
> Augustine: Are the most usual and the most manifest, and falling back again too deeply hidden, and a new one is invented.

So Wittgenstein shows us the illusion we fall into through the very blessed ordinary language:

> 437 A wish seems already to know what will or would satisfy it; a proposition, a thought, what makes it true—even when that thing is not

> there at all! Whence this *determining* of what is not yet there? This despotic demand? ("The hardness of the logical must.")

Even so, no matter how remarkably Wittgenstein framed the true phenomenon that occurs when we try to capture a precise thought that we imagine should go with a sentence we can say we understood and that we can also say is true or false, this doesn't prevent us from searching for a method of capturing the precise nature and the content of our thoughts.

3. Theories of Embodied Cognition

A number of other important recent views have contributed to discussions concerning private language following Wittgenstein's later work and the pragmatic tradition of the philosophy of language. These views divert attention from language-use to evolutionary and behavioral variables that are part of social interaction. Among these variables are: (1) A shared "perceptual system" (see GIBSON, 1966), which predisposes humans to recognize significant features in the environment and to classify these features in similar ways (see QUINE, 1969); (2) innate predispositions for the use of grammatical structures (see CHOMSKY, 2000); (3) innate predispositions for "joint attention" (see TOMASELLO, 1999) that permit joint perception and joint actions (see STEIN, 2012: 169–170). The main idea shared by these new approaches on how human beings "acquire their minds" is that our minds are not, strictly speaking, individual. This is also one of the main ideas present in theories of embodied cognition like those sustained by Varela, Thompson, and Rosch (1991). We are, from their point of view, "embodied minds" in action. Their position is known as "enactivism" and emphasizes that minds are the result of constant bodily interaction with the environment.

Forty years after the *Philosophical Investigations* were published, Varela, Thompson and Rosch (VTR) criticized what they called, following Bernstein, "the Cartesian anxiety":

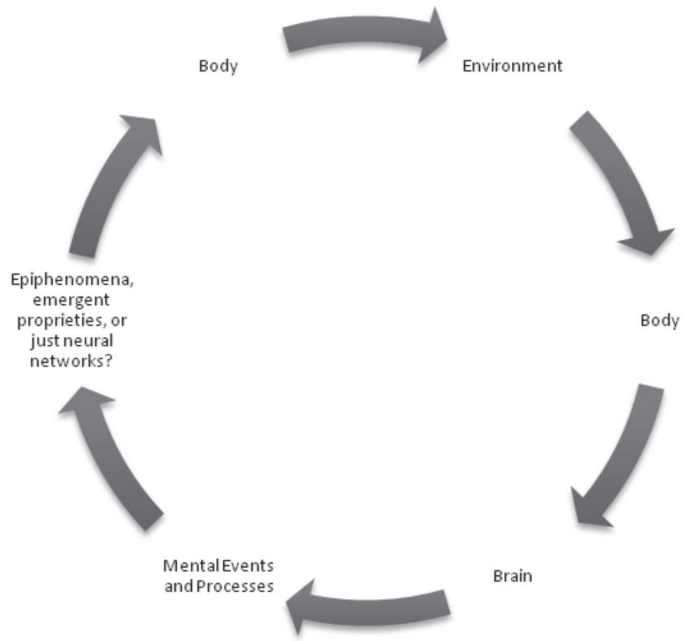
> This feeling of anxiety arises from the craving for an absolute ground. When this craving cannot be satisfied, the only other possibility seems to be nihilism or anarchy. The search for a ground can take many forms, but given the basic logic of representationalism, the tendency is to search either for an outer ground in the world or an inner ground in the mind. By treating mind and world as opposed subjective and objective poles, the Cartesian anxiety oscillates endlessly between the two in search of a ground. (1991: 141.)

VTR contrast the representationalist view, which sustains that: "(1) the world is pregiven; (2) our cognition is of this world—even if only to a partial extent; and (3) the way in which we cognize this pregiven world is to represent its features and then act on the basis of these representations" (1991: 135), with the enactive approach, which consists of two main theses: "(1) perception consists in perceptually guided action; and (2) cognitive structures emerge from recurrent sensorimotor patterns that enable action to be perceptually guided" (1991: 173).

3a. Humans as Dynamic Systems

Clark tries to reconcile the representational approach to cognition with the view held by Varela, Thompson, and Rosch (VTR, 1991), who claim that cognition is embodied action, embedded in biological and cultural contexts. The perceived world depends on biological and cultural forms shared by co-specifics, that is, it depends on evolutionary, historical, and cultural constraints. Despite agreeing with some fundamental theses sustained by VTR, Andy Clark (1997) claims that it isn't necessary to eliminate the concepts of computation and representation from research in embodied cognition.[2] If we know the functions of the brain and where exactly they take place, we can also identify representations as chemical-physical manifestations that participate in cognition and actions. Clark places emphasis on cases such as those involving reasoning in the absence or non-existence of states of affairs, as well as abstract reasoning processes that seem not to dispense with the assumption of some kind of representational system.

Against more radical views of embodied cognition, Clark believes that representation—if we still consider it relevant to investigate what it is—is an object of the expanded neurosciences, of interest to those that study the dynamics of the integrated brain-body-world system. An auto-organized dynamic system can be represented as follows:



2 Clark lists six characteristic elements of research on embodied cognition: a) Nontrivial causal spread; b) principle of ecological assembly; c) open channel perception; d) self-structuring information; e) perception as sensorimotor experience; f) dynamic-computational complementarity (see SHAPIRO, 2011; CLARK, 1997).

We need to think of human beings as part of an evolutionary drift. Thus we are able to explain how the brain works, not just how we behave: The brain functions and the way that they become manifest in some areas of the brain have their origin in how we execute the activities necessary for our survival, and these functions developed according to our evolution as organisms. We can, for example, explain from an evolutionary point of view why it is easier to grasp an object with the whole hand than it is to move one of our fingers independently.

3b. Mental Representations and Enactivism

Clark argues against radical embodied cognition, according to which computational and representational views of the human mind are wrong. Clark mentions in this context: Thelen e Smith (1994) (from developmental psychology); Brooks (1991) (from robotics); Maturana and Varela (1987) and VTR (1991) (philosophers and cognitive scientists); and Sjarda and Freedman (1987) (neuro-scientists) among others. Clark states that "minds can be essentially embodied and embedded [in the environment] and *still* depend crucially on brains that compute and represent" (1997: 143).

But if all of this is correct, are there mental representations after all? If so, how might we identify them? According to Clark (1997), there is a representation when there is a code that correlates internal states of the system to performance in specific tasks. In these cases, one can say that internal states "carry information". A population of neurons in the superior parietal cortex of a rat carries information about the direction (left, center, right) to which the head of the animal is directed. In evolution, at some point, there was a need to use internal codes to communicate information about certain environmental circumstances in their absence. So there was a need to represent the world, to engage in imagining and reflecting, and to use complex reasoning, even if it was a contra-factual one (CLARK, 1997: 147). "For example, if knowledge about an object's location is to be used for a multiplicity of different purposes, it may be most efficient to generate a single, action-independent inner map that can be accessed by multiple, more special-purpose routines" (1997: 152).

Theorists of dynamic systems, when disdaining the discourse on representations, withdraw the focus of the analysis from the inputs and outputs of the brain and focus instead on the dynamics of cognitive systems when the latter are engaged in actions such as speaking, sports, and dancing. So the anti-representationalists try to define the actions of a dynamic system as emerging from a search for balance, instead of being a result of representations. But Clark is confident that "we will learn to mark the information-processing adaptive role of inner states and processes in ways which do not blind us to the complexities of the interactive exchanges that undergird so much of our adaptive success" (1997: 175). For that purpose we must use several kinds of tools, because according to him: "[…] if the brain were so simple that a single approach could unlock its secrets, we would be so simple that we couldn't do the job!" (1997:175).

4. Mental Representations as Meaning

In order to speak about meaning, we must depart from a materialist naturalism, which sees humans as part of a biological species, a result of evolution, and a

component of the physical world. Our so-called mental capacities are the result of biological needs developed during our evolution. We are part of a material world, and matter is all there is—to start and to end with. Any phenomenon, even if it is not strictly speaking material, is the result of a material interface. Or we can start from a metaphysical rationalism that relies on language and on thought. But what does this mean? One can trust that the way we think and speak corresponds to what things are in the world. So it is possible to achieve a true account of the world through *a priori* inferences about concepts that we already understand and share in thought and language.

The second starting point depends on seeing thought and language either as something transcendental or as something proper to a human second nature (see McDOWELL, 1994). It presupposes that we aren't able to describe human nature in any trustworthy sense simply by describing biological imperatives. We also need to describe the influence of human tradition or culture, which are the result of our rational mental capacities. It isn't, McDowell claims, essential to our description of human second nature that we give the history of the evolution of culture, but it is essential that we show how human beings maintain the realm of reason, which is the realm of meaning. So, McDowell focuses on our rational abilities. Even if he agrees with embodied cognition theories such as Varela's, which also want to understand the cultural aspects of language and thought—that is, the external social aspects that influence our ways of thinking and of communicating—his way of understanding Wittgensteinian pragmatism allows him to speak about rational capacities independently of an explanation of physical interactions.

If we try to assimilate mental capacities to the first materialist perspective, we can say that, among the capacities developed by human beings, there are rational capacities; there are capacities to think and ratiocinate so as to solve problems created by interaction with external conditions. So a solution to the semantic problem about in what exactly meaning consists would be found in a sphere of life that is not immediately reducible to mere physical causal relations, but is still part of a material world.

4a. Biosemantics

One example of a materialist view in semantics is Millikan's biosemantics (1984; 1989). For Millikan, beliefs are internal intentional symbols with normal projection rules, and the conjunction of intentional symbols and projection rules gives beliefs their sense. The normal rules of projection, which establish a relation with conditions in the external world and assist biological functions, are necessary for individual survival.

For Millikan (2004), the most important factor in communication, or in the transmission of information, is the natural system's mechanism, besides producing an external representation in the form of a linguistic sign that corresponds to the world, to also ensure that the "consumer" internally represents this relationship with the world. It is important for a representation to state, for example, that "Phoebe is my cat", and in order for it to carry out its proper function, Phoebe must, in fact, be my cat. Therefore, Millikan concludes, an internal or external representation with a subject-predicate structure is the solution found by nature to adapt our cognitive

system to our survival needs, and to our need to transmit information, in order to share this information with whoever shares the same life goals (see STEIN, 2012a).

One of the main conclusions at which Millikan arrives with her biosemantic theory is that senses aren't "*in* the head" and aren't transparent to us as thinkers. Therefore it is essential for her semantic proposal to sustain biosemantics against meaning rationalism. As Millikan states in her paper "White Queen Psychology" (1993), "meaning rationalism divides into three entwined epistemological theses that deserve to be stated separately" (1993: 287):

> 1. The epistemic givenness of meaning identity and difference: "A rational person has the capacity to discern *a priori* whether or not any two of her thoughts comprehend the same term or proposition, the same meaning" (1993: 287).
>
> 2. The epistemic givenness of univocity. "A rational person has the capacity to discern *a priori* when she is entertaining a thought with double or ambiguous meaning (if ambiguous thoughts are possible at all)" (1993: 287).
>
> 3. The epistemic givenness of meaningfulness. "A rational person has the ability to discern *a priori* whether she is meaning a term or proposition or whether her thought is empty of meaning" (1993: 287).

Thus, there are senses, but these senses are the result of projection rules that establish a link between mental symbols and external objects and that have a history of succeeding in helping to adapt human organisms to the environmental conditions. The strong dependency of senses from a mental linking of symbols to objects characterizes Millikan's externalist theory of meaning. At the same time, representing means establishing this linking of symbols to objects, actual or remembered. Therefore, knowing the meaning of a sentence is the same as knowing the projection rules of the sentence to external objects. So there is no sense that can be grasped without knowing to which objects the symbols are linked by these rules. There is no sense that we could grasp *a priori* independently of the facts of the actual world.

4b. Non-reductive Naturalism

Biology and epistemology both search to explain normativity—this is what they have in common. Therefore, one points of agreement between McDowell and Millikan is that epistemology and semantics must be concerned with norms and not with laws. But McDowell (1999), in his response to Millikan's criticism of meaning rationalism, doesn't consider the mere fact of using biological norms that include different types of functional norms—which would include also rational capacities—as a satisfactory alternative to the first and second nature distinction.

McDowell's own proposal (1994) is to avoid the bald naturalism he attributes to Millikan, but also to avoid a rampant platonism in relation to meaning. Instead he wants to explain meaning as something natural, but not part of a world governed by physical laws or of a world governed by biological norms. Rather, it is part of a world regulated by the norms of reason, maintained by tradition and *Bildung*, which McDowell calls second nature. So Millikan's attempt to explain meaning through

natural history, biological evolution of cooperation patterns, conventions and purposes, and, more specifically, through proper function, projection functions—that presuppose a notion of correspondence—isn't, in principle, acceptable from McDowell's perspective.

It is very important to emphasize that the refutation of a strict naturalist approach to understanding meaning is related to the belief that meaning is irreducible to physical laws, that is, to scientific explanations. So no scientific explanation of meaning would achieve the goal of rendering McDowell's view of meaning compatible with a scientific semantic explanation, because any scientific explanation would have to explain meaning as subject to laws or natural norms, and, according to McDowell (1994), it is intrinsic to meaning that it is formed by an act of freedom, that is, that it isn't determined by a natural causal chain but by an act of spontaneity.

Because Millikan rejects the view that what we share when we communicate is meaning as propositions, which are uniquely identifiable, the main target of McDowell's criticism of Millikan's view is her denial of Fregean senses. Despite McDowell's Wittgensteinian commitment to a pragmatic view of language, which is also shared by Millikan, his reading of the later Wittgenstein doesn't follow interpretations of Wittgenstein that see him as refusing Fregean senses. In "Intentionality and Interiority in Wittgenstein" (1991), McDowell sustains a common-sense perspective of meaning that permits him to interpret the later Wittgenstein as not denying that meaning is something mental and internal to the subject that can be grasped and is identifiable (see STEIN, 2012c).

Besides this, we can see a similar idea behind the Fregean view of shared sense and Millikan's biological explanation of how we share representations—namely, the idea that there is a need to establish a common mental ground between speakers so as to have a positive theory of human communication. Both McDowell and Millikan still believe in the possibility of identifying senses, notwithstanding their disagreement about our power of knowing consciously the rational relations that exist between them. Obviously the identification isn't explained meta-semantically in the same way, since for McDowell identifying senses is something that a subject is able to do in the space of reasons, while for Millikan it is something less transparent to the subject, and she thinks that naturalized semantics can help to describe how it works. A second important aspect that brings both philosophers closer is their externalist view of meaning.

4c. Conceptual Empiricism

Another interesting way to maintain the notion of representation in a theory of the acquisition of knowledge about the world is put forward by Jesse Prinz, in his view of conceptual empiricism. Prinz's naturalized proxytype theory aims to unify classical philosophical concerns about the content of thoughts with a possible way of explaining through neuroscience the formation of representations. What holds these elements together is a form of empiricism that argues for an empirical origin of all representational concepts. All cognitive contents of our mental states that are called concepts have a perceptual origin. "Concepts are built from perceptual representations" (2002: 235). More precisely: concepts are amodal neural networks

of the long-term memory that can be activated by the working memory so as to perform the mental processes needed for actions. And "representations are construed by patterns of neural activation" (2002: 195). Prinz's empiricism shows its classical roots when he proposes a "theory of copy" that resembles Hume's: "Concepts are copies of experimental states" (2002: 235).

Our learning depends on the formation and retention of representations (concepts) that allow further practical uses—not just because of their causal link with objects and properties, but also because of their semantic complexity. As De Rosa describes:

> Prinz identifies (narrowly individuated) concepts with long-term memory networks of perceptual representations which get their intentional content through nomological relations with their causes. The novelty of proxytype theory, then, consists in combining the informational component of informational atomism (i.e., the view that concepts get their intentional content through a mind-world relation) with the view that concepts are semantically complex (i.e., the view that concepts have internal structure). (2005: 594).

Prinz believes that concepts represent real categories in the world. However, at the same time, the working memory, in order to track objects of the same category in the world, has to utilize, besides "real" cognitive content—which expresses the essential properties of objects—, "nominal" content about these objects, i.e., information about how these objects appear in perception. Thus, Prinz claims that, "children and adults recognize that the properties in virtue of which something belongs to a particular biological category do not always correlate with its appearances" (2002: 223). The nominal content of concepts is what helps us to re-identify different instances of objects belonging to the same category. And this nominal content is a perceptual content, i.e., a result of different instances of perception of objects of the same category, that is, instances of perception of these objects from different perspectives, under different kinds of lighting, etc.

Prinz oscillates between a form of descriptivism that results from his empiricism—a theory of perception, where concepts are perceptual representations—and a kind of causal theory of concepts complemented by a realistic point of view, which tries to save the direct relation between concepts and categories. As such, some critics, such as De Rosa, show dissatisfaction with Prinz's conceptual empiricism and with his definition of proxytypes:

> We must interpret him either as claiming that proxytypes determine reference, and so that concepts refer to appearances (with the unhappy result that he cannot retain his realism about natural kinds [as Gold]), or as claiming that proxytypes only track the causal relations between concepts and objects, with the result that his theory is not substantially different from informational semantics. (De ROSA, 2005: 605)

There seems to exist a disjunction between the task proxytypes must undertake—viz. the task of referring to objects through the complex representation of apparent

proprieties of objects belonging to the same category—and a strong realist perspective of categories.

5. Neural-pragmatism

In order to reconcile some important presuppositions of the pragmatic analytic tradition with recent debates in cognitive sciences about the status of representations, I wish to advocate the neural-pragmatic thesis that it is possible to explain *meaning* as a phenomenon that takes place when people *know how to act* when hearing a sentence, that is, as the phenomenon of *understanding what can be done* in a very broad sense. For example, if a physician understands what it means when a patient has an iron deficiency, he or she knows *how to act* in accordance with this information. Therefore, I suggest we view the phenomenon of language not from the perspective of what exactly human beings represent when they understand a sentence (i.e. what rules of projection they follow), but instead focus on what specific actions they grasp to be possible when they understand a sentence. This also conciliates anti-representationalist views of knowledge with our need to understand what is informed in communicative linguistic acts. If thinking about a content of an utterance is, in a broad sense, "understanding through utterances actual possibilities of actions", and understanding is "perceiving actual possibilities of actions (of body movements)", and no longer "grasping senses", then we can view utterances of expressions (symbols) that make us understand as those that make us understand the possibility of actual actions.

5a. Representations in a Neural-pragmatic View

As I see it, meaning is a social phenomenon that can be observed in open behavior—something that happens when individuals learn from each other what can be done. Therefore, when scientists speak about atoms or about subatomic particles, what they are doing isn't exactly "describing what it is to be an atom or where this atom is"; rather, they are telling other scientists how we can behave in relation to something that appears to them in perception in a similar way.

If they say that a certain atom is a carbon atom, for example, then they know what to expect when it collides against a wall. They don't need to have exactly the same Fregean understanding of what a carbon atom is, and they also don't need to represent a carbon atom in the same way. But they do need to know what to do in relation to a thing that is called a carbon atom.

My suggestion doesn't deny, in principle, a naturalistic perspective of meaning, and nor does it deny an anti-scientific perspective of meaning (a common sense perspective). But it does deny the need to presuppose a single identification of sentence meanings (either by a subject or from a third person perspective) in order to explain communication.

5b. Prospects

I agree with Millikan, McDowell, and Prinz that senses as contents of thoughts must be something: a) objective; b) publically identifiable; c) culturally learned; d) resulted from our practical need to act in society; and e) related to rules of a

linguistic practice. And I still consider a cause of controversy the claim that senses are f) equal to internal representations; g) something that we can identify in a third realm; h) correlatives of facts that they represent.

If it is accepted that senses aren't representations that correlate to objects or facts, and that,[3] because of this, they aren't uniquely identifiable internal mental processes or neural networks,[4] and that the main goal of communication is to express to others "how they can act", we must conclude that empirical investigations:

i) Can follow actions and brain activations during the learning of words, expressions, and sentences, and during communicative cooperative actions;

ii) Can help to identify similar events that occur in bodies and their brains during verbalization and cooperation, because we are biologically similar and acquire culturally similar habits;

iii) Don't identify senses, defined as propositions or representations, during observations of brain activities related to performances of different tasks.

And the third conclusion unfolds into the following:

iiia) It is improbable that we will find physiologically *identical* reactions to sentences and expressions among humans—and not even very similar reactions—, because of the different learning processes each person has been through in order to master the use of words in different contexts.

Carrying out a naturalized philosophy that looks to biology, primatology, paleontology, anthropology, neurosciences, psychology, etc. for support, we can expect to gradually achieve a deeper and more accurate comprehension of the mechanisms of knowledge acquisition and to be able to explain the process of forming thoughts. It seems plausible that we will gradually reach a satisfactory explanation not only of simple perceptual and representational acts, but also of more complex forms of cognition, such as those we use in performing scientific inquiry. Even mathematics can be conceived as a brain mechanism with an organic nature, if we see it as the result of physical interaction with the environment and of the need to solve problems involved in this interaction. Such naturalist research is still in its beginning stages, but its future looks promising.

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3 This claim isn't inconsistent with agreeing that perceptual representations and body representations exist.

4 This also excludes the view that "thinking" is in the main dependent on rational capacities. I am assuming that speaking, communicating, and thinking are processes that should be examined empirically. Senses are not apprehended by introspection or by rationalization, despite the fact that we are capable of reflecting consciously about many internal processes—which might still be explained empirically.

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Data de envio: 06-01-2014
Data de aprovação: 25-03-2014