TURNING MENTAL EXPRESSIONS' REFERENCE INTO NEURAL FLEXIBLE ACTIVATIONS (3WN)

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Abstract: In this paper, I intend to justify a positive approach to social neuroscience that takes into consideration restrictive philosophical arguments about our—common and scientific—use of mental concepts. I will start with a clarification of the philosophical point of view, which holds that it is impossible to identify others' mental states as neural states because the language we use to speak about others' mental states—and our own, too—is a public language. Second, I will show the gap between explanations of social linguistic communication of intentions and reasons for acting and neurological explanations of the human mind. Third, I will use M. D. Lieberman's (2007) Internal/External Reference dichotomy to question whether recent findings in the social neurosciences confirm that many folk psychological concepts refer to external social events rather than internal states. If this is the case, neuroscientific findings show that part of the psychological language use is fundamentally behavioristic, i.e., not about neural states, but about social actions (see Suzanne Oosterwijk et al., 2015). These actions obviously include bodily and neurological processes, but they are not defined by these. Therefore, if all this is true, neuroscientists are right to be confident that neuroscience can help us to investigate social interactions, but certainly not in a reductive manner—that is, not by reducing socially used concepts, such as the concept of "intending" to do something, to neural activities; instead, neuroscience can help to establish new and more precise classifications of social behaviors, that have, among their parts, scientifically identifiable flexible neural processes.

Keywords: Mental concepts; social neuroscience; brain processes; social actions.

1. Mental states descriptions as part of a public language

We are a result of evolution, physically and mentally. One of our main achievements is our complex structured language, our ability to communicate not only descriptions of what is happening, has happened or will happen, but also of our inner life, of our detailed plans for the future, of our hopes and fears. Language is part of our history, our natural-biological and our cultural history, as far as we can dissociate both. Natural and cultural histories are part of what we could call our "social life", whose maintenance was and is

the main goal of our actions and thoughts. So, we do not aim to preserve just our own life: for us it is crucial to preserve our life in relation to others. In some sense one could say that natural is to be social. The same holds with culture: it is a social result.

Therefore, language and communication must be seen as central when we try to understand humans. Language is one of the main connections between individuals exercising social actions. And, of course, it is a social action itself. It participates in other social actions; all of them infused with symbolic character. We have achieved through evolution a kind of social life that cannot be understood without the understanding of what it means to communicate. All our social actions are connected to goals, to intentions, to purposes, that are "expressed" trough these same actions. They can be explicitly communicated or just implicitly so.

We can also give reasons before or after performing actions. One of the core characteristics of these reasons must be connected to how our actions contribute to social life. It is obvious that "social life" is a very broad concept, but I am suggesting that it must be our central concept when explaining actions and "given reasons" to actions. One of the primary questions one should aim to answer would be: in what degree can our *behaviors* of given reasons to our actions be explained by means of a description of our natural behavior —and the physical and biochemical processes that are part of it—, understood as the behaviors for which causes can be determinate?[1]

Perhaps one could reconcile two divergent points of views: a. the point of view that explains behaviors, human representations or thoughts and actions as part of the natural world; b. the point of view that sees the realm of understanding and intending, to which "given reason" belongs, as having some degree of autonomy. Perhaps the link between these two points of views could be the admission that we *could*, in principle, say that the realm of understanding and intending is part of a natural chain, but that the symbolic and complex nature of these human abilities creates chains of thoughts, which, although linked to social actions and social approval, that is, to practical life and pragmatic determinations, are reluctant to be reduced to "material" (or

[1] To draw the conclusion that the naturalized discourse, i.e., a scientific discourse, has limits and that socially given reasons for actions (explaining or justifying actions) is not regulated by natural laws, one must demonstrate that humans' mental capacities permit them to decide about courses of actions and to justify them without being determined entirely by natural causes. If we could do that, we would be distinguishing between two worlds: the world of causes and the world of reasons (see McDowell, 1994; Davidson, 2001).

physical) explanations. In what sense does understanding others and intending (rationally) to do something[2] resist being reduced to natural laws?

According to Davidson (1985), the mutual understanding of linguistic meanings—or meanings resulting from other kind of actions—can happen only by the interpretation of facial expressions and of open actions. But, it's possible to know what others are thinking just when they express openly, through verbal actions, their beliefs—expressed by propositional attitudes such as "I believe that *p*"—, i.e., some of their inner conscious meaningful—referentially working—structured processes, that we suppose can be linguistically expressed. But these behavioral meaningful signs that allow the interpretations of beliefs do not need to be reduced to—or explained by—sensorial data or global stimuli.

Quine (1960; 1990) disagrees with Davidson. He thinks that it should be possible to explain the process of linguistic skills acquisition by explaining how the utterance of specific sentences is linked to nerve endings stimuli. Obviously, this explanation must contain a description of the social environment. We learn with others to react verbally to specific contexts. There is no private language, i.e., we can't learn alone to react verbally to specific contexts. And precisely because language is essentially social, there is a correct manner to react linguistically to specific contexts. Besides Quine's emphasis on the sociality of language use, he also insists that this use is related to impingements on nerve endings. So, Quine believes that there should be a neuroscientific explanation to complement the behavioral explanation of language learning so as to explain verbal behavior.

Therefore, even if we find many similarities between Quine's philosophy of language (1960; 1974; 1990) and Wittgenstein's (1990 [1953]), Quine's insistence on the necessity of a neuroscientific explanation to complement behavioral explanation of verbal performance, opposes Wittgenstein's belief that meaningful thoughts cannot be traced organically. According to Wittgenstein, using words and sentences in a proper manner means knowing which rules of use to follow. Even agreeing with regard to the social dependency of any kind of linguistic learning, Wittgenstein deems it unnecessary to discuss how speakers are physically affected by the environment so as to explain how they learn to manage and understand verbal expressions.

Quine worried about how to relate verbal expressions with nerve endings stimuli. But he couldn't answer the main problem: would an

[2] This understanding would be related to meanings that are expressed during *actions*, as meanings present in justifications of actions.

explanation of physiological and neurological internal processes that happen during verbal exchange help to make sense of what speakers are understanding or intending others to understand? Could the neuroscientific explanation of irradiation patterns or of global neural inputs, supplemented, today, by neurological images or records of neurologically evoked potentials, really help to elucidate mental processes, i.e., processes that are described by mental vocabulary, as the concept of "understanding" a content conveyed by a word or a sentence, or the concept of "intending" to act in a specific way because of certain reasons?[3]

Quine was criticized for his insistence on the idea that to explain not only bodily interaction but also verbal interaction there was a need to speak about firings of sensory nerve endings and patterns of sensory stimulation. Davidson, for example, claims that:

> A clever compromise brilliantly advocated by Quine is to tie meaning and content to the firings of sensory nerves. […] The dependence of meaning and belief on patterns of stimulation is one thing that makes Quine's epistemology naturalistic, and it is what places him in the empiricist tradition. It is also an idea which, for all its attraction, I think Quine should abandon (1990, p.68)

Davidson (1990, p. 73) questions whether a neuroscientific discourse about "proximal" neural stimuli could improve our understanding of what it means to think about represented external "distal" objects and events and what it means to think about how to react to these events. The ontological and semantical gap between the common-sense explanation of human thoughts and actions and the neuroscientific explanation of physiological and neurological processes seems, to him, insurmountable. The key reason for Davidson's skepticism concerning the relevance of neurological explanations of social handling and communication has to do with the possibility of multiple processes in different individuals during mutual social agreement. It is not just words and rules of use that are socially learned; thoughts and reasons for actions are also shared socially and are not related to definite neurological processes.

2. The gap between social communication of mental states and their neurological explanations

In recent writings of a naturalistic type, philosophers such as Eric Lormand (2006) have tried to explain, from a philosophical point of view—but based on scientific evidence—the nature of propositional attitudes, i.e., to

[3] Both expressible by propositional attitudes such as "I understand that *p*"—for example, "I understand that you want to travel"—or "I intend *p*"—for example, "I intend helping you with your experiment".

what extent they depend on empirical content (e.g. impressions), and to what extent they depend on a mental domain which is not necessarily linked to impressions. For us, in this paper, it is important to reflect if there is a need to presuppose some kind of correlation between propositional attitudes and internal states—describable by neuroscientific concepts. If the answer is positive, it would corroborate that a neuroscientific explanation of mental states could improve our understanding of social behavior. I will start by reflecting on Wittgenstein's affirmation that one need not establish any kind of internal correlation—to a subject of speech—between the expression of a propositional attitude and an internal state to the subject, in order for 'correct usage' of propositional attitudes to occur. This analysis may help to clarify to what extent explanations of verbal behavior depend on the supposition of correlations between phrases and stimuli, which is considered by Canfield (1996) to be a clearly positivist trait of, for example, Quine's position. This line of reasoning can help us to examine whether explanations of language-games—which are a part of social interactions and which are necessarily intersubjective and intentional—can be clarified in their nature and processes by neuroscientific findings.

According to John Canfield (1996), Quine and Wittgenstein, two major semanticists of the twentieth century, agree on three presuppositions: a) The affirmation that language is social, i.e., language rules are learned in social contexts; b) Informational contents conveyed by linguistic symbols are not linked to internal or external referentially determined contents, but are rules linked to public visible contexts and actions—language and thought are pragmatically guided, they are not containers of informational contents; c) Understanding what is happening in a particular context and knowing, from there on, to react properly to it, demands managing rules that permit proper reactions according to determined goals. Again: there is no need to presuppose determined informational content of symbols or thoughts in order for proper actions to be possible.

Thinking about social neuroscience and its role in the elucidation of social behavior, it is interesting to remember that logical empiricism, born in Vienna before migrating to the USA during the Second World War, had already tried to reflect on how to unify all scientific discourse, psychological, sociological, economical and physical discourse, among others. According to Canfield, what stands out in Quine's presentation of language-learning in children (1974) is its marked similarity to the neo-empiricist position:

> One is reminded here of those positivists who wanted to trace the epistemological and justificatory links between science and sense data. Sensory stimulations take the place of sense data, but the agenda is broadly the same, as

> is the hypothesis of the unity of science. There is to be one overarching system of laws, hypotheses and claims, the whole anchored in our perceptions, now in the sense of our sensory stimulations (1996, p.122).

For Canfield, the main problem with Quine's view of language-learning lies in the emphasis he gives to the role of stimulations during this process. Quine tries to show that people who receive a range of stimulations, observe situations from different angles, and can learn to use the same phrase in a similar way, can also agree about the use of this phrase. In his later writings, Quine endeavors to resolve this problem by appealing to the notion of empathy. Canfield refers to Quine's position concerning the role of stimuli in learning as "neural solipsism" (1996, p. 123).

In Quine's view, what does language 'use' mean? It means the establishment of correlations between sensory stimuli and meaningful utterances through the imitation of the behavior of other members of the same language community, and through the reinforcement or non-reinforcement of the use of these meaningful utterances in association with determined stimuli—conditioning. However, Canfield points out that Quine's view of language use is restricted to the use of utterances which can be confirmed or denied, and which may serve as a foundation for the sciences, for epistemology, and for the justification of beliefs.

As a result of his extremely limited notion of use—which is related to the establishment through conditioning of correlations between phrases and stimuli—, when Quine tries to explain scientific discourse in general, he must, according to Canfield, presuppose a correlation between basic utterances and 'states of external receivers', and also a correlation between "states of the brain and states of 'having thoughts' or 'having intentions'" (p.138). Quine's claim in *Pursuit of Truth* that "the subordinate statement [in an utterance describing a propositional attitude] intends to reflect the mental state of the subject, rather than a state of things" (1990, p. 68)—an example of this would be "I intend to climb the stairs"—leads Canfield to conclude that, for Quine, an utterance which expresses a propositional attitude must be related to 'internal states' of the subject in order to possess sense.[4]

[4] According to Canfield, the basic point in the differences, which can be established, between Wittgenstein (1990 [1953]) and Quine (1960, 1974) is the fact that Wittgenstein starts from the conception of language as action, as a multiplicity of 'language games': "For Wittgenstein, […] there are a number of distinct entrance ways to language, and not merely one, the conditioned simple affirmation. The different paths into language correspond to the distinctively different various activity patterns – the different protolanguage games – within which words come to be used, to function." (1996, p. 128). With Quine, we find the idea—which, according to Canfield, is a fantasy inherited from logical empiricism—that language is a network of inferentially interconnected utterances. With Wittgenstein, on the other hand, both colloquial and scientific language is divided into units, which operate in accordance with their own

For Wittgenstein, on the contrary, the affirmation of a propositional attitude is not the description of a determined internal state of the speaker—an internal entity, or an internal state of things—but rather an action, the transmission of a piece of information which indicates to other speakers what would be done by the speaker, for instance, in the case of confirmation of intentions—climbing the stairs, in the above example. For Wittgenstein, propositional attitudes are *Äusserungen*—manifestations or externalizations—which do not correlate with internal events, but which are part of the language games, which indicate to other speakers what the speaker will do, or what will happen. Manifestations may be affirmations initiated by "I want to", "I intend to", "I think", "I believe", "I'm afraid that", "I hope", and so on. According to Canfield, they substitute proto-languages, gestures, or just sounds, which indicate what the speaker is going to do, of how she/he will act in response to concrete situations. Therefore, the fundamental difference between Wittgenstein and Quine in relation to psychological utterances would be that, for Quine, propositional attitudes have a physical and neurological basis whereas, for Wittgenstein, any neurological correlation is a "grammatical fiction" (see Canfield 1996, p. 141).

As regards propositional attitudes, in *Philosophical Investigations* (1990 [1953]) Wittgenstein claims: "The grammar of the word 'know' is clear, and it is very similar to the grammar of 'can' and 'be able to'. But it is also very similar to the word 'understand' (to 'master' a technique). (§150)". Unlike those who claim that there is a correspondence between propositional attitudes and mental states—possibly reducible to neural states—, Wittgenstein affirms the impossibility of understanding the language—which includes propositional attitudes—as something that can be explained through reference to external or internal mental events.

There is an important example of Wittgenstein's argument against private language in his analysis of the verb "to think". This can also be applied, with the necessary modifications, to verbs like 'desire', 'believe', 'hope', and so on (see Zilhão 1993, p. 128). For Wittgenstein, the propositional attitude (for example, "I hope that *p*") is the externalization of a personal expectation, and not the result "of an internal communication" or "of an introspective observation" (Zilhão 1993, p. 128).[5] For Zilhão, Wittgenstein's claim that

distinctive criteria, with "aims, fashions and passions, and their own distinctive form of life" (Canfield 1996, p.135).

[5] As Wittgenstein (1990 [1953]) says in §243: "But would it also be possible to have a language in which someone could, for her own use, note or express her internal experiences (her feelings, her states of mind)? Can we not do this in everyday language? I do not think so. The words in this language refer to

propositional attitudes such as "I think that *p*" are externalizations, and not "statements of internal or external, mental or physical observations":

> […]obviously does not mean that Wittgenstein is contesting the occurrence of mental images in the conscience of the thinker, or certain physical and chemical phenomena in the brain of thinking beings, but only that he considers this kind of *causal* explanation to be totally irrelevant for the understanding of the meaning of the verb "to understand" in our language. (1993, p.127)

However, it does not follow from the existence of mental phenomena that it is the investigation of them which makes it possible to explain expressions of propositional attitudes, or of any other type of linguistic expression. To use Zilhão's words, for the later Wittgenstein "the consideration of a determined expression in human language which has or does not have meaning can never be dependent on empirical investigation" (1993, p. 133). Nevertheless, in order to understand what Zilhão is saying, we need to distinguish between empirical neurological and physiological investigation, and social and behavioral investigation, since it is quite obvious that Wittgenstein describes observable social practices—i.e., those which are empirically observable—in his investigation of semantic processes. As Ian Hacking says in an article on Wittgenstein's psychological philosophy: "Wittgenstein holds […] that shared practices, actions, reactions, and interactions among people provide the foothold upon which all such self-description of our mental life must rest" (2002, p.215). However, the psychological philosophy proposed by the later Wittgenstein:

> […] is not cognitive psychology, which seeks models of what goes on in the brain when we think, know, talk, perceive. Cognitive psychology nowadays most often means the study of how mental representations are connected with cognitive functions in the brain. Wittgenstein would have been quite hostile to this. 'I don't care whether this brain goes red or green when he thinks of that'. […] We are not to think of seeing and imaging as being different phenomena in themselves, but as verbs distinguished by the ways in which they 'relate to a host of important kinds of human behavior, to the phenomena of life'. (Hacking 2002, p. 221)

For Quine, empathy allows us to attribute a propositional attitude such as "perceives that" or "believes that".[6] It also allows us to suppose or

what only the speaker can know, to his immediate and private feelings. So another speaker would not be able to understand this language."

[6] In *Pursuit of Truth* (1990), Quine claims: "The construction 'perceives that p' was essential to the propagation of language (§24), and at that observational level it was well under the control of empirical evidence. By extrapolation, analogy, and further extrapolation, however, it has spawned a boundless, lawless swarm: the ascription of belief. Responsible ones grade off into the irresponsible, and one despairs of drawing a line." (p.67).

judge what goes on in the mind of a person, and to attribute a propositional attitude to it (Quine 1990, p. 68).

By presupposing the impossibility of establishing equivalence from a scientific and philosophical point of view between the expression of propositional attitudes and neurological events—despite his claim that perceptions are neurological realities—, Quine also admits the impossibility of determining the equivalence between mentalist discourse and clusters of physical and neurological events. He agrees with Davidson, when he sustains anomalous monism, that discourse regarding propositional attitudes is not reducible to a discourse about physical events, even without wishing to establish the existence of a mental substance that would have a different nature and characteristics of the bodily substance. However, for each propositional attitude, a correlated physical event is presupposed to exist, even if it remains indeterminate.[7]

3. Internal/External Reference dichotomy

In the last two decades, neuroscience has achieved a certain amount of empirical knowledge about semantic and epistemic reference of mental states and propositional states. In the case of mental expressions, such as "believing", "thinking", "representing" and "intending", and the propositional attitudes where they appear ("I believe that *p*" etc.), fMRI images and EEG measurements have detected differences in neural activation between contexts where these concepts were present and contexts where concepts related to physical objects—external referents—were present. Subjects react differently neurologically according to which kind of sentence they are reading: sentences containing expressions of mental states and processes, or sentences containing exclusively concepts that describe external states of affairs—relations between objects— or proprieties of objects. Furthermore, mental expressions, even if attributed to other mental states, could activate similar neural patterns to those when subjects are supposedly executing specific mental processes—for example, when subjects are "entertaining" thoughts about what to do in a particular situation.

The traditional philosophical distinction between internal or external reference is treated by Lieberman (2007) as a difference between internal or external *focus* that puts into action internal focused neural processes or external

[7] As regards intentional discourse, and in spite of his criticisms of it, Quine (1990) claims: "But there is no dismissing it. It implements vital communication and harbors indispensable lore about human activity and motivation, past and expected. Its irreducibility is all the more reason for treasuring it. We have no substitute." (p.71).

focused neural processes. Recently tests have been conducted to determine which brain areas are mainly activated when subjects are considering internal mental states or external physical states. The findings of these tests are contributing to a rethinking of social psychology.

Lieberman distinguishes, as has been common in recent neuroscience, between two ways of knowing the minds of others: either in a direct way or in a propositional indirect way, through a "theory of other minds". The Dorsomedial Pre-Frontal Cortex (DMPFC) was identified by developmental neuroscience as the brain region responsible for mentalizing, i.e., for considering the internal mental states of others in certain observed contexts of actions (Frith & Frith, 2003). Decrease in CMPFC activation occurs when the focus changes to "externally-focused processes that do not require consideration of a target's internal states" (Lieberman, 2007, p. 264). Several neuroscientific findings (Mason et al., 2004; den Ouden et al., 2005) are consistent with the "internal/external distinction observed in theory of mind research, as DMPFC was associated with encoding the psychological traits of a target (internal), whereas pSTS [Posterior Superior Temporal Sulcus] and the temporal poles were activated in response to descriptions of observable behavior (external)" (Lieberman, 2007, p. 264).

Oosterwijk et al. (2012, 2015) have investigated whether sentences that describe mental states (emotional or not), such as sentences containing expressions as "thinking", always prompt activation in the same regions of the brain. The question they wanted to answer was whether "activation of neural systems associated with action, interoception and introspection is flexibly modulated when people process descriptions of mental states that focus on internal or external aspects of experience" (Oosterwijk et al., 2015). I.e., they were interested in refuting the thesis that every sentence describing a mental state activated the same brain regions apart from the other concepts present in the description. As expected, their findings, using fMRI images when presenting internal and external emotion and nonemotion sentences, "indicate that different patterns of brain activation can represent the same mental state concepts depending on the focus provided by the surrounding linguistic context" (Oosterwijk et al., 2015, p. 301).[8] Which implies that "the brain represents other people's minds in a flexible fashion depending on the information available in the situational context" (p.305).

[8] ""Internal sentences described mental states with a focus on interoceptive sensations, feelings, and introspections (e.g., "her mouth went dry with fear," "he was lost in thought"). External sentences described mental states with a focus on actions and expressions (e.g., "his chest swelled with pride," "she shook her head in doubt")." (Oosterwijk et al., 2015, p. 296).

As explicitly stated, Oosterwijk (2011, 2015) based their questions and hypotheses on views about embodied simulation routines as interpreted by situated cognition approaches. Gallese, who has linked embodied cognition approaches to neuroscientific investigations of mirror neurons, emphasizes that the intersubjective space "relies on a specific functional mechanism, which is probably also a basic feature of how our brain/body system models its interactions with the world: embodied simulation" (2004, p.160). Embodied cognition approaches, even if they can help in investigating verbal communication (García & Ibáñez, 2014), hold that there is a bio-physiological common ground that enables human beings to understand others' mental states without conceptualizing about them. This common ground has as one of its main parts, according to Gallese (2004), the capacity of simulating not only the actions of others, but also the mental states of others in an immediate and automatic way, by unconscious and pre-reflexive simulation processes—embodied simulation—, without the intervention of rational and inferential thought. If there is such a ground mechanism that enables the understanding of others' actions and mental states without the occurrence of mental meta-representations of a propositional nature, as many neuroscientific experiments are confirming, then it is possible to accept that neuroscience can help to explain the role of mental states and of understanding mental states in intersubjective interactions without needing to presuppose explicit linguistic reference to them. This is a great step toward explaining the nature of intersubjective understanding of mental states without cognitivist and referentialist presuppositions of necessary conditions for a precise reference of mental expressions in meaningful propositions that express knowledge about mental states.

Final Remarks

Much of what social neuroscience knows about automatic empathy with others does not immediately eliminate our doubts about how we use mental expressions and how it is possible to use them without determined internal or external references. But when social neuroscientific findings show that there are flexible neural ways to simulate others' feelings, beliefs, intentions and thoughts, this at least means that these *folk psychological* concepts are as complex in their meanings as are the many situations in which they are used; it also means that they do not just refer to internal states, but also include external actions as part of what they mean, of what people take them to mean when they are used in utterances. Besides that, it is important to highlight that if there were an expectation to translate these expressions into specific activations of brain regions, tests have shown that—even if we really know

more about which brain regions are activated when we understand them in the context of certain sentences— neuroscientific findings display what is wrong with our common-sense—and philosophical—intuitions about mental expressions' references.

Even if neuroscientists are still seeking the right words to describe neurophysiological processes as part of social interactions (see Dunbar, 2013, p.9), this doesn't mean that these words will describe precise and inflexible processes. Social neurosciences cannot expect to find correlates between brain processes and social behavioral processes or social acts of communication. But, yes, it can expect to describe and explain brain processes that complement social actions, that participate in social life. There is a great difference between the two goals.

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