

Three Ways to Bridge the Gap between Perception and Action, and Language

Jean-Luc Petit

A rallying cry in some sectors of cognitive science, the embodiment of language is understood here in the full content of meaning of phenomenological tradition to help assess the remaining distance from neuroscience to a science of language, provided that tracking down in the brain neural events correlative of verbal behavior would not be sufficient. From an eidetic standpoint, one must build the transition between perceptive, pragmatic and semantic morphologies. From the point of view of subjective experience, one must understand how it is possible that we move from our sensory and kinaesthetic experiences to verbal expressions of a sense that could be shared by others. That is why, in order to prevent neglect of any dimension of embodiment of language, we would rather plead for a threefold approach than concede that the current naturalistic mode is the only possible.

Keywords: embodiment of language; kinaesthesia as operator of constitution; meaning morphologies and morphodynamics

1. The 'Embodiment of Language': A Spectrum of Possible Meanings

The expression 'embodiment of language' refers to a new trend of research on the neural basis of language. Apart from a convenient label to bring together different research teams, this expression suggests that there is a special relationship between language and the body. The philosophical observer may wonder whether he will find in it the traditional philosophical problem of the incarnation of mind. But, as it would be foolish to project interpretations of a philosopher on empirical science, we should first get familiar with the use of 'embodiment' by the researchers themselves. If we try to consider all the contributions to the investigation of the brain bases of language without omitting any of the protagonists in the ongoing controversy (cf. Dinstein *et al.* 2008; Hickok 2008; Lotto *et al.* 2008; Mahon & Caramazza 2008; Lingnau *et al.* 2009; Scott *et al.* 2009), we will find a spectrum of, at first sight not very homogeneous, uses: Are these different uses of the term 'embodiment' mutually compatible, and can they be reduced to one unequivocal sense? That is no mere pedantic tinkering aimed at the semantic correctness of scientific discourse. My suspicion is that the fashion



of embodiment makes us underestimate the difficulty of naturalizing the study of language. Rooting language in the body, without worrying too much on how to do it, are we not tempted to believe abolished the distance between our material nature and the logical ideality of meaning, between empirical data and the lived experience of meaning?

1.1. *From Modularity to Interaction*

After the provocative revival of Gall's Phrenology by Fodor (1983), it looked as though major cognitive functions, such as object or sentence recognition, could be fully carried out by specialized peripheral systems that operate independently of each other without exchanging information, so that the organism, in spite of its anatomic unity, is like a hydra at the cognitive point of view. The contribution of brain imaging in a study previously limited to the observation of deficits due to brain lesions made possible a new approach on the foundations of language. This new approach suggests that its functions are not underpinned by specialized modules but rather by an extensive network of distinct areas of the brain that sustain a permanent dialogue with each other (cf. Wise *et al.* 1991; Démonet *et al.* 1992; Bookheimer 2002). Such research tends assuredly to some form of embodiment: the recovery of the integrative unity of the organism on its fragmentation into multiple modules. Even more interestingly, the recognition of the interdependence between widely distributed brain regions at the basis of language opened the way for revolutionary assumptions about the direction of their mutual interactions during verbal behavior.

1.2. *The Motor System Not a Mere Output*

The classic model of the bases of language (cf. Lichtheim 1885, Geschwind 1965) strictly subordinates the production of speech sounds by articulators to the cognitive processing of linguistic information. This model limits the contribution of the motor system to the role of slavishly executing a motor program developed elsewhere in auditory areas and in the upper levels of the hierarchy of the cognitive system. This representation of the muscular production of speech rests on the traditional prejudice concerning the body as an instrument of thought. This prejudice is shaken by the discovery of retroactive influences, sometimes modulatory and sometimes formative, performed by the articulator system on auditory reception and semantic interpretation of phonemes and expressions (cf. Gentilucci *et al.* 2001, Fadiga *et al.* 2002). This rehabilitation of the cognitive function of movement in speech amounts to an embodiment of language.

1.3. *Binding Doesn't Need Abstract Supramodal Computation*

The synthesis of sensory qualities of perceived objects raises, at the level of the neuron or neuronal group, the problem of binding of unimodal signals of different pathways: visual, auditory, olfactory, vestibular, proprioceptive, and visceral in a supramodal concept of the object (cf. von der Malsburg 1995). This integration function is classically delegated to a central cognitive system hierarchically superior to the various sensory systems and exerting an influence on

their operation, especially through the orientation of attention (cf. Norman & Shallice 1980). This hypothesis of a purely conceptual, amodal thus disembodied, center is unlikely given the ubiquity of the mixture of influences of the various modalities that occurs at synaptic connections. The introduction of a transversal process of integration between modalities would allow us to dispense with this hypothesis, assuming that the motor system is able to preform perception through action (cf. Rizzolatti *et al.* 1994; Umiltà *et al.* 1994; Skipper *et al.* 2007).

1.4. *From Mentalese to 'the Language of Neurons'*

In the history of cognitive science Chomskyan idea of *competence*, with its strict distinction as to *performance* and its priority over the latter for the study of language has had a founding role (cf. Chomsky 1965). This distinction, and hierarchy resulting from it, tended to assimilate the core structure of the linguistic capability of man to a language of symbolic logic and its implementation to an application of syntactic rules to strings of symbols (a calculus). Once the language of thought has been internalized in this deep structure its realization in acts of communication could only appear as a contingent coating surface structure. The mind's *Mentalese*, following Fodor (1975), limited the contribution of neuroscience to the study of language to the realization of the logical structure of competence in a brain-machine indifferent to its program. A recent alternative to this ideology, the identification of linguistic information processing with neural dynamics itself and its laws of association is yet another form of embodiment of language (cf. Pulvermüller 2002).

1.5. *Broca's Area: An All-Purpose Processor of Complexity*

Whether converging or diverging, the various trends expressing themselves through the theme of embodiment are represented in the debate on the interpretation of the functions of Broca's area. Traditionally regarded as a center for motor realization of speech at the end of cognitive processing, the contribution of Broca's area was found to take place earlier and to be more complex, since it is recruited at all levels of verbal conduct: for perception as well as for production, for syntactic construction as well as for semantic interpretation (cf. Nishitani *et al.* 2005; Fadiga & Craighero 2006; Tettamanti & Weniger 2006). This redefinition of the linguistic functions of Broca's area coupled with a phylogenetic hypothesis put forward by Rizzolatti & Arbib (1998) about its origins in a monkey's premotor area site of mirror neurons crosses the issue of embodiment: Should we assign this key node in the brain circuits of language to the motor system? Or should we not rather focus on the emancipation of this area from its former utilitarian functions and the acquisition by it of a capacity to process any multimodal cognitive complexity, such as syntactic dependencies between items at non rigid positions whether in the word order or in any sequence, including arbitrary symbols, musical sounds and motor acts parts of a goal-oriented action (cf. Tettamanti *et al.* 2009; Fadiga *et al.* 2010)? The conflict of interpretations on the function of Broca's area shows that concerning the relationship between language and the body empirical research has not resulted in a generally accepted doctrine which may discharge of its responsibilities the philosophical reflection on

embodiment, a reflection to which it might be time to return for a much-needed guidance.

2. That Neuroscience Cannot Do Without a Phenomenology of Language

On ne comprendra jamais ces deux idées à la fois si l'on continue d'osciller entre la notion de «motricité» et celle «d'intelligence», et si l'on ne découvre pas une troisième notion qui permette de les intégrer, une fonction, la même à tous les niveaux, qui soit à l'œuvre aussi bien dans les préparations cachées de la parole que dans les phénomènes articulatoires, qui porte tout l'édifice du langage, et qui cependant se stabilise en processus relativement autonomes.¹
(Merleau-Ponty 1945: 228)

One will not fail to note in passing that the well-known promoter of the phenomenology of the body, far from being uniquely concerned with bodily experience, was fully aware of the importance of being clear about the implementation of functions and processes of language. Does recent work on the cerebral bases of language have surpassed this vacillation between motricity and representation? As everyone knows, such work is divided into two schools: Theory of Mind (cf. Premack & Woodruff 1978; Frith & Frith 1999) and Simulation (cf. Goldman 1989, 1992) or Embodiment (cf. Gallese & Goldman 1998; Gallese 2001), although some researchers are leaving the path of controversy for a search for complementarity (cf. Schippers *et al.* 2009, 2010). Is this a confirmation of Merleau-Ponty's diagnosis? His remark would shift from diagnosis to prognosis and even premonition: Should we go that far? The turn taken by empirical research barely helps to fix our ideas.

2.1. *Let's Not Replace Questions of Essence with Evolutionary Narratives*

The concern of biologists for the evolutionary origins of human capabilities may sometimes cause puzzlement to the philosopher. It may seem natural to think that the primary issue of any inquiry, philosophical, empirical, or otherwise, is the question "What is it?" a question concerning the essence of the thing itself and not its becoming, its origins, its cause, its effects, etc. The transition from a study of language to a study of its neural basis led to a replacement of "What is it?" by "Where did that come from?" even though the story answering the second question does not necessarily provide the definition expected in response to the first (cf. Rizzolatti & Arbib 1998; Corballis 2002, 2004, 2011; Fadiga & Craighero 2007). Moreover, blurring the differences can be detrimental to our understanding: If speaking, hearing and understanding are to be conceived henceforth as species of movement or imitation of movement, surely our concepts of movement and of speech will have to be altered. Will moving still mean moving one's body and will understanding someone still mean knowing what he means?

¹ 'We will never understand these two ideas at once if we continue to oscillate between the notions of "motricity" and of "intelligence", and if one does not discover a third concept that allows to integrate both of them, a function, the same at all levels, that is at work both in the hidden preparations of speech and in the articulator processes, which supports the whole structure of language, and yet stabilizes itself in relatively autonomous processes.'

2.2. *Piecemeal Solutions Conceal the Full Extent of the Dilemma*

The shortest way to account for the embodiment of language goes through observation of articulator gestures and hand gestures that accompany or replace speech, as in sign language: These gestures are what is seen in linguistic communication; their neural correlates are the natural candidates for rooting language in the body (cf. Goldin-Meadow 1999; Gallagher & Frith 2004; Corina & Knapp 2006; Montgomery *et al.* 2007; Holle *et al.* 2008; MacSweeney *et al.* 2008; Xu *et al.* 2009; Emmorey *et al.* 2010). If the embodiment of language in all its dimensions has little meaning, an obvious short circuit is to look first in the cartographic representations of the body in sensorimotor cortical areas as mapped by Penfield & Rasmussen (1950) for the potential correlates of the lexicon of action verbs or of action sentences (cf. Hauk *et al.* 2004; Buccino *et al.* 2005; Pulvermüller 2005; Aziz-Zadeh 2006; Pulvermüller & Fadiga 2010). From there, one will address the following problem: whether it is possible to extend what is true for gesture (or the motor repertory) to the entire verbal behavior in the hope that the generalization reveals the uninterrupted passage between phoneme production/perception and construction/interpretation of expressions or sentences. But if gesture is already language, basing language on gesture cannot do much to clarify the nature of language. If action verbs derive their meaning from actions they express, this is not the case in the rest of lexicon. Their metaphorical usage is a semantic innovation that might rather undermine than safeguard the link with action.

2.3. *The Challenge: Rooting Meaning Morphologies in the Body*

The possibility for human beings to express through linguistic expressions perceived forms of the visual field and goals or affordances of the practical field depends on an underlying mediation between the categories of perception and of action presumably to be performed in the last instance in brain circuits. The abstract principle of the semantic universality of natural language in the sense of Tarski (1936) presupposes such mediation without accounting for it: “If it is possible in general to talk of anything whatsoever in a sensible way, then it is also possible to talk of that thing in everyday language” (p. 170). One must understand step by step how it is possible that any configurations, whether objects of visual attention or goals of intended actions — configurations that emerge and stabilize in a silent experience — are promoted and safeguarded in terms of their expression in linguistic forms. To clarify the transition between the morphologies of different eidetic types (not just the linguistic type) that inform the conduct of agents-observers-speakers it is not sufficient to trace courses of events in brain circuits. The problem of embodiment is not settled at the level of neurons because it is both and inextricably eidetic and psychophysiological.

3. *The Phenomenological Tradition and its Deceptive Proxy*

Without lapsing into an outdated imperialism, a philosopher may be surprised by what appears to be a revival of the theme of incarnation in the literature on embodiment coupled with a misunderstanding, if not a systematic attribution

error, of the original sources of this theme. The fact is that the requirement of thinking together, and inter-relating, bodily experience with understanding the actions of others, action with the perception of the environment, imitation with intersubjective communication, dates back to the phenomenological movement in the early twentieth century (e.g., Lipps, Dilthey, Husserl, Scheler, Stein, Reinach, Heidegger, etc.). However, everything happens as if current neuroscience sought a basically inadequate substitute for this phenomenology in authors who hesitate between behaviorism and cognitivism, between mentalism and physicalism, between computation and simulation (e.g., Liberman, Gibson, Goldman, etc.).

3.1. *Liberman, Gibson, Goldman, et alii*

Instead of relying on a phenomenology, Liberman's (1985) conception of articulator gesture seeks to frame phenomena in two successive doctrines: (i) a behaviorist concern to assign phonetic units to a coarticulation resistant, recordable movement; (ii) an assignment of phonetic encoding and decoding to a peripheral system, conforming to the modularity of mind doctrine. Gibson's concept of affordance and ecological theory of perception (1977, 1979) resembles a phenomenological description of the morphological structures of *Umwelt* for a living being, but is marred by a physicalism for which the perceptual invariants are due to information actually residing in the optical flow. Recycling Goldman's simulation theory (1989, 1992) as functional interpretation of the brain system of mirror neurons linking observation and execution of actions does not provide the satisfactory alternative that Gallese & Goldman (1998) believe to the theory of the mind that subordinates recognition of others to an inference of the cognitive subject. That is because, insofar as the observer is supposed to have his own motor system objectified as a representation in mind and to use it for predicting the future behavior of an observed agent, this so-called simulation remains a solipsistic process that takes place entirely in the cognitive system of an isolated individual. I'm not specifically trying to prove the reality of these shortcomings because they only make sense and present any seriousness from the phenomenological perspective. Whether they follow the line of Liberman, Gibson, or Goldman, their disciples presumably can live without discomfort with the aspects we just emphasized of their favorite theories. The point is that none of these approaches, despite the attraction they may have for those who seek to embody the language in the body, is likely to meet the requirements of a phenomenology of embodiment of language, a phenomenology in the lack of which, I contend, one will remain stuck midway on the path to embodiment.

3.2. *Merleau-Ponty, the One Acceptable Phenomenologist*

Merleau-Ponty enjoys in cognitive science a favorable view that is denied to the philosopher from whom he borrows his ideas, namely Husserl, especially in his later texts on the body and intersubjectivity and the world (Husserl 2008, 1973a). This unfair attribution goes so far as to conceal the Husserlian origins of the themes of Merleau-Ponty's phenomenology of perception, despite the fact that he himself made no mystery of their provenance. To counterbalance this trend, it is noteworthy that Merleau-Ponty's assimilation of the own body (*Leib* in contra-

distinction to *Körper*) with the body schema of neurologists (cf. Head & Holmes 1911) is perhaps not the bridge one might think would lead to the functional somatotopic maps of current neuroscience. That is not so much because it would imply an oversight on his part of the distinction — absolutely essential in phenomenology — between the lived body and the body object of science, as any attempt at finding neurological — or neuropsychological — correlates of our bodily experience cannot but try again crossing the gap to its own risk. It is the very authenticity of the phenomenon that was the basis for his classic description of bodily experience which is at issue. In fact, although this has not received much attention and even if it is surely not enough to tarnish his reputation, Merleau-Ponty's uncritical adherence both to Goldstein's dogma of *Gestalt* and Goldstein and Gelb (1920) observations of a single case: Schneider, a probable simulator warns Goldenberg (2002), casts serious doubt on his description (cf. Petit 2010).

3.3. *Husserl, the Founder and Transcendental Scarecrow*

In science philosophers are considered producers of theories to be tested experimentally. But in Husserl the issue is not of theory but of a lived experience — even if it's a thought experiment — which requires a conversion of attitude in anyone who wants to follow suit. That's what is needed to understand a paradox of his phenomenology of language pointed out by Merleau-Ponty (1960): starting from an eidetic science of ideal essences of meaning as a priori norms for any language (*Logische Untersuchungen* IV, 1901/1913), Husserl came to the truly phenomenological point of view of later texts where: «*le langage apparaît comme le corps de la pensée pour le sujet parlant qui use de sa langue comme d'un moyen de communication avec une communauté vivante*»² (pp. 106–107). That is because we are invited by Husserl to take part in a thought experiment: that of the gradual lifting of intellectual obstacles enabling the scholar to go beyond the rigid dichotomies of a logical understanding to reach a harmonious integration of the two dimensions of language: ideality — incarnation in a single constitutive process.

3.4. *Body/Language Ambivalence of Expressions Reconsidered*

Whoever approaches language through logical ideality opposes linguistic expression and bodily expression, while an embodied conception of language allows for a founding continuity leading from one to another. The following passages might spot the starting point and end point of this development:

Zu betonen ist, dass auch die so genannten unwillkürlichen „Ausdrücke“ unserer Seelenlebens, wie Mienenspiel und Geste, zur ausgeschlossenen Sphäre gehören, obwohl die gewöhnliche Rede es bei ihnen wie bei den sprachlichen Ausdrücken zu sagen gestattet, dass ihre Bedeutung verstanden ist.³ (*Bedeutungslehre* 1908: Husserl 1987: 10)

² 'Language appears as the body of thought to the speaker who uses language as a means of communicating with a living community.'

³ 'It should be stressed that even the so-called involuntary "expressions" of our mental life, such as facial expression and gesture belong to the excluded sphere, although the ordinary speech permitted to say for them as for the linguistic expressions, that their meaning is understood.'

Für Sehende, für Hörende, Sprechende sind die Worte „Ausdrücke“, sind die Leiber Ausdrücke, die einen für Mitteilungen an andere Menschen, die anderen als Ausdrücke vom Dasein von Personen. Wortausdrücke setzt im Ausgedrückten Menschen als ausgedetete und nicht nur redende. Der erste und einfachste Ausdruck ist der des leiblichen Aussehens als Menschenleib, er setzt natürlich „Sehende“ und verstehende voraus”.⁴

(*Phänomenologie der Intersubjektivität* III, Blg. LVI, 9 Sept. 1935: Husserl 1973a: 665)

Husserl's overcoming of a prior Cartesian solipsism which posed communication as inessential to thought promoted body expression to the status of linguistic expression and his subsequent foundation of subjective experience in intersubjectivity involved the founding of expression in communication. That said, we must beware of too quickly identify intersubjectivity with empathy and, with the latter, the ability for an observer to resonate with the behavior of an agent observed, an ability based on the brain system of mirror neurons. *Einfühlung* for Husserl — following Th. Lipps (1903) — is indeed a natural mode of perceiving the body of the other as a direct expression of inner life, but let's not lose sight, Ricœur reminds us in *Soi-même comme un autre* (1990), that it is also an ethical imperative one should practice in expressing one's own inner life, and that in this respect it is not obvious to naturalize. The thought process of a philosopher through the stages of his work takes a path and this path has some continuity — including a logical one — the interpreter would like to recover. But the task ahead us is perhaps not the unlikely reconciliation in the context of a unifying theory of the positions assumed by Husserl in *Logische Untersuchungen*, where his concern with linguistic expression is dominant, with those of *Erfahrung und Urteil*, where the issue of embodiment becomes central. The well documented multi-layered character of Husserl's thinking might inspire us a way out of such predicament: Why not deploy the issue of embodiment on as many tracks as needed to defuse looming incompatibilities and why do we not engage in parallel on all these tracks at once?

4. Three Ways to Bridge the Gap between Perception and Action, and Language

4.1. *Kinaesthesia in the Constitution of Lebenswelt*

How is it possible that the chain of physical events do not unfold in me without me, but that *I have* a sensible experience? How is it that visual forms *have for me* the value of independent things in the world or that movements of this body carry *my (or the other's) intentions*? How is it that expressions heard or produced do not simply obey the rules of phonology, syntax and semantics of some language (or reflect its statistic regularities), but are *endowed with sense* for

⁴ 'For sighted people, for hearing people, for speaking people the words are "expressions" the bodies are expressions, the former for communicating with other people, the latter as expressions of the existence of persons. Verbal expressions suppose humans who express themselves as being spoken to, and not just speaking. The first and simplest expression is that of the physical appearance as a human body, it is naturally "seeing" and understanding in advance.'

communicating subjects? To answer these questions Husserl developed his theory of constitution. The principle is that any object of experience which appears to be provided with any value for a subject (including the value of being) must be understood *transcendentally*, i.e. based on subjective conditions of possibility qua deriving its value from the subject's own capability to make sense of it. The primary domain of this constitution includes the objects of perception and goals of practical actions of an individual subject, but it extends far beyond. The constitution of *Lebenswelt* is an intersubjective foundation of the ordinary life world of personal agents in a community, which perceive, act and communicate through speech drawing on their own resources and actively mobilizing their bodily capabilities of giving meaning. The experience of one's body and its extension through the intropathic experience of the other's body are operative in giving sense to objects through the progressive recruitment of the kinaesthetic systems of the body, from ocular to manual movements, and to locomotion. Neglect of Husserl's strong reliance on the kinaesthetic system in our dealing (*hantieren*) with anything whatsoever made of Merleau-Ponty's construing of man's being in the world as a kind of *hantieren* a slightly ghostly affair: «*Le corps hante le monde, etc.*».⁵ The recruitment of the powers of the body in the constitution of the world and its objects cannot fail to interest the neurosciences, at least their embodied cognition trend: How do they take up the challenge? For my part, I do not see the above considerations as a chapter in the history of philosophy. Husserl himself conceived constitution not as the expression of idiosyncratic opinions of an individual thinker, but rather as a permanent program of collaborative research: Might cognitive neuroscience represent the updated form of implementation of such program, thereby achieving a successful naturalization of phenomenology (provisionally assuming, although it goes against the grain for the community of phenomenologists, that such naturalization is possible and desirable)?

4.2. *Tracing Neural Events in Brain Circuits of the Speaker: A Unique Pathway to Bridge the Gap?*

For the first time in history of the knowledge of man we see on the basis of data of empirical research a possibility to trace the uninterrupted course of events inside the organism that goes from perception and action to communication through language. Not content with tracking correlative activity patterns in the temporal-frontal circuits of an isolated brain during speech perception (cf. Pulvermüller *et al.* 2003; Pulvermüller 2005), neuroimager reveals synchronizations of such patterns in the brains of communicating individuals (cf. Wilson 2007; Schippers 2009, 2010; Stephens 2010). However the narrative of brain events involved is far from answering all questions, despite the reductionist appeal of such chains of events for any naturalistic explanation of human linguistic behavior and capability. At that neuronal level 'the effort after meaning', in the words of Sir Frederick Bartlett (quoted by Barlow 1985), falls far short of giving a univocal ontological genesis. It remains a sequence of mere facts that keep the

⁵ 'The body is haunting the world.'

contingency of what is empirical despite their derivation from the history of phylogenetic evolution and ontogenetic development. As cognitive science, the work on the neural basis of language is not just to go back to pure physical events: the occurrence of a change of brain state. First, the events that they seek as sciences of nature are the regulatory ideas of a consensus expected at the end of an ongoing controversy in the community of neuroscientists: Should we say 'modulation' or 'induction' or simply 'spreading of activation' or even 'unselective cortical response to the task' (cf. Dinstein *et al.* 2008; Hickok 2008; Mahon & Caramazza 2008)? These are not perfectly objective entities that are only what they are and whose unambiguous description might be immune to 'the conflict of interpretations', but rather the likely signature of a behavioral task or the language capability this conduct denotes. The fact that correlative brain events cannot be taken in isolation from the verbal behavior in 'ecological' conditions captured by the experimental protocol restores priority to phenomenology of language. Speaking of communication *between brains* as if the dialogue *between speaking persons* were a tale for the public remains a misnomer.

4.3. *The Challenge of Part-Whole Semantic Dependency*

The electrophysiological discharge of a nerve cell is an individual event so riveted to the present modality of its occurrence, that it contains no reserve of being to be further determined. Nothing in common with the entity of meaning — a semantic category expressed by any *synkategorematic* expression, one which realizes its function by its completion with other expressions of which it contains (not in explicit form but only in the signifying intention of the speaker) the empty place, a place quite determined, nevertheless, since it specifies a priori the category of suitable complementary expressions in the sentence:

Synkategorematika werden als Träger inhaltlich bestimmter Bedeutungsmomente aufgefasst, die nach einer gewissen Ergänzung verlangen, und zwar einer Ergänzung, die, obschon der Materie nach unbestimmt, doch ihrer Form nach durch den gegebenen Inhalt mitbestimmt und somit gesetzlich umschrieben ist.⁶

(Logische Untersuchungen IV § 5 in Husserl 1901/1913: 306).

The generality of this morphological structure of *incompleteness-dependence* is especially supported by the lastly revived structural syntax of Tesnière (1965), that some view as a possible alternative to Chomskyan generative grammar theory: «*Les connexions entre les mots ne sont indiquées par rien. Mais il est indispensable qu'elles soient aperçues par l'esprit sans quoi la phrase ne serait pas intelligible*» (*Eléments* A, I, 4)⁷ (cf. Petitot, 1985, 1995, 2011, 36–37; Pulvermüller 2002: 139).

How is it possible that the brain frees itself from the transient and

⁶ 'Synkategorematika are to be construed as supports of meaning moments of content that require a certain supplement, and one supplement that, although underdetermined as regard the matter, is codetermined in form by the given content and is thus lawfully prescribed.'

⁷ 'Connections between words are specified by nothing. But it is essential that they are perceived by the mind without which the sentence is not intelligible.'

contingent flux of instantaneous events in its neural circuitry so as to be sensitive to dependencies which reflect the regulatory power of semantic categories, giving them life and support and impact over time? The question is no longer an absolute enigma posed by the phenomenology of language for empirical sciences, since the latter were split into a more observational neurophysiology (eventually supported by brain imagery) and a theoretical neuroscience working on hypothetical models along the lines of McCulloch & Pitts (1943), and Minsky & Papert (1969): One might consider that some naturalization of eidetics (not necessarily under that name) is in progress, in so far as the modeling (e.g., in Pulvermüller 2002: 124, 139, 214) of the detection of rule-governed relations of dependence between spatiotemporally non-adjacent elements of the verbal flow by neural networks implicitly naturalizes Husserl's theory of syntactic categories (despite its explicit anti-naturalism), as an a priori determination of the possible forms of meaning (*Logische Untersuchungen IV* in Husserl 1901/1913: 295).

4.4. *Eidetic Phenomenology and its Geometric Modelling*

Phenomenology claims to describe the verbal or perceptual semantic forms 'without prejudice', that is to say remaining at their own level of emergence which is that of lived experience, without making assumptions about the underlying causal mechanisms of basic brain substrate. His approach may perhaps be characterized as essentialist because it treats forms as transcendent entities objects of acts of consciousness. Anyway one cannot reproach it to be static and to freeze these forms in a Platonic heaven of Ideas, because these semantic forms of expression (words, phrases) are typically driven by *Ergänzungs-bedürftigkeit*: the need or requirement of completion which leads these forms to become parts of wholes (sentences, speech). Which brings back the semantic forms as expressed in discourse to the mereological standard of perception (*Logische Untersuchungen III* in Husserl 1901/1913 and also *Ding und Raum* in Husserl 1973b), suggesting a rule-governed transition from the muteness of perceptual (or practical) forms to the expressive forms of language. Along the same lines, a geometric morphodynamics (cf. Petitot 1985, 1992, 1999, 2011; Thom 1988) undertook in the last decades to model the morphogenetic dynamism with which semantic forms emerge from the physical substrate, by stabilizing them at the phenomenal plane and then transforming each into the other with a view to structuring the sense of experience of the speakers. More specifically, the process by which objects stand out in the visual field and the process by which prepositions apply to configurations of experience may both be represented or even reconstructed by equations of differential geometry. These equations were independently developed for the purposes of image analysis in computational vision, yet they can be interpreted, according to Petitot, as dynamic redeployment of Husserl's eidetic description of the constitution of visual objects through fusion (*Verschmelzung*) and separation (*Sonderung*) of sketches (*Abschattungen*) by gaze movements. Note that the high abstraction of such theoretical program does not prevent its promoter from claiming for it the label of Embodiment, which is consistent with his assumption of the phenomenological tradition: "The opening of the conceptual structure onto the phenomenal world is also an opening onto

the body. Mind is 'embodied' and semiolinguistic structures and universals are fundamentally constrained by the compatibility between language, perception and action. Hence the spectacular renewal of *phenomenological* problematics (those of the later Husserl and Merleau-Ponty)" (Petitot 2011: 17–18).

4.5. *Lebenswelt: The limit of Body Foundationalism*

But will the constitution of the speaking world of communication save all the way the corporeal rootedness of the perceived world in kinesthesia? That is a bet made by a neuroscience of language that would aspire to naturalize our phenomenological experience of meaning. The gamble is rather risky. If only because the extension carried out by *Einfühlung* of the circle of actions and intentions of the ego to actions and intentions of others is definitely limited to the current face to face interaction. It cannot but stumble on ordinary *social acts*: (1) accomplished through speech, (2) dependent on the reception by the addressee, (3) separating in time the utterance and the realization, and (4) building supratemporal and immaterial relationships. Illustrating his eidetic analysis of the social acts with a familiar example, Reinach (1913) convincingly showed that the socially basic act of promising something to someone, and keeping one's word, owes nothing to empathy. In addition to kinaesthesia and *Einfühlung* or empathy the constitution of the verbally articulate *Lebenswelt*, including idealities of the Law regulating social acts, requires the recognition of speech and on top of speech the whole 'formalism' of language as web of reciprocally constitutive (but not purely bodily) co-operations. Such transcendently ultimate constitutive power of language in relation to the world of institutional non physical realities we are dealing with in daily life no longer depends on kinaesthesia or *Einfühlung*: Hence the skepticism one may have towards the ambitions of a 'social neuroscience', such as planned by Gallese *et al.* (2004), looking for the basis of social cognition and eventually the roots of sociality in mirror neurons or in cortical maps of the brain.

5. Conclusion

Faced with issues unresolved by the mere narrative of events in a brain, that which is currently presented as a univocal ontological genesis of an embodied meaning will predictably break out in three directions: (i) *neurophysiologic* investigation of the organic substrate of the continuous linkage between perception and action, and language; (ii) *eidetic-geometric* morphodynamics as norm a priori backing the transformation of forms/schemes in syntactic or semantic structures; and (iii) *transcendental* constitution of the *Lebenswelt* of a community of perceiving-acting personal subjects who interact by words and gestures drawing on bodily capabilities and other operations of meaning-giving. Of these lines of approach only the first unquestionably ranks in the ideological framework of a naturalistic science, while the remaining lines cannot simply be fitted into traditional metaphysical dualism. Therefore we plead for an epistemology of language that is neither monistic nor dualistic, but rather trinitarian, as an alternative to the physicalism of current neuroscience (under its embodied disguise).

I might be objected that even a trinitarian approach should at least justify the mutual compatibility of the methods it proposes to be carried out in parallel. But the cause I am pleading here seems at first sight jeopardized by the irreconcilable character of the methods in question. "Monism, as one of my reviewers justly remarks, would presumably be the outcome of physical reductionism (of cognitive neuroscience), leading to the conclusion that a neurophysiologic account will eventually suffice." How did we come to introduce a triplication of approaches? There we came in playing the game of naturalizing the phenomenology of embodiment of language by means of cognitive neuroscience not by any ideological commitment in favor of physicalist naturalism, but to push to its limits this line of research in order to check the foreseeable incompleteness of its realization. The call for an eidetics of meaning on the one hand, for a transcendental constitution of the *Lebenswelt* on the other hand, is intended to meet the requirements arisen from the recognition of that deficiency. As a phenomenologist, I am not primarily concerned with the formal correctness of expression of a theory ideally cleaned up from any logical imperfections: capturing common intuitions is more important. About the embodiment of language, I do not defend a theory of my own: I am happy to accompany opportunistically certain research programs of which I have known in my narrow limits of scientific information. No excessive modesty in this, because I am convinced — with a few others — that the philosopher has no territory of its own to defend but is doomed to squat the territory of other disciplines. Such a situation does not allow one to ask these disciplines to put in coherence their respective approaches. The only mode of compatibility worthy to be envisaged is in the philosopher's *Erlebnis*: the lived experience of an unresolved tension between ultimately possibly incompatible approaches which nonetheless impose themselves as contingent context of the quest for truth.

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Jean-Luc Petit

Université de Strasbourg
Faculté de Philosophie
7, rue de l'Université
67000 Strasbourg
France

&

Collège de France
Laboratoire de Physiologie de la Perception et de l'Action
11, place Marcelin Berthelot
75005 Paris
France

jean-luc.petit@college-de-france.fr