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# Naturalizing Semantics? Beyond *Cognitive Neuro-Reductionism*: From Varela's *Systemic Cognitive Neuroscience* to *Complex Realism Sociology*

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## Abstract

Is it possible to naturalize semantics? Starting from Libet's 1983 studies, current research developments in neuronal bases of behavior reduce the mind to the brain, with significant implications in reference to issues of free will, imputability and individual behavioral responsibility. However, many criticisms can be made at this approach. This paper shows the limits of Cognitive Neuro-reductionism, especially in the light of Varela's *Systemic Cognitive Neuroscience* or *Neurophenomenology* and the current theoretical revision process of social systems as *complex—dynamical*, *emergent* and *unpredictable—social systems*, or *Complex Realism Sociology.* Here, there is an agreement point. The conception of living systems as *complex system* as well as that of social system as complex systems acknowledge the autonomy of human reflexivity capability and free will be able to initiate the chain of events that triggers the process of adaptation to environment and change and social emergence ones, and, in so doing, problematize a neuro-reductionist determinism of cognitive life and behavioral processes, with its dilemmatic consequences on individual social responsibility and, ultimately, on social order possibilities. This being stated, this paper reflects on dialogue possibilities between Varela's neuroscientific revolution and Complex Realism Sociology. Going beyond the Parsonsian functionalism's social homeostasis and maintaining the point firm of *social emergence* and relationship between reflexivity and social morphogenesis, *Complex Realism Sociology* can dialogue well with Varela's *Neurophenomenology*. *Lieb*'s disciplined analysis shows to be a fruitful ground for interlocution about the understanding of that Organism which cannot be liquidated but must be reinterpreted in its function, about the understanding of neuronal circuits that mediate free will and intersubjectivity, conscious de-

liberative intentionality and awareness of oneself and others, self-control, perception of time and risk, in other terms, about the understanding our ability to give meaning to the world, to adapt or change it, to know, remember, desire, empathize, socialize and interact. In Varela's revision, stripped of problematic reductionist claims, Neuroscience can provide to Sociology a wealth of observations that contribute to the understanding of the bodily basis of social interactions and social order. This paper is within Piaceri's research.

## Keywords

Cognitive Neuro-Reductionism, Free Will and Responsibility, Enactivism, Neurophenomenology, Complex Realism Sociology

## 1. Introduction: The Brain Does Not Explain Who We Are and How We Signify the World

Can awareness, conscious intention of the action be causally ineffective for the production of the action itself? Is it possible to biologize ethics? To reduce mental processes to brain processes? In other words, can the mind be reduced to the functioning of brain, to the sum of its organic parts or is it something more and different from this *sum*?

The image of man as a banal machine, according to von Fœrster's words (1960), as an empty box, a simple computational information processor (input) whose outputs can be predicted, is an image dear to behaviorism. This is an image that cognitivism and neuroscience developments have opposed to the philosophy of free will and Parsons' structural-functionalism. In fact, man's mechanistic representation biologizes action, removes it from the semantic scrutiny of an actor which builds meanings and produces choice, capable, albeit in the context of structural constraints (institutional and/or contingent), of pursuing goals and strategies that make sense of his action. An actor, therefore, is vivified of signs through a conscious operation of symbolization capable of opening up and giving way to those possibilities of novelty, emergency, and unpredictability which the process of meaning production and of choice construction brings with it. In fact, this process is that space of freedom never perfectly flattened on institutionalized constraints of meaning and, therefore, source of social change, of an interactional and communicative variety.

Starting from Libet's 1983 studies, current research developments in neuronal bases of behavior and cognitive activities due to new brain imaging techniques, involving the overcoming of Cartesian dualism in the direction of an increasingly pronounced physicalism, are having significant effects on the social sciences. In opposition to the Parsonsian model where the institutionalization of meaning *informs* organic processes and *forms* identity, action and interaction in relation, that is, *forms* social system, and in contrast to Luhmann where this process con-

stitutively opens up to emergence, Cognitivism and Neuroscience today challenge and overturn the model, challenge the Weberian concept of intentional action, endowed with meaning, and seem to resurrect in addition to the behaviorism's stimulus-response model of action also other, certainly not new, trends in the social sciences such as those that have sought in genetic, chemical and neurological processes the explanation of human and social evolution, from Eugenics to Wilson's Sociobiology. Furthermore, this shows unavoidable implications on the level of ethics and law.

The action as expression of voluntary decisions, as rational and conscious action, endowed with subjectively intentional sense in its relationships with reference objects and with intersubjectivity, subjected to definitions of the situation, to the evaluation of the choice reasons between possible alternatives and to self-control in understanding its consequences, accompanied by the subjective experience of being the producer of the action (*agency*), informs free will. Conscience or intentionality is its founding condition as well as, consequently, it is the founding condition of moral and juridical responsibility. In short, we are faced with a problem not only of purely theoretical interest, because it affects the practice of our individual and social life. On this point, the clarity of Arnason is commendable:

> Without free will, there can be neither moral responsibility nor legal culpability. […], punishment for breaking the law, […] blame for immoral behavior. […] In other words, a conceptual level, free will is a precondition for moral responsibility. If the view that free will is an illusion becomes widely accepted, it will have various implications for society. One of the implications is that the legal system would have to be drastically revised. Justice and desert cannot play any part in punishment [--]. Another implication is that people may behave less morally (Arnason, 2011: pp. 147-148).

Hooking up to this discourse, in modern criminal systems justice imply the distinction between *actus reus* and *mens rea*, the assumption that imputability and punishment require subjective responsibility for the actions committed, and therefore, free will, estimated precisely on the consideration of the possibility of 1) choosing between alternative courses of action, 2) acting according to one's will (autonomy, control of one's choices), and 3) acting rationally (evaluating the reasons underlining to choice, decision and action). Therefore, understanding, on the basis of these criteria, whether human action is free or not is one of the prerequisites for applying ethical and juridical judgment in relation to social order, just as the question of very existence of free will vs determinism has always been at the center of philosophical debate.

Incompatibilism between free will and the deterministic necessity of the living system and his actions, Compatibilism, and Libertarianism have animated a close and intense debate being far from resolving the problem on a metaphysical level. When the Neurosciences entered into the heart of the matter, they did so with a rich body of experiments on the role of awareness in causing the behavior

to which Libet's studies have given the opening: is human action caused by the conscious intention to act? Or more simply, does conscious experience follow an unconscious neural activity, which is the true origin of that action, and over which human beings only have limited immediate control? The findings seem to have shown that the conscious intention to act does not have a causal role in the decision-making process and in the production of action. The point in question is the registration of RP (*Readiness Potential*), a *neural firing* signal that indicates the start of the action even before the conscious awareness of deciding, even before maturing and signifying its purpose and reasons (Libet et al., 1983). Therefore, automatic cognitive processes that we are not aware of, control behavior. *Evidently*, Libet concluded, the brain decides to initiate action even before a person is aware of having taken the decision. Awareness intervenes in "things done" (Haggard, 2008). Free will, as a rational evaluation of the choices that initiates *causa sui* the causal chain of events and as conscious control of behavior, is a mere cognitive illusion, a mere *epiphenomenon* (on this point, see Gallagher's comment, Gallagher, 2006; also Vierkant et al., 2013), an *impression* towards which and for which we are "constructed" (Wegner, 2002; Aarts et al., 2004), a psychic appendage that evolution has created but which has no genuine causal function. Has the problem been solved then? Are we really facing a neurobiological solution to the problem of determinism? Can free will really be liquidated to the ranks of a mere illusion? The stakes, in a speculative as well as pragmatic sense, are high. Neurosciences could erase humanistic and sociological visions of a society based on autonomous, rational individuals, capable of self-control and responsible for their own actions, who generate their own identity and produce their own cognitive domain, offering in exchange, a merely mechanistic and reductionist vision of a society made up of "bodies", governed by neurons, and in this sense irrational, thusly, lacking free will and moral and legal responsibility (de Cunha & Relvas, 2017: p. 24).

In a theoretical and pragmatic sense, is the exchange convenient? The question is less rhetorical than it may seem on the surface: while on the one hand, we see its real threat to the foundations of humanism, social order and modern Western law, on the other hand, it is not hard to understand its possible manipulation by sectors of the social sciences interested in the application developments of Neuroscience, in that rampant neuromania—as Legrenzi and Umiltà (2009) would have called it—focused on the neural determinants of individual choice in the forms of neuroeconomics, neurofinance, neuroesthetics, neuropolitics, neuromarketing, which have always been driven by the goal of persuasive communication, and of neurolaw and even neurotheology. This article deals with this question. Here we want to re-unite the threads of the discourse and examine the real impact of neuroscientific discoveries on free will starting from the beginning, from Libet's experiments. There are, in fact, aspects of the Libet experimental approach, as well as of the most current research that fits into the same groove, which are not convincing and which have not convinced different parts of the academia.

In this regard, the critical reflections that have highlighted the question of the operationalization of the free will concept treated as a unitary concept, exclusively reduced to the beginning of the action, seem convincing. Consensus, as we shall see, has coagulated on the need for a more articulated operationalization of the concept of volition or voluntary-intentional action, as well as on the questioning of the RP predictive capacity accuracy with respect to the actual execution of the action, which is only slightly higher than chance, and of the logical extensibility of the findings acquired in reference to simple motor decisions, on elementary forms of behavior—not oriented toward a planned purpose and without consequences, such as those analyzed in Libet's experiments and in similar subsequent research—to strategic decisions, those more properly subjected to moral as well as juridical evaluation. Thus, although the findings that neural activity precedes the moment in which one consciously decides to act have proved robust, the interpretation of the meaning of the RP as evidence of the illusion of free will seems to remain doubtful (Roskies, 2012). It remains questionable whether the experiments of this line of neurocientific research are capable of undermining our understanding of social actors as intentional, rational, responsible agents.

So what do these experiments really tell us? What is their value?

The question makes all the more sense if we consider the theoretical framework proposed by Francisco Varela's *Neurophenomenology*, as an interdisciplinary approach to the study of the problem of consciousness capable of combining the empirical methodology of neuroscience with the first-person analysis of Phenomenology. Varelian *Enactivism*, or *embodied* and *situated* approach to cognition, is aimed at the study of the neural mechanisms of behavior, making emergence the keystone for understanding the relationship between body, mind and environment. This is a holistic rather than a reductionist view of cognitive life, centered upon the *human reflexivity capability* or intentional awareness *embodied* in the biological mind of an agent which is *situated* in an environment, and is *enactive*, engaged in *creative* processes of adaptation to environmental inputs experienced in a relationship of dynamic circularity between body-brain, world and experience. Not living systems similar to machines, therefore, but a cognition that is produced as a dynamic, creative outcome of the circular interaction between an environment and a biological mind, which is presented not as a passive processor of information but capable of self-organization and autopoiesis and co-participant in the generation of the meaning of adaptation of the action to the needs of a lived and experienced situation (Maturana and Varela, *Machines and living beings*, 1992; original edition 1972). The interaction between Phenomenology and Cognitive Neuroscience (Varela et al., 1991, *The embodied mind*) leads the questions about free will, moral and legal responsibility and, ultimately, about the possibility of social order on a path that is far from the disembodied vision of the cognition proper to Cartesian dualism that has flowed into a kind of spiritualist or socio-cultural reductionism as much as from that of

the neurobiological reductionism. Stripped of problematic reductionist claims and reinterpreted in the perspective of mediation relationships, and not one-way causal determination relationships, between neuronal activities and behavioral traits (economic, political, moral, and so on), the studies *à la* Libet on neural circuits at the base of cognition, experience and behavior, can be virtuously placed in this programmatic framework. This neurophenomenological rearrangement of the question on the theoretical level, that is, the acknowledgment of a relationship of dynamic, circular, interaction in which the organism forms and is formed by the environment, the biological mind structures the experience and is structured by the experience of what it puts in place, becomes also a fruitful ground for dialogue with Sociology, with particular reference to the current theoretical revision process of social systems as *complex—dynamical emergent* and *unpredictable—social systems*. On the one hand, there is an agreement point. Living systems and social systems are not machines but are historical, dynamic systems. Therefore, also current *Complex Realism Sociology*, by opening social systems to *emergence* and *creativity* and linking *structure* and *agency*, macro and micro, in a *co-determination* relationship, acknowledges the autonomy of human reflexivity capability and free will beyond any reductionism, be neuro-cognitive or cultural. On the other hand, maintaining the point firm of *social emergence* and relationship between reflexivity and social morphogenesis, through *Lieb*'s disciplined analysis Sociology can dialogue well with Varela's *Systemic Cognitive Neuroscience* about the understanding of that Organism which cannot be liquidated but must be reinterpreted in its function, about the understanding of neuronal circuits that mediate free will and intersubjectivity, conscious deliberative intentionality and awareness of oneself and others, self-control, perception of time and risk, in other terms, about the understanding our ability to give meaning to the world, to adapt or change it, to know, remember, desire, empathize, socialize, interact.

This being stated, first, this paper shows the limits of Cognitive Neuro-reductionsm. Especially, it shows how the conception of living systems and social systems as *complex system—dynamical, emergent and creative systems*—contributes to problematizing a neuro-reductionist determinism of cognitive life and behavioral processes, with its dilemmatic consequences on individual social responsibility and, ultimately, on social order possibilities. Secondly, it reflects on fruitful dialogue possibilities between Varela's neuroscientific revolution and Complex Realism Sociology, beyond reductionism, in Varela's revision, Neuroscience provides to Sociology a wealth of observations that contribute to the understanding of the bodily basis of social interactions and social order.

## 2. The Neuroscientific Challenge to Free Will and Responsibility: Simple…Too Simple

Starting from Libet's pioneering work, much of the neuroscientific research of the last few decades is confident in having demonstrated that, *surprisingly*, men

are not the authors of their actions. At the origin of actions considered free and voluntary, there are automatic neural processes that develop in the absence of intentional awareness. In other terms, the mind is reduced to the brain. Consequently, borrowing the words by which Rosch describes this perspective, if *the mind* (*and hence experience*) *is just the brain* (Rosch, 2016: p. XXXVI), if *the brain is inside the mind rather than vice versa* (*cit.*: p. XXXVII) so that the *brain is seen*, *dissected*, *experimented on*, *believed to be the cause of mental events* (*ibidem*), then

> the gold standard for studying anything human is to observe changes in the brain (Rosch, 2016: p. XXXVI),

in its electrical activity, so to *provide a window into the relation between thoughts*, *emotions and brain's activity*, a brain that, in the era of artificial intelligence and *personal technology*, *is assumed to work like a computer*, that is, *to be a machine that should be studied accordingly*, implying the *overriding of much self-awareness* (*ibidem*), which prompted Rosch to critically say that

> where once there were spaces in the day between events to digest information, reflect on occurrences, notice one's reaction, and be with one's thoughts and emotions, now there is only time to whip out the call phone (*ibidem*).

To dissipate confidence in the contribution of intentionality to decision-making processes and in the idea of free will, there is an unequivocal experimental result according to Libet, as well as, for the neuroscientists who have gathered his legacy by variously repeating his experiments by using more up-to-date instrumentation (neuroimaging techniques such as functional magnetic resonance imaging (fMRI) and an enhanced electroencephalogram (EEG)): the evidence of an accumulation of brain activity (RP) originating in an area of the brain involved in the preparation for movement (pre-SMA—supplementary or prefrontal motor area) and signaled out on electroencephalography by a wave signal which was observed 500 milliseconds before the moment in which the subjects participating in the experiment reported that they had consciously decided to act and that had initiated the execution of the action (specifically, moving of their right wrist). Awareness of the intention to act intervened at about 350 *ms* after the evidence of this potential, that is, according to Libet, after the brain signaled that it had "made" the decision to move. In short, the decision-making process begins unconsciously. We must surrender to the evidence of a brain that absorbs the mind into itself, which decides *before*, by itself, what we will do. Action predictability is taken for granted due to the substantial impossibility of acting differently from what we have actually *done* (Libet et al., 1983; Libet, 1985, 2009, 2011). Although with slight variations in executive tasks required of participants (arbitrarily moving, that is, moving when they wanted to, without the impulse of an external stimulus, the index finger of the right or left hand, or pressing a button), subsequent more recent studies, repeated several times over time, con-

firmed these findings with a good degree of reliability and came to the same conclusions, theoretically challenging, on an empirical basis, the dependence of action on subjective introspection and the validity of the experience of free will. The time difference between RP and the moment of conscious intention of the movement has continued, in fact, to be interpreted as a marker of an unconscious decision to act which, once initiated, leads to the action (see, for example, Haggard & Eimer, 1999; Wegner, 2003, 2004; Waszak et al., 2005; Shibasaki & Hallett, 2006; Gold & Shadlen, 2007; Wallis, 2007; Haggard, 2008, 2009, 2019; Soon et al., 2008; Banks & Isham, 2009; Haynes, 2011; Bode et al., 2011; Fried et al., 2011; Moore, 2011; Harris, 2012; Soon et al., 2013; Nahmias et al. 2014; Salvaris & Haggard, 2014; de Lafuente et al., 2015; Perez et al., 2015; Hallett, 2007, 2016; Wisniewski et al., 2016; Frith & Haggard, 2018).

Since here the question we want to deal with is that of the theoretical and empirical sustainability of the inferential interpretation of neural correlates of the decision-making process rather than going into detail of the quantity of experiments conducted, there are, in my opinion, three particularly valid data to highlight the problematic nature of this interpretation.

In the first place, interpreting the neural signal meaning by passing from the evidence of the RP to the inference that free will is then an illusion poses problems in reference to the relationship between theory and practice. It is the problem of the operationalization of free will—*deeply flawed* (Schlosser, 2015)—measured with reference to only one aspect of the notion of freedom, namely the conscious control of the initiation of action. Critical debate has insisted on the reductiveness of this theoretical choice, harbinger of logical simplifications and interpretative misunderstandings, with a broad reflection on the opportunity to separate the decision from the beginning of the action and on the logical decomposition of the concept of conscious action into several intervening components: 1) action initiation, 2) intention, 3) decision-making, 4) inhibition and control, and 5) phenomenology of agency (for more information, see Roskies, 2010).

Over the years, research has attempted to analyze the conscious action process with reference to all the aspects indicated above, however, without succeeding, all the same, to convince on the inferential rejection of free will from the results produced. In this regard, considerable progress has been made in identifying the neural circuits involved in the production of *agency* in its two phenomenological aspects—the awareness of an intention to act, the *before* of the action, and, the *post hoc* one, that is, being the author of the action—(respectively, the involvement of the parietal and premotor cortex (Fried et al., 1991; Desmurget & Sirigu, 2009) and the dependence of authorship on proprioceptive feedback (Moore & Haggard, 2008; Moore et al., 2009). The same applies to studies on self-control as the ability to inhibit inappropriate or deviant actions, which is fundamental for the attribution of guilt in criminal matters. Libet, inferring the illusion of free will, had tried to soften the terms of his inference by hypothesizing that the time delay between the RP and the action could be the place of implementation of a

process of inhibition of the unconsciously generated actions, thus shifting the spirit of free will from "freedom to act" to "freedom not to act". While Libet left the question at the level of pure hypothesis, more recent studies have begun to shed light on the neural mechanisms involved in the inhibition of self-generated actions, identifying the involvement of regions of the frontomedial and parietal cortex (Aron et al., 2007; Brass & Haggard, 2007; Brown et al., 2008; Badre, 2008; Bode & Haynes, 2009; Chiu & Yantis, 2009; Dosenbach et al., 2008; Praamstra et al., 2005; Rossi et al., 2009; Serences & Yantis, 2007). The incidence of the prefrontal dorsal cortex has been studied with reference to actions involving a purpose (intention) *before* the execution of the action (e.g., Jenkins et al., 2000; Lau et al., 2004a) and a choice decision between alternatives (decision-making process, e.g. Palmer et al., 2005; Lau, 2004b; Heekeren et al., 2006, 2008; Bode et al., 2014). In any case, however, doubt still remains that neuroscientific evidence can show free will not exist at all and decision-making is fundamentally unconscious and therefore not free (Arnason, 2011: p. 152). In what sense the ascertainment, for example, that the process of selecting between different choices or the experience of agency possess neural basis is sufficient data to deny free will (for example, see Hallett, 2007; Wegner, 2002)? Many have considered this conclusion a logical simplification that is difficult to sustain (see Roskies, 2010). In the case of inhibitory control, then, the identification in many cases of the same neural basis for decisions to act and those to refrain from acting "lends credence to the commonsensical notion that both actions and omissions are acts of the will for which we can be held responsible" (Roskies, 2010: p. 122). This brings us to the second critical point which can be extended to studies *à la* Libet taken as a whole. The problem arises, above all, from the type of actions subjected to experimental analysis.

There is an aspect that immediately raises doubts, once again suggesting the need for "conceptual refinement to avoid simplifications and unfounded claims" (Lavazza, 2016: p. 4; Lavazza & Inglese, 2015): the assumption underlying the aforementioned experiments of logical equalization between simple motor actions (*simple or low-level decisions*)—*arbitrary decisions and actions with no real implications* (Maoz et al., 2019: p. 4), often not stimulated by external inputs, and which do not involve reasoning on the consequences connected to alternatives of choice—and deliberative actions, that is, reasoned and intentional actions, which imply planning, a process of *high-level strategic decisions* and produce consequences (Arnason, 2011; Maoz et al., 2019). In other terms, what raises serious doubt is the possibility of generalizing to deliberative actions the interpretation of causal ineffectiveness of conscious intentionality reserved to the results obtained on simple motor actions. How can we logically equate the decision to move our wrist or our right hand—decisions without purpose, which do not require any reasoning and have no real consequences—to those decisions that are mainly made in real life, strategic decisions, which involve a reasoned choice between possible alternatives, planning oriented to a purpose, typically

harbingers of consequences and moral and legal responsibility: from the simple act of choosing an item from a restaurant menu, to where to go on vacation, to more demanding choices such as choosing a specific study course, deciding what stock to invest our capital in, or planning a criminal act? The logical difficulty, on a theoretical level, of this hypothesis, has found more than one empirical confirmation: the deliberative actions escape the dynamics found for motor actions where the highlighting of the RP precedes the awareness of the decision. In complex experimental situations designed by Maoz, for example, decisions involving the choice between different alternatives cancel the timing between the RP and the conscious experience of the decision (Maoz et al., 2019; Mudrik & Maoz, 2014; Maoz et al., 2015). From this point of view, the studies *à la* Libet have shown theoretical and empirical limits, unable to convincingly and definitively exclude the role of conscious reflection and free will in the decision-making process. They are not conclusive and, therefore, cannot question the moral responsibility dimension in the interactional behavior. As Lavazza suggests:

> The difficulty in repeating this type of study in real life situations and the forecast rate still very far from 100% leave ample margin to support that such experiments do not provide a definitive demonstration of the epiphenomenal character of our choices and decisions, i.e., of the fact that they are accomplished in an unconscious way, guided by cerebral processes to which we have no direct access. One of the key points is that many of our decisions can be "distributed" over time and it is difficult to pinpoint the proximal choice that precedes the action (Lavazza, 2019: p. 5).

Following this direction, we are at our third significant critical point: the low significance of the predictive capacity of the RP with respect to the acquisition of awareness of the action itself that was found in many of the studies on the subject (e.g. Soon et al., 2008). Roskies has no doubts on this point, in particular:

> Other studies that claim to predict decisions far in advance of our conscious deciding are sometimes mistakenly interpreted to show free will to be illusory. *Because prediction accuracy is only slightly greater than chance*, *they fail to show that decision precedes awareness*, *or that we cannot do otherwise than we do. The results merely suggest that the brain contains information relevant to*, *but not determinant of*, *future decisions* (*italics ours*, Roskies, 2012: epub., pp. 3-4).

What, then, does *Readiness Potential* mean? Recent studies have suggested a different interpretation from the standard one, highlighting its artificial nature, linked to the way the data are analyzed (Schurger et al., 2012; Schurger, 2018; Schurger et al., 2016; Maoz et al., 2019). If deciding means choosing, the RP isn't the signal of unconscious neural precursors to choice decision making process. It is nothing more than an *apparent* accumulation of brain activity that expresses the ebb and flow of neuronal *noise*, the spontaneous and tumultuous flicker of

hundreds of thousands of interconnected neurons rather than a brain decision to initiate movement (Schurger et al., 2016; Schurger et al., 2021). In this regard, considering the question of action initiation mechanisms and the timing of consciousness, Mele (2014) shows that the moment of decision is close to that of its conscious perception and, therefore, after that considered in the experiments of Libet and his epigones. For others, using a control sample instructed not to perform any movement, the RP would only mean the brain activation of an *attentional process* and not a specific sign of motor preparation that precedes decision awareness, not having found, as expected, a stronger electrophysiological signal prior to the decision to move rather than before the decision not to move (e.g. Trevena & Miller, 2010).

As stated above, the purpose here, rather than being exhaustive about the experimental system, is to establish a fundamental point. Contrary to what was expected and declared, studies *à la* Libet fail to undermine the notion of free will. The aforementioned reasons for caution show that the dismissal of free will, in favor of the activation of unconscious and automatic brain processes as direct causes of action, is *empirically* difficult to support, inducing us, from a *theoretical* point of view, to put aside problematic reductionist and mechanistic inferential claims and redefine the role of neuroscience within the framework of this neuro-biological anti-reductionism. Setting aside the claim that we can, with advances in technology, "see" our brain activity and, consequently, with this information, know what we will decide and do *before* we even become aware of the decisions we will make (see commentary by Nahmias & Thompson, 2014), the recovery of the relationship between brain and mind can benefit from clarifications on the neural circuits that activate and mediate strategic decisions, on the interactions between the mechanisms involved in the initiation of movement and those that mediate the experience of agency, intention formation, risk perception, self-control, and intersubjectivity. Beyond any reductionist claim, the potential of these clarifications can be seen. Shedding light on the neural correlates of decision allows you to "look inside" the Organism of the Parsonsian cybernetic action model, for a disciplined discourse on sociability and existence of social order, on individual moral and criminal responsibility

## 3. *Neurophenomenology* and Systemic Complexity

With Varela, the Neuroscience computational and reductionist orthodoxy change program. At the end of the 1980s, this cognitive revolution, as Varela calls it, directed Neuroscience towards *connectionism*, to a new approach centered on systemic complexity and on the founding concepts of *emergent self-organization* and *autopoiesis* (Varela et al., 1991). The implications of this shift from reductionism to emergence are particularly significant in terms of novelty. Questions change and inferences change:

> *there was a shift away from an emphasis on reductionism to an emphasis on the notions of emergence and self-organization. The question was how*

> *higher-level personal structures emerged from lower-level subpersonal, self-organizing processes.* This turn in the fortunes of cognitive science also motivated a new interest in *consciousness* […]. The current situation in the cognitive sciences is characterized by a growing interest in *the ecological-embodied-enactive approach* […]. This approach takes up the connectionist emphasis on dynamical mechanisms and self-organizing emergence, but it further insists that cognition is best characterized as belonging *to embodied, situated agents—agents who are in-the-world* (*italics ours*, Gallagher & Varela, 2003: p. 93).

This is, therefore, a holistic rather than a reductionist view of cognitive life, centered upon the intentional awareness *embodied* in the biological mind of an agent which is *situated* in an environment and is *enactive*, engaged in *creative* processes of adaptation to environmental inputs experienced in a relationship of dynamic *circularity* between body-brain, world and experience. In this meaning, cognition now qualifies as *embodied action* (Varela et al., 1991; *revised edition* 2016: p. 66). So, lived body, lived mind, and lived environment are all part of the same process (Rosch, 2016: p. XXXVIII), a process of mutual constitution or mutual creation (*Enactivism*:). Living body is *not* a *banal machine*, programmed and determined from outside to act and react automatically to environmental input so that at the same input there is always the same output, but a system that *autonomously* and *unpredictably self-organizes* (*operative closure* and *nonlinear*, *emergence process*), *continuously* reorganizes (*dynamic system*) and self-produces its own elements (*autopoiesis*) to survive and maintain its homeostasis, adapting to its environment and adapting the environment to one's own needs by giving meaning to external world with its constraints (including structural or socio-cultural constraints) and *deliberatively* acting in this world. *Deliberate actions* are purposeful, endowed with meaning, *reflexive actions*, expression of a signifying process, and, therefore, of mind, of cognition (*ibidem*). Thus, cognition and environment do not exist independently but mutually produce each other. This idea links *Enactivism* to *Phenomenology*, challenging reductionist Cognitive Science. For both the environment, what is given to the subject and what he experiences (including other cognitive agents), exists not in crude objectivity but in dependence on the manner of the coupling relationship with autonomous reflexive or mental activity (capacity for self-awareness and intersubjectivity) of the cognitive subject. And the environment is constitutive *for* and *of* cognition. On one hand, therefore, cognition emerges in the interaction between a living body and its environment (so, the mind is radically embodied), and, on the other hand, living body *enacts*, that is, *creates* environment, interacts with it and constitutes it through cognition, its mental activity of creation, production and attribution, of meaning. The concept of autopoiesis, introduced by Maturana and Varela (1972, 1980), refers to this organization of the living, which continuously produces its own constituent elements marking a boundary between itself and surrounding environment (*differentiating* from environment that also

includes other agents) and, at the same time, modifies the environment in relation to its vital needs. Organism and environment are in a relationship of structural coupling, in a *co-determination process* that takes place over time. This relationship of *structural coupling* in a *co-determination* process between Organism and Environment makes evident the opposition with the Behaviorism and computational paradigm of Cognitive Sciences. In the light of autopoiesis theoretical conception, the mind or consciousness is no more an *automatic* input-output, stimulus-response system, a mere system of formal manipulation of symbols representing external world, but an activity of elaboration and meaning-making between input and output that belongs to life, with a continuity relation between self-organizing features of mind and self-organizing features of biological life—operative closure, emergence, unpredictability, surprise, creativity, autopoiesis (i.e. Thompson, 2007).

These are the theoretical assumptions that motivate Varela for needing interdisciplinary studies on how living systems construct their world, far from the Cartesian ontological dualism implicit, on the one hand, in the claims of neuro-reductionism, which seeks to solve the problem of conscious awareness by eliminating the role of experience in favor of some form of neurobiological causal explanation, as well as in the claims of Husserl's phenomenological reductionism, with his rejection of naturalism, on the other hand. Now, the role of Cognitive Sciences and Phenomenology is redefined in a dialogic framework that integrates them (that is, integrates science and experience) a *disciplined approach* to human experience (Varela, 1996: p. 335), in a rigorous dialogue, capable of grasping the interactional interweavings between neural brain processes and experience, that *irreducible* nature of lived conscious experience from which phenomenological approach starts, "where we start from and where all must link back to, like a guiding thread" (Varela, 1996: p. 334) (wishing to clarify: those mental states with phenomenal qualities (*qualia*), such as the consciousness of time, useful for understanding schizophrenia and loss of agency sense) (Varela, 1996: p. 330). Here we can find the meaning of Varela's *Neurophenomenology* or *Enactivism*: going beyond eliminativist cognitivism by going beyond Husserl and vice versa. Cognition for Varela can therefore only be embodied, *structurally*, i.e. mediated by bodily, neural and environmental processes (including other cognitive agents), and *phenomenologically*, i.e. mediated by one's own experience as bodily subjects situated in the world (the *Leib* or subjectively lived body—the experience of oneself as a subject of voluntary movement, as a subject who perceives and acts, as a situated, affective or social, subject). The *hard problem*, that domain of consciousness that led Chalmers (1995) to declare its ontological autonomy and irreducibility that can only be faced with theoretical principles or *extra ingredients* aimed at bridging the gap between experience and cerebral mechanisms, finds in the Varelian project of *naturalization* of Phenomenology (see also Petitot et al., 1999, *Naturalizing Phenomenology*) the possibility of overcoming the Husserlian *spectrum* of subjectivity and maintaining the dis-

course on a scientific level by transferring to the "third person" personal experiences in the "first person". For its part, Phenomenology (be it the analysis of intentionality and consciousness of time or the experience of the perception of oneself and others) appears to Varela as directly relevant for a natural scientific understanding of cognition as consciousness or conscious experience (Varela et al., 1991; as in the debate between Changeux and Ricoeur (2000), cited by Varela himself (Gallagher & Varela, 2003), and in the Berthoz's import of Husserl's analysis of temporal consciousness for the explanation of the anticipatory aspects of motor control (Berthoz, 2000).

So, similarly to what Merleau-Ponty (1945) has done by integrating phenomenological analyzes with considerations drawn from the empirical sciences of Psychology and Neurology, Varela deals with issues of theory and method, trying to bridge the gap between Phenomenology and Cognitive Sciences: between rejection, on the one hand, of Neuroscience, too computational or too reductionistic to be seriously considered capable of explaining experience or consciousness—understandable rejection due to Husserl's anti-naturalism and Schütz's Transcendental Phenomenology—and, on the other hand, rejection of the phenomenological method, understood as a not disciplined psychological introspection (thus, for example, Dennett, 1991).

Open to a *circular co-determination relationship* between subject and object, between experiential mind and biological mind, in the new research program, the phenomenological explanation of the structure of experience and its counterpart in cognitive sciences are conceived as related to each other through mutual constraints: exploration of lived life and structure of human experience plays a central role in scientific explanation and scientific explanation illuminates mental experience, first-person experience guides empirical observation and cognitive science provides intuitions to the explanation of human experience through a methodologically well-founded examination of experiential invariants that converts a "naïve or unexamined experience into a reflexive or second-order one" (Varela, 1996: p. 336).

As was said at the start, this refocusing of the question of experience places the *hard problem* at the center of a crossroads where "phenomenology and the cognitive sciences can come together in a positive and productive exchange" (Gallagher & Varela, 2003: p. 93) underlies an epistemological presupposition that looks to *emergence*. What is at stake here is the functioning of systems. By conceptualizing the emergence of the macro from an intertwining of micro interactions, the more so the more systemic variety and numerousness is configured, the epistemology of complexity imports into systems—material, living and social systems—all the load of *unpredictability* and *surprise* connected to emergence. It is that *essential unpredictability* with which Prigogine defines the complexity (Prigogine & Stengers, 1979), the *creativity* of self-organization process as a response of adaptation to the inputs to which the system is subjected by virtue of its being situated in an equally complex environment, with the same variety and

numerousness of elements and factors that constitute and qualify it.

The implication of emergence novelty and autopoiesis of living systems for cognitive sciences is precisely that

> new *interest* in *consciousness*

which was stated by Varela in the extensive quote at the beginning of this section and to which it is worth returning. This interest is *new* in rejecting neuro-reductionism, on the one hand, and a naïve approach to experience, on the other. And it is *new* in overcoming the body-mind dualism by placing at the center of the empirical investigation the *Lieb*—the living body in experience, the integration between biological mind and world, brain events and human experience. With *Enactivism* men return to being *authors* of their actions and legitimacy is recovered for a sociological discourse on free will, on intersubjectivity, on cooperation, and on responsibility, to which the *complementary* and *mutually informative* relationship of phenomenology and modern cognitive science contributes by a *disciplined*, *mindful*, *open-ended approach* to human experience. Varela theorizes this contribution of the *embodied action* concept to social sciences as follows:

> we believe that this insight is important to the social sciences if they are to explain the egoistic behaviour of individual or of groups. Even more important, however, is what the mindful, open-ended approach to experience has to contribute to the transformation of that egoism (Varela et al., 1991; *revised edition*, 2016: p. 245)

## 4. Reflexivity and Society: *Emergence Sociology* and *Complex Realism vs* Reductionism, Be Cognitive and Cultural

*Deliberate actions* are *reflexive actions.* The conception of mind as the living's sense-making activity and *Lieb*'s disciplined analysis are a fruitful ground for dialogue between Sociology, with particular reference to the current theoretical revision process of social systems that goes beyond Parsons' functionalism and social homeostasis, and Neurophenomenology. Introducing here the first point of this dialogue possibility and reserving the second for the conclusions, an analysis of social systems as *complex systems*, which is open to social system's *emergence* and *creativity* (Luhmann, 1984, 1986, 1990; Luhmann & De Giorgi, 1992; Bailey, 1984, 1994; Sawyer, 2005; Byrne & Callaghan, 2014), and solves, therefore, the central problem of sociological theory of the *structure* and *agency* relationship as mutual creative influence relationship, cannot work without acknowledging the autonomy of human reflexivity capability and free will which initiates the chain of events that triggers the process of adaptation to environment or change and social emergence ones.

How to explain *creativity* in personal choices of adaptation to social context or change? How to understand *creativity* of society's morphostasis and morphogenesis processes?

There is a logical argument that allows us to support the link that binds reflexivity, free will and responsibility to the social system (see Bertelli & Neresini, 1988): the impossibility for the system to coincide perfectly with a state of maximum disorder or maximum order—with a type of interaction totally devoid of institutionalized references, on the one hand, or totally precoded by constraints, by institutionalized regulatory criteria (norms, values), on the other. In the first case, the set of interactions follows the law of chance and the necessary conditions for the very existence of the social system are missing (presence of a constraint, of a common and shared symbolic code that makes interaction and communication processes possible). In the second case, if every interaction is rigidly oriented by a normative framework, the system loses that capacity to produce meaning and communication that is source of variety, adaptation and change. In fact, the processes of interaction and communication never completely flatten themselves out on institutionalized constraints and this disorder guarantees the continuous reproduction and variety of the system without which these processes cease (Bertelli & Neresini, 1988: p. 54). It is, in other words, the complexity of social systems, which feeds on free will.

Current conceptualization of social systems such as complex systems links micro and macro in a *co-determination* relationship, that is, in a relationship where *structure* and *agency* influence each other in circular dynamics, beyond reductionism, be cognitive or cultural reductionism. Understanding *Social Emergence* means understanding the capacity of social systems to show a multiplicity of meaning and behaviour production possibilities in their morphogenetic process of self-organization. The need to reduce complexity commits them, as Luhmann theorises (Luhmann, 1984), to differentiate from environment, stabilizing in response to environmental perturbations, in a continuous, *unpredictable* and *surprising* process of organization (meaning stabilization) and disorganization, as an emergent result of intertwining of micro interactions, of the circularity and non-linearity of communication and interaction flows. Thus, social systems orient individual action but don't determine, do not strictly condition human action. This means acknowledging the role of human reflexivities such as mental activity that mediates in a *creative* manner between structure and action, by continually meaning giving to situation, interpreting and elaborating environmental inputs including action of others, weighing structural constraints and, consequently, *creatively* adapting to them or pushing beyond any horizon of desire, material or spiritual desire, and imagination, redefining interests and purposes, projects and idea, symbolic languages, value and norm constraints, and being, in so doing, source of structural morphogenesis, of emerging, unpredictable, dynamics of social change, of *new* institutionalization. Unilateral micro and macro perspectives have been set aside and solved in the social emergence such as *spontaneous and circular* or *bottom-up* and *up-down* process of causal determination between the parts and the and the whole, which recognizes the self-reflexivity and rationality of social actors without losing the emergent cha-

racter of social totality, being expressed by emergence of surprising, counter-intuitive, unintended, unexpected and unpredictable patterns of social expectations, which are beyond the intentions of each agent and cannot be explained by reducing them to the properties of individual interactions, considered one by one, in an isolated manner. This re-structuring of micro e macro relationship in inter-relational terms, where the macro *emerges* from non-linear micro local interactions (*upward causality*) and, in turn, *new emergen*t order connects the parts in a new whole which constrains and re-orients social actions (*downward causality process*), until new perturbation pushes system toward new evolutive trajectories, new self-organization and change process, rejects definitively the Parsonsian property of equilibrium as homeostasis, that is, a system's tendency toward stability, self-maintenance of order if disturbed, in favour of an emergent self-organization process analysis of social systems *at the edge of chaos* (e.g. assessment of Parson's functionalism, Bailey, 1984). Human organization is now a *non-banal-machine*[1], an entity capable of creating ever new order and re-creating itself. And reflexivity is the device that links micro and macro.

There is, therefore, an arrival point. In the current theoretical revision process of social systems, the answer to the question that has interested all of modern social theory—whether it is society that makes individual or it is individual that makes society, the problem of the relationship between structure and person's free action—finds solution in the theorization of the relationship between reflexivity and society, reflexivity and social morphogenesis, able to build a *synthesis* between different paradigms such as Critical Realism, Postmodernism and New System Theory.

On the one hand, the autonomous role of human reflexivity capability, such as mental activity by which we choose our action paths by mediating, through the meaning, between our goals and social context, is the subject of extensive reflection in the Archer's realist social theory. There is no society without reflexivity (Archer, 2007). The problem of agency and its relationship with the structure

[1]A machine is *banal* if at the same input ever there is the same output, due to a linear and unilateral relationship between cause and effect. In a non-banal machine the output depends not just on input, but also on internal state (or identity) of machine itself (*operative clousure*). Therefore:

> The system's organization has within itself the rules of its own transformation. At the same input or perturbation there can be different outputs (or system behaviors), according to the internal state of the machine (i.e. the organizarion or structure it had before being disrupted). There are some differences in terminology between the *Autopoiesis Theory*, and all approaches which on the whole constitute Complexity Theory, such as the *Adaptive Systems Theory* and *Dissipative Structure Theory*. What this latter call organization, or the pattern of interactions among the elements or components constituting the system, is called structure in the Autopoiesis Theory. For AT the organization is the set of relationships among the elements that define the system's identity—it's essential characteristics which cannot be lacking. The organization may take on different types of structures, different patterns of interaction that the system can take over without, however, losing its identity or organization. So, the structure is the physical materialization of the organization, the set of components and interactions that it tangibly produces. From this perspective, the *ontogenesis* is the process of system's structural change (equivalent to what is called process of *self-organization* in the other two theories) that takes place without the loss of system identity or organization (Condorelli, 2016: p. 425).

(Archer, 2000) finds solution is in that *internal conversation* that actualizes the human reflexivity capability, engendering what Archer theorizes as the 4 types of reflexivity able to mediate the relationship between structure and action and theoretically specify the action in terms of agency: *communicative reflexivity*, *autonomous reflexivity*, *meta-reflexivity*, and *fractured reflexivity* (Archer, 2003, 2007)[2]. *Internal dialogue* leads us to choose the most appropriate action paths in relation to own *ultimate concerns* by orienting in that network of constraints and facilities posed by social context. And it is this reference that can allow us to explain both differences in our life paths—different ways in which we make our way through the world—such as differences concerning professional mobility chooses, and social morphogenesis (Archer, 2007).

On the other hand, it is already in Luhmannian theorization that this analysis of social morphostasis and morphogenesis processes built on the relationship between *reflexivity* and *society* takes the language of complexity.

In the Luhmannian system, the "redundancy" of meaning is that space of freedom and that source of variety that the actor constitutes for the system. Luhmann's social systems, *emerging communication systems*, *autopoietic* and *operatively closed*, that is, autonomous on the structural (self-organization) and operational (autopoiesis) level, are like Prigogine's dissipative structures and von Foerster's non-trivial machines, historical, dynamic and indeterminable in an attempt to reduce the infinite multiplicity of possibilities of meaning (its elements) by selecting a dimension that can be experienced as an expression of an actualized meaning for action, and this through an incessant circular process of production and reproduction of its constituent elements, of communication that is, through communication (Luhmann, 1984). Reflexivity capability of social systems links micro and macro: it is essential to condition for existence of social systems and society, for reducing complexity, the multiplicity of meaning production possibilities that constitute social system by selecting from time to time what can be actualized, and is condition of social change, of *new*, *unpredictable*, meaning stabilization, of *new* institutionalization. The Luhmannian *media symbolically generalized* emerge as expression of this selective process that system (ego and alter in interaction and each one environment of the other) activates if wants to make possible interactions, thus regulating the double contingency, the transparency of mutual expectations. The reflexivity is, therefore, inserted both in social morphostasis and morphogenesis processes. The system reduces complexity but doesn't eliminate it because is constantly subjected to perturbations

[2]In *Making our Way Through the World: Human Reflexivity and Social Mobility*, Archer reflects on different ways of *internal dialogue* that explain different choices in professional mobility and *mediate* between constraints and facilities which are offered by structure and individual's personal interests. There are actors who tend towards professional stability, maintaining the choices previously made, those who activate a morphogenetic reflexivity, an internal dialogue aimed to plans strategies for the pursuit of new professional growth goals, those who activate a reflexivity that tends to pursuit value ideals and for this are often disaffectioned of their professional life, discontinuously oscillating between morphostasis and morphogenesis, that is, going from one job to another even to the detriment of their own professional growth, and those who are perpetually disoriented, unable to carry out a project and, consequently, passive (Archer, 2007).

of internal and external environment and, therefore, oscillates between continuous disoganization and organization processes, de-selection and new meaning selection processes. The circular network mechanism of the communicative process between system and environment (*ego* and *alter*, each one environment of the other), firmly grafted on the *autopoiesis* and *operative closure* concepts, borrowed from Maturana and Varela, and *emergence* concept, definitively leaves behind the mechanistic and homeostatic conceptualization of social systems that still seems to influence the Parsonsian systemics (in particular see Bailey, 1984). Communication, the operation that identifies luhmannian social systems, such a reality emerging from the double contingency, unexpected synthesis of the perspectives of *ego* and *alter*, no longer leaves room for some forms of reductionism. *Social Emergence* implies free will, the intentional, reflexive, capability of an actor who does not fit in the framework of any form of reductionism, be it biological or cultural, and save with reflexivity his moral and social responsibility.

Similarly, complex social systems are Morin's ones—such as solidary ring that proceeds by qualitative leaps (Morin, 1977, 2008), as well as Bailey's (1994) and Sawyer's (2005) ones, and Reed' & Harvey's (1992), Byrne's (Byrne, 1998; Byrne & Callaghan, 2014) and Williams' ones (Williams, 2021) who explicitly have emphasized the connection between New System Theory and Sociological Realism. All classic issues of Sociology (social system concept, social change and predictability concepts, the relationship between system and environment, order and disorder) have been re-specified from an emergentist, anti-reductionist, perspective, and *Critical Realism* and *Post-modern vitalism* (i.e. Harvey & Reed, 1997) have been synthesized in the *Complex Realism* concept. *Complex Realism* arranges the tension between search for general theory and instances of contextual understandings in the idea of *social emergence* such as *spontaneous* and *circular or bottom-up and up-down process.* Although Cilliers (1998) argues complexity's compatibility with postmodernism (by emphasizing the lack of stable sources of sense and rational teleology of history, the dismissal of the possibility of social causality and systematic social inquiry in favour of the uncertainty, unpredictability and surprise, the *emergent self-organization* construct allows (Byrne 1998; Byrne & Callaghan, 2014) to underscore the compatibility between Sociological Realism (the idea of a stable order of sense in line with the conception of a deterministic world, with an intrinsic order) and complexity theory (nonlinear determinism or emergence). *Complex Realism* grasps the potential of Complexity Theory of going beyond dichotomy between post-modernism and realism, linking in the emergence determinism and unpredictability, order and disorder, constraints and possibilities (Reed & Harvey, 1992). It remains within the modernist programme of progressive thought, and rejects at the same time the canons of reductionist positivism and postmodernism. This synthesis between complexity theory and critical realism is a theoretical paradigm as well as a method of research (see also Cochran-Smith et al., 2014; Williams & Dyer, 2017; Williams, 2021; Yang, 2021). In Cochran-Smith's words, this synthesis deals

> with some of central problems of sociological theory: a way to relate macro

and micro issues without being reductionist and a way to describe the agency-structure relationship that accounts for human agency by acknowledging that human beings may have the capacity to initiate certain causal sequences (Cochran-Smith et al., 2014: p. 111).

## 5. Conclusion: Interlocution between *Enactivism* and *Complex Realism Sociology*

On the basis of what has been argued earlier, convinced of being able to say something further than the cautious recognition of a relationship of interdependence between *Nature* and *Culture*, an inferential approach *à la* Libet risks retrogressing the interdisciplinary debate on man and his action. Neurophenomenological approach avoids this risk and keeps the doors wide open to more fruitful possibilities for dialogue with Sociology. And it is still on these possibilities of dialogue with Sociology that it is worth looking and concluding our argument. Out of the physicalist chorus, Enactivism drives us to consider the processes of signification underlying experience more than a certain neuro-reductionism *à la* Libet is willing to accept, or, on other fronts, more than a certain social naturalism—a reductionism inspired by Lombroso's Sociology, for example, or Wilson's Sociobiology—was willing to accept, later surpassed within the heart of the Social Sciences by micro theories of action, from Simmel to Weber and from Weber onwards, as well as from the macro theory of Parsons' structural-functionalism. We can add to these the countless more recent studies that have shown the theoretical unsustainability of neuro-reductionism, demonstrating its empirical invalidity with more modern methods—e.g. studies on homozygous twins raised in different cultural environments and producers, despite overlapping of the genetic patrimony, of different behaviors. Enactivism, therefore, considers men who build their own world, their own identity, by conscious intentionality, free will, out of the reductivity of a strict evolutionary conception of action, intersubjectivity, and social bond, but still without falling into the opposite extreme of reductionism and cultural determinism, also difficult to sustain after Simmel and Weber, and which has cost the Parsonsian structural-functionalism the accusation of making men "disappear" from the social scene by representing *cultural doping* actors (from Homans and Blumer's symbolic interactionism, up to approaches to modernity such as Bauman's, Beck's, Touraine's ones, that today move away from Parsons by understanding the prevailing of the individual over the social, of the micro over the macro). Borrowing from Legrenzi and Umiltà (2009), the brain does not explain who we are, and on this Neurophenomenology and Structural-functionalism, Methodological Individualism, Transcendental Phenomenology, Moral and Social Philosophy, and so on, all agree albeit in their difference. On the other hand, if the brain does not explain who we are, can we get rid of it as an explanatory category of action? Here too, Neurophenomenology stands out from the chorus, recognizing the role of the Organism more than Transcendental Phenomenology or Parsonsian structural-functionalism is not

willing to do. There is, therefore, no an Organism which is informative on action and determinant of action, which engulfs consciousness, the property of intentional processing of environmental inputs and its influence on individual and social life, but nether is there a *banalization* of the Organism, conceived as a passive processor of environmental inputs, having an irrelevant influence on behavior, so irrelevant that it allows itself to be modeled by the cultural domain that informs it and forms intentionality of action. In the Parsonsian cybernetic model, the Organism disappears from the framework, and the culture explains the action and the interaction, models the identity and the intentional conscience in the role, acting as glue between the personality system and the social system with the socialization which ensures their interpenetration. Enactivism likewise moves away from this form of causal unidirectionality: as well as from that implied by neurobiological reductionism also from that implied by Transcendental Phenomenology and Parsonsian Structural-functionalism. Meaning and experience are produced by the continuous reciprocal relationships between brain, mind and world. The mind, although irreducible to the brain, is embodied in the Organism as well as *situated* in the world and the brain participates in the generation of meaning.

As I previously said, in *Lieb*'s disciplined analysis, Sociology and in particular current Complex Realism Sociology finds a fruitful interlocution with Neurophenomenology.

On the one hand, current Complex Realism Sociology, being open to social systems' *emergence* and *creativity*, relates structure and agency, macro and micro, beyond reductionism, are cognitive or cultural reductionism, acknowledging human reflexivity capability and free will that triggers the process of social emergence.

On the other hand, maintaining the point firm of social emergence and relationship between reflexivity and social morphogenesis, Sociology can dialogue well with Varela's Neurophenomenology about the understanding of that Organism which cannot be liquidated but must be reinterpreted in its function. Neuroscience can give to the reflection of social and human sciences a wealth of observations that contribute to defining the bodily basis of meaning, imagination, and reason, such as Johnson called them (Johnson, 1990), the neuronal circuits, the sensorimotor capacities, that functionally mediate free will and inter-subjectivity, conscious deliberative intentionality, awareness of oneself and others, self-control, perception of time and risk, in other terms our ability to give meaning to world, know, remember, desire, empathize, socialize. Recent studies on *mirror neurons*, for example, can give new impetus to the sociological debate on these issues, and, in particular, on the issues of criminal responsibility and social order.

On this line of reasoning, which warns against a reductionist and eliminativist physicalism such as that of experiments *à la* Libet, we get the deliberately provocative tone already suggested in the title of an article by Maoz and Yaffe from

2016: *What does recent neuroscience tell us about criminal responsibility*? For Maoz, it is a logical mistake to pretend to generalize Libet's results and epigones to

> *decisions of the kind that bring people into courtrooms* (Maoz & Yaffe, 2016: p. 126).

These decisions are deliberative decisions, taken by a *situated* actor, capable of defining the situation and deciding on his behavior, as indeed widely reasoned in a modern sociological approach to deviance, that has surpassed the analytical approach. Modern sociological understanding of deviant behaviour, starting from Sutherland and the theory of criminal responsibility, are integrated with the *brain-culture co-evolution model* which places free will as the pivot of inter-subjectivity and moral and penal judgment. From an anti-reductionist point of view, a neuropsychological model of voluntary action and agency can help to better understand the relationship between the brain and criminal responsibility.

That is, nothing prevents us from admitting that Neuroscience can illuminate the neural correlates of those states that count for the *mens rea*, and that contribute to and constitute criminal responsibility (self-determination or intentional deliberation—knowing consciously that one is committing a criminal act and engineering it—the perception of risk, self-control…). Furthermore, its usefulness in diagnosing the threshold condition between mental illness and mental defect can well be understood (Nestor, 2019). But the rearrangement of the question on the theoretical level, that is, the recognition of a relationship of dynamic, circular, interaction in which the organism forms and is formed by the environment, the biological mind structures the experience and is structured by the experience of what it puts in place, has set a fixed point. Faced with the declared possibility from "neuro-law" perspectives to foresee for the law, in general, and criminal law, in particular, a future where justice can be *even determinate* more than enlightened by Neuroscience (for example, Greene & Cohen, 2004; O'Hara, 2004; Zeki & Goodenough, 2006; Gazzaniga, 2011), *theoretically* and *empirically* the question still remains: how can we not feel cautious, *scientifically* and *sociologically* cautious, in the face of inferential claims, including their social implications, of a certain *neuro-reductionism* or *neuroessentialism* that is convinced it has shown that it is our brain that defines who we are and decides our behavior in complete absence of consciousness? because if, due to the "disappearance" of the mind, relational responsibility disappears, rule becomes the law of chance and the very concept of justice evaporates, the answer to how social order—our living together—is possible, no longer leads to Durkheim, to Parsons, much less to Simmel but not even to Hobbes, but rather to an even more draconian and less humane and just regime than the Hobbesian one….

## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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