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Chapter 14: The role of biology in the history of psychology: neuropsychanalysis and the foundation of a mental level of causality - Ariane Bazan

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Psychology in response to the threatening unveiling by biology

While, since Ancient Greece, reflexion on the human condition took place under the term "philosophy", it was in the sixteenth century that the word *psychologia* appeared for the first time (Mengal, 2000). What made this word indispensable? It was a century of religious barbarism in what would become Europe, and corpses, often ripped apart, were strewn over the public scenery, overtaking effectively the informal Catholic ban on the dissection of human bodies. Progress in anatomy was major and, for the first time in the history of thought, the Brussels physician Andreas Vesalius, proposed, with his anatomical drawings, an image of internal human systems, and in particular, of muscular anatomy, as well as of the nerves innervating these muscles. These images were phenomenal, and we may suppose that their effect generated a turmoil comparable to the turmoil elicited by modern brain imagery. Indeed, they unveiled the fact that this bodily fabric is a logically articulated machinery whose movement can be understood mechanically by the mere beauty of how muscles and nerves intertwine.

Up until that time, « *fysica* », the natural sciences of Aristotle, had been the principle source of medical knowledge in the Jewish, Christian and Muslim world for more than fifteen centuries. Aristotle proposed that the soul had a prerogative over the body: indeed, the body was merely a clay which must be moved to life by inspiration, i.e. by the breath of the soul – or *anima*. This medical doctrine underpinned the art of healing for so long a time, that it seemed built to last forever (Mengal, 2000). But then, in the sixteenth century, anatomical drawings made the Aristotelian doctrine tremble: if it is no longer the *anima* which moves the body, then the world is in need of a new anthropology, one that redefines the soul. In 1540, the German religious reformer Philipp Melanchthon published a book which commented on the *De anima* of Aristotle, and he added to the Aristotelian text a long treatise on anatomy (Mengal, 2000). On the basis of this new knowledge, Melanchthon attributed functions to the body which were previously reserved for the soul². The brain became the principal organ of sensory functions and displaced the heart as the seat of emotional life and of thought. But the

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² Not only movement, but also body heat through the production of blood and blood circulation with the discovery in 1628 by William Harvey of the distinction between small and large blood circulation (see the book: "The History of the Heart, which speaks of the nothingness of the spirits, the production of blood, the warmth of the living bodies, etc. At first an address to the readers, at the end a complement on the bloodstream of Harveius (by) Dr. Jacob De Bak "(our translation of de « Verhaal van 't Hart, waarin werd gesproken van de nietigheid der geesten, van de bloedmaking, van de warmte der levende lichamen, etc. In den aanvang een aanspreking tot de lezers, in 't einde een bijvoegsel voor de omloop des bloets van Harveius (door) Dr. Jacob De Bak », 1653, 't Amsterdam bij Lodewijk Spillebout).

simple addition of an anatomical treaty was not enough. The images of the body fundamentally blurred the old maps: since the body seemed to be able to ensure a series of functions previously reserved to the soul, the soul must be redefined! To the Aristotelian position that all living beings, whether plant, animal or human, to varying degrees possess a soul which organizes the body, Melanchthon opposed a dualistic anthropology that divided the human into a moving body extended in space and a thinking soul. The two-dimensional *anthropologia* was articulated in *anatomia*, a doctrine of the body, and *psychologia*, a doctrine of the soul. This new anthropology was diffused into the world of the Reformation (Mengal, 2000). The use of the term *psychologia* by Melanchthon was its first intentional use and founded a new field of knowledge.

In its wake, the Dutch reformer Rudolph Snellius (1594, 26-27) specified the essential properties that distinguish body from soul: "The rational soul of man is the thought that, coupled with the body, completes man. (...) The physical things closer to natural bodies that move naturally, have an extension and for that reason occupy a space. (...) The faculty of the rational soul is the mind or will. Thought is the faculty of the soul to discourse and think about things which are and which are not."³ (Snellius, 1594, 26-27). Wisely, thinking was defined as the ability to imagine things without them having to be actually present, that is to say, as imagination. The soul, threatened by the progress of anatomy, was therefore rescued by the attribution of new exclusive properties, especially thinking (imagination) and will. René Descartes (1648, 225) understood the rapid progresses of his time in terms of anatomy; he, himself, dissected animals and human cadavers and was familiar with research on blood circulation (Fuchs, 2001). He came to the conclusion that the body is a complex device capable of moving without the soul, thus contradicting the Aristotelian doctrine of the soul: "The soul can excite no movement in the body, if not all bodily organs, that are required for this movement are well prepared; but that, on the contrary, when the body has all the elements arranged some movement, there is no need of the soul to produce them."⁴ The metaphysical order, which stated that the body exists by virtue of the soul, was broken. It was as a philosopher that Descartes proposed his dualistic view, which corresponded to Reformist views; he never used the new term *psychologia*. At the end of the seventeenth century, this way of presenting anthropology, the doctrine of man, in two parts, anatomy and psychology, was widespread, especially in medical literature (Mengal, 2000).

The word « psychology » thus arose from *the need to think the soul* in response to the threatened unveiling of man by biology. This paradox is repeated in the mid-nineteenth century, when psychology, which was still widely regarded as a branch of philosophy, emancipated itself as an autonomous domain of science. And, again, this was

³Translated by the author from the French translation (in Mengal, 2000: 10) : « L'âme raisonnable de l'homme est la pensée qui, conjugée au corps, parachève l'homme. (...) Les choses physiques plus proches des corps naturels qui se meuvent naturellement, possèdent une étendue et à cause de cela occupent un lieu.» Original text (Snellius, 1594: 26-27) : « Animus hominis est mens quae corpori coniuncta hominem perficit. (...) Physica pressior in corporibus naturalibus, quae physice moventur, magnitudine sunt praedita, & propterea locum implent. (...) Rationalis animae facultas est mens aut voluntas. Mens est animae facultas de entibus & non entibus disserens & ratiocinans » Snellius, R. (1594). *Partitiones Physicae*. Hanoviae: apud Guilielmum Antoninum? 1594, pp. 26-27.

⁴ « L'âme ne peut exciter aucun mouvement dans le corps, si ce n'est que tous les organes corporels, qui sont requis à ce mouvement, soient bien disposés; mais que, tout au contraire, lorsque le corps a tous les organes disposés à quelque mouvement, il n'y a pas besoin de l'âme pour les produire. »

concomitant with a period of great advancement in biology. Indeed, in the 19th century some fundamental discoveries were made in physiology, including neurophysiology. Charles Bell and François Magendie, independently, discovered the distinction between sensory and motor nerves in the spinal column; Emil du Bois-Reymond mapped the electrical basis of muscle contraction; Pierre Paul Broca and Carl Wernicke identified brain areas responsible for different aspects of language, and Gustav Fritsch, Eduard Hitzig, and David Ferrier localized the sensory and motor areas of the brain (e.g., see Brennan, 1998). One of the principal founders of experimental physiology, Hermann von Helmholtz, conducted studies of a wide range of topics including the natures of sound and colour, and of our perceptions of them (Warren & Warren, 1968). In the 1860s, while he held a position in Heidelberg, Helmholtz took on as an assistant a young M.D. named Wilhelm Wundt. Wundt used the equipment of the physiology laboratory to address more complicated psychological questions that had not, until then, been investigated experimentally. He experimentally studied the principles of sensory perception. He applied the method of reaction time measures, a measure proper to psychological research. In 1874, Wundt published his landmark textbook, *Grundzüge der physiologische Psychologie (Principles of Physiological Psychology, 1874⁵)* and in 1879, he founded a laboratory specifically dedicated to original research in experimental psychology, the first laboratory of its kind in the world. Psychology as an autonomous domain of science was born.

In other words, it was the confrontation with the amazing complexity of the body, respectively of the brain, in the 16th and 19th centuries that instigated the need to invoke, and then settle, the discipline of psychology. What seemed to happen in each of these moments was the recognition that what had previously been ascribed to the soul was in fact taken care of by the body. It is very paradoxical that it is precisely this recognition which, in turn, promotes psychology as an autonomous field. In the 16th century, the observation that anatomy in itself can explain how a body comes to move, for example, promoted the institution of a field, separate from anatomy, for the qualities of the soul which do not seem to have an extension and therefore do not occupy space, such as thought, discourse and will. In the 19th century, the observation that neurophysiology helps to explain perception and language definitively confirms psychology as a scientific discipline emancipated from philosophy.

Paradoxically, it also established psychology as a domain distinct from physiology itself, though firmly grounded in it: in fact, some philosophers and some of the first psychologists⁶, proposed that psychology is characterized *not by proper functions, but by proper laws*. In 1867, Wundt, for example, rejected a naively materialistic approach and defended the idea of the autonomy of the mental: the laws that govern the mind are fundamentally different from those that govern material nature. The philosopher John Stuart Mill (1882 [1843], 590) also defended the autonomy of a psychological level of analysis and rejected the idea that mental phenomena were "generated through the intervention of material mechanisms.". The study of mental phenomena must start from invariable laws which are distinct not only from metaphysics, but also from physicalist approaches to the mind or from a biologized psychology. Psychology was to describe "the uniformities of succession, the laws, whether ultimate or derivative, according to

⁵ *Grundzüge der Physiologische Psychologie*

⁶ but not, for example, William James, who is an empiricist

which one mental state succeeds another; is caused by, or at least, is caused to follow, another" (Mill, 1882 [1843], 490). The physiologist Helmholtz (1896 [1877], 187), also proposed that "memory, experience and custom" are "facts, whose laws are to be sought, and which are not to be explained away because they cannot be [...] referred to the known laws of nervous excitation". In other words, at the end of the nineteenth century some of the major proponents of psychology sought to found psychology in laws and regularities proper to its domain.

On the tragedy of not thinking the *psyché* (correctly)

In the twentieth century, then, it was Sigmund Freud, who, with psychoanalysis, offered a science of the soul, the organizing principles of which were radically distinct from those both of physiology and of philosophy. Freud, a neurologist, was trained at the physicalist physiology school of Berlin, and remained faithful to the teachings of his masters, Ernst Brucke and, especially, Hermann von Helmholtz. His feat was to propose a psychoanalytic metapsychology, which, along the lines of his other master, this one in philosophy, Mill, offers a real autonomous science of the soul, the laws of which are distinct from the biological while remaining faithful to the transcendental approach of the physiologists Fichte and von Helmholtz. That is, provided with an expertise in neurophysiology, Freud ended up *assuming the physiological functioning of the mental apparatus if it was to be able to account for what he experienced in his clinical encounters*. This, then, resulted in 1895 in his *Project for a Scientific Psychology* where he introduced, for example, the concepts of primary and secondary processes to describe the mind – with the primary process then seemingly directly inspired by the laws already proposed by Mill, namely the laws of association by contiguity and similarity.

However, the advent of psychotropic drugs in the fifties, combined with the breathtaking advances in brain imaging of the last thirty years, have rearranged the field of psychology and have, in particular, blown new powerful life into the partializing "resolutive-recompositive" paradigm of its beginnings. Indeed, the founding model for *psychologia* is borrowed from anatomy: as science proceeds by analysis, by dissecting into the most simple to reconstructing to the most complex, in the same way, psychology is supposed to describe the faculties, the single components, from which to build up a mind. The empiricist philosopher David Hume (1938 [1740], 6; 1969 [1739 to 1740], 311), for example, described his project in terms of an anatomy of human nature: that is to say, he proposes to break down the mental phenomena into more primitive elements (impressions and ideas) and to rebuild their formative history with a minimum number of mental laws. Wundt (1882: 399) also proposed that the purpose of scientific psychology is the "complete decomposition [*Zergliederung*] of conscious phenomena into their elements". Recent advances in neuroscience, then, allow for a totalitarian version of this ambition: in fact, nothing we might have wished to arrogate to the intimacy of the soul, neither passion, nor love, friendship, aspirations or even faith, morality, desire or orgasmic enjoyment... nothing escapes visualization. Is it any wonder, then, to infer that the mental would be merely some kind of phenomenology or direct expression of the brain? The paradoxical result of this progress seems to be then, on the one hand, the idea of the *psyché* as a phenomenology of the (neuro-)physiological realm, and therefore governed by biological and medical laws and, on the other, the inability to think the specificity of the mental.

What we now propose is that both the incorrect thinking and the “non-thinking” of the mental are structurally doomed to failure and tragedy. Regarding the incorrect thinking: if the *psyché* is governed by biological laws, then it follows that *the soul is to be treated according to the same principles as those applied to the body, that is to say, according to medical principles*. We have proposed elsewhere (Bazan, 2013) how these medical principles, although they have led to valuable and spectacular advances in somatic medicine, are actually counterproductive when applied to mental health. We will here briefly critically assess three of these medical principles.

First, *diagnosis by isolating (by dissecting)* the problem from its logical chain *through specialized clinical intervention* renders the symptom meaningless. What the “specialized” clinician is then left with is an *essentialist* approach, explaining the problem either in terms of an essence, a characteristic, a trait, or in terms of nature or predisposition (Hyman, 2010). This essence is then crystallized in the name of a diagnosis. However, this diagnosis identifies the subject with his problem, without offering real indications for further intervention (see e.g. Casper, 2008)⁷. Moreover, this essentialist approach, in turn, instigates the identification of distinctive profiles of subjects with the “same” problem and, as a result, new “personality disorders” emerge. However, this then has its own effects (Hacking 1985, 102-103): indeed, subjects, worried about their distresses and disarrays, or those of their relatives, seek to understand their pains and are (temporarily) relieved by being able to stick a label onto them⁸. Formalizing a new diagnosis thereby increases the occurrence of this diagnosis and thus contributes to *creating* an epidemic (see eg, Kutchins, 1997)⁹. Regarding the second medical principle, *screening and prevention* in the field of mental health, these have – along the same lines – an effect opposite to the desired one: indeed, active screening acts as an incentive for identifying with the publicized disorder and thus contributes to *the creation of waves of psychopathological epidemics*¹⁰. Thirdly and finally, then, the constitutive component of the medical approach in mental health is often the psychotropic drug. Even if it often remains to be shown that the treated problem refers to a particular physiological substrate or how most psychotropic drugs elicit their therapeutic effect, we are sure, however, that long-term use of these drugs induces changes in the physiological substrate¹¹. After a certain period, it is even

⁷Moncrieff and others have shown that diagnostic labels are less useful than a description of a person's problems for predicting treatment response. *The British Journal of Psychiatry*. 167, 1995, pp. 569-573; Moncrieff, J., Kirsch, I., Efficacy of antidepressants in adults. *British Medical Journal*, 331, 2005, p. 155 doi: 10.1136; Moncrieff, J., Timimi, S., Is ADHD a valid diagnosis in adults? No. *British Medical Journal*, 2010, p. 340:c547 doi: 10.1136/bmj.c547.

⁸ Even the British Psychological Society states that “clients often, unfortunately, find that diagnosis offers only a spurious promise of such benefits [of recognition of their problems] » and that “diagnoses seem positively unhelpful compared to the alternatives”. *The British Psychological Society Response to the American Psychiatric Association: DSM-5 Development*, June 2011.

⁹ For example, Ethan Watters (2010) reports that in Hong Kong, the first description of anorexia nervosa in the media in November 1994, precedes an explosive emergence of this disease which was previously virtually unknown (see also *The New York Times* of January 8, 2010, *The Americanization of Mental Illness*). Further, on February 6, 2012, *Der Spiegel* quoted this statement of Eisenberg, in an article that made the cover page: “ADHD [Attention Deficit and Hyperactivity Disorder] is telling example of a fabricated illness”. It is no small detail that it was Leon Eisenberg, who in 1968 actually had ADHD added in the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders). Leon Eisenberg also convinced the community that ADHD has a genetic origin without being able to prove it.

¹⁰ See also the journal *PLoS Medicine*, which devoted its April 2006 issue to the “fabrication” of diseases.

¹¹ For example, the studies of Waddington et al. (1993, 1998) and of Wade (1993) show the tardive dyskinesia side effects of neuroleptics intake (with, in particular, a number of cognitive and non-verbal

difficult to distinguish the supposed effects of the mental disorder from the effects induced by psychotropic medication. The discussion of these aspects requires a more substantiated contradictory debate, but we take the liberty, for the time being, of maintaining the idea that the application of medical principles to the field of mental health may be thought to induce psychopathology rather than to cure it (for further debate see e.g., Gonon, 2011).

Moreover, the choice of a medical approach is linked to a real *inability to think the psyche* both in scientific arenas¹² and, by backlash, in the "general public". Psychology does not really seem to have an answer to the question: if psychological functions and instances can be mapped to specific and determined structures in the brain, how is psychology different from neurophysiology? What does psychology mean beyond the brain? Far from being trivial, we propose that as subjects, we are "doomed" by the inability to conceptualize the mental. Indeed, in this time of history, it appears most often impossible to explain suffering unless it is done within assumed biological or sociological parameters: if the explanation is not given in terms of genes, hormones or neurons, it must be in terms of education, family, context, society, etc. A subject can only be thought of as a bodily or as a social entity: that is, there is no subject who is not doomed to be a victim or an object. And, as a consequence, these "victims" are claiming compensations and rights and are continuously on the lookout for possible culprits, which are invariably external and extraneous. Indeed, since there is no subject, there is no ethics of the subject, nor is there a subject who can be called upon to assume his or her proper role in the organization of the misfortune that has befallen him or her. It then follows that, like Sisyphus, unable to take measure of our proper involvement, we, subjects, are condemned to repeat indefinitely – and, worse even, that this not only befalls us as subjects of our singular history, but also as societies taken in the endless repetition of History.

A third momentum for psychology

But we all have reason to rejoice: it is from "the source of all evil" itself that salvation will arise! Indeed, the paradoxical consequences of the extreme sophistication of neuroimaging techniques lead to embarrassment in neuroscience. For, now that we see better and better, we can see "everything", and that totality is staggering: in the brain everything is multiply connected to everything – and vice versa. In other words, it is *only now that we can see it all*, that we can finally take measure of the fact that in truth we cannot see anything: opening the body is not like opening a book, there are no

deficits) and shows that the reason why schizophrenic patients have a lower life expectancy would be neuroleptics intake. Another study shows these same signs in young patients younger than 40 (Pourcher 1993). A more recent study (Harrow et al., 2014), which has followed patients over a period of twenty years, shows that after 20 years, the schizophrenic group that was not prescribed antipsychotic drugs had significantly less psychotic activity than the group, which took neuroleptics.

¹² For example, in a BBC program commenting on his work the neuroscientist Jack Gallant at the University of California, Berkeley, who primed participants with video clips, put them in a scanner and translated the electrical signals back into clips which looked very similar to what they had watched, denied that he would be able to do mind reading, "as he doesn't really know what the mind is". (*The difficult task of reading the brain*, BBC program by Melissa Hogenboom of 5 May 2014). In another example, the neurologist Robert Burton (2013) says in his book *A Skeptic's Guide to the Mind*, that even after 2500 years of contemplation and research, we still have "no idea what a mind actually is".

captions or subtitles to its cells, the organs and tissues do not come with a manual attached. There is no truth about human nature that could be read from a neuron. But as long as we have not yet pushed our flashlights till the very end and turned the very last neuron inside out, the illusion that “someday, when we have better techniques, we will understand it all, and we’ll be able to resolve the mysteries of the human mind” will continue to flourish. However, excess data will eventually wipe out all contrast– similar to how by seeing the pixels of a photo too well, one loses sight of the overall picture. And the need for an interpretative frame from another level will be felt more urgently and more precisely than ever before¹³.

We therefore propose that the current neuroimaging revolution heralds a third moment for psychology and that, by virtue of its totalitarian unveiling, it pushes psychology into its last entrenchments, thereby provoking a new moment of truth (see Bazan, 2011): either psychology is exhaustively replaced by neuroscience and disappears as such, or the field is founded in a radically different way, and perhaps in a, for the first time, truly independent way. We propose that it is not so much the modules, the components, or the faculties that distinguish the psychological from the biological¹⁴, but rather it is the organizational level from which to consider them. More specifically, psychology considers them from the level of the subject while neuroscience considers them from the level of the function¹⁵. At this stage we are thus summoned to give a definition of the subject, but the logic of the proposed reasoning does not require being restricted to a single definition, as long as this level provides a perspective *on* the body rather than a perspective coming *from* the body. We thus propose that it is this subject which founds the field of the *psyché* in its specificity and that, paradoxically, it is the brain imagery revolution which helps to create the need for that foundation.

Psychoanalysis and Neuroscience

Clinical listening is a methodology specific to psychology that can yield the materials for a conceptual framework that is coherent at the subject level. Among the clinical theories which share this epistemology of the subject, there is psychoanalysis. If psychoanalysis has proposed principles which are specific to mental functioning (e.g.

¹³ see, e.g., the neurologist Robert Burton, in an interview of April 6, 2013 with journalist Jonathan Keats about the BRAIN initiative, an enormous investment of resources in neuroscience research: "Such a project is likely to produce abundant new data regarding electrical brain activity, but I don't sense any great underlying new idea or intuition. Data is informative, but what is really needed is some intellectual innovation that goes beyond technology – both present and future. (...) Improving our technologies without an accompanying breakthrough in thinking about the brain-mind connection is equivalent to upgrading a linotype machine to the world's greatest printer without having something to say."

http://www.salon.com/2013/04/06/neuroscience_needs_its_einstein/

See, also, the article by journalist Gary Marcus in The New York Times of July 12, 2014, about this same initiative: "But biological complexity is only part of the challenge in figuring out what kind of theory of the brain we're seeking. What we are really looking for is a *bridge*, some way of connecting two separate scientific languages — those of neuroscience and psychology. (...). But as anyone in a field richer in data than theory (like weather forecasting) can tell you, amassing data is only a start. The success of both the Human Brain Project and the Brain Initiative will ultimately rest not just on the data to be collected but also on what can be done with those data once they are collected. On that, too little has been said. »

¹⁴ in line therefore with Mill, Wundt and von Helmholtz

¹⁵ much like biology does not differ from chemistry by its components but considers them at another scale (see Bazan, 2011).

primary and secondary processes, the signifier, *jouissance*), its history shows that this development has also implied, as concerns Freud, a journey through biology: it is by departing from the limits of biology that metapsychology was founded. It is through what reveals itself to be impossible to conceptualize within biology that a place is designated, opened up, in which the mental can be thought. In other words, and paradoxically, biology is vital for psychoanalysis.

Biology and psychoanalysis, neuroscience and psychoanalysis, especially intersect in this domain called «neuropsychanalysis». Both the name, and the thing itself, "neuropsychanalysis," are sometimes, and rightly so, considered to be a barbarism. The epistemological line most followed is that of Solms and Turnbull (2002), a « dual aspect monism », that is to say, the idea that there is one single object, which can be approached either objectively or neuroscientifically – the brain – or subjectively or clinically – the mental apparatus. In the end, a more or less linear correspondence between the cerebral and the mental parameters is supposed: each phenomenon with consistency in the brain is thought to correspond to a phenomenon with consistency at the mental level. Research operates along the classical paradigm: neurophysiological observations are mapped to behavioral or personality characteristics, so that even within this psychoanalytic perspective the soul is thought to mirror the brain. This paradigm implies that knowledge of the brain can (directly) contribute to the psychoanalytic clinic. I reject this approach: I propose, instead, that an object can not exist by itself, that is to say, as an (inert and already constituted) object regardless of its perception. I subscribe to a Kantian transcendental approach¹⁶ which implies that the object, constituted by capturing part of « Nature¹⁷ », is also determined by the procedure itself by which Nature is grasped, that is to say that the object is constituted in the negotiation between a grasping subject and a resisting nature (Van de Vijver & Demarest, 2013). The idea is not that the subject can determine or exhaustively construct the object, but that the object is nevertheless marked by the question through which it appeared. In this approach, biology constitutes an object "brain" on the one hand while the clinic constitutes a "mental apparatus" object on the other. But there is not necessarily a linear correspondence between the two¹⁸. What is consistent in the brain cannot be mapped point by point to what is consistent in the mental apparatus; the soul is not the mirror of the neural substrate.

This epistemology is part of a more general approach to the organization of matter and life. The idea that although biology emerges from chemistry, biology and chemistry nevertheless constitute independent organization levels of matter, which are not in a reciprocal point-to-point correspondence and each of which has a conceptual apparatus of its own, as well as analysis and intervention techniques appropriate to

¹⁶ (which is also in line with Fichte and von Helmholtz)

¹⁷ or of matter – or else even of the Real, in a Lacanian perspective

¹⁸ This is therefore a form of dualism, even if it is not an ontological dualism. One could say that this is an *epistemological dualism*, that is to say, an approach that refuses to explain mental states in terms of bodily states. We subscribe to the non-reductionist psychological approach of von Helmholtz (as described in Hatfield, 1990, 182). See also the comments of neurobiologist Marc Jeannerod (2002): "The paradox is that personal identity, although it is clearly situated in the field of physics and biology, belongs to a category of facts that are beyond objective description and therefore appear as excluded from a scientific approach. It is not true that it is impossible to understand how meaning is rooted in the biological. But knowing that it has its roots there does not guarantee them to be accessible. "

each, is generally not subject to debate. Similarly, psychology does not relate differently to biology than biology does to chemistry: although it may be important in some respects to "return" to the biological substrate, it would nevertheless be absurd to attempt to "ultimately" replace mental phenomena by biological dynamics. Obviously this does not imply that the *psyche* materializes like a Genie coming out of a lamp. If we consider that material and living reality are respective organizational layers – consisting of the physical, the chemical, the biological and the social – then the mental is an organizational layer that emerges in between the biological and the social: the mental arises from the field of tension between the push from the biological substrate and the pull from the social level, that is to say, departing from a drive pressure and in response to a calling other. For example, the hungry child is moved by a drive pressure energizing all possible action pathways, making the child giggle and cry. A caring *Nebenmensch* hears the cries and addresses the baby: "Oh, but you must be hungry...". In the field of tension between the drive and the (linguistic) address a mental apparatus, a human subject, is called into being. From this ontology, it follows that the mental apparatus is marked both by biology and by the Other. The "neuropsychanalytic" dimension in our approach tries to characterize the attachment or knotting points between the biological and the mental, that is to say, it tries to articulate how the same phenomenon at the heart of such a node can be spelled out in both biological and mental terms. These attachment points concern phenomena that account at the mental level for being in the human condition in a human body. At the level of these nodes the correspondence between the biological and the mental is direct¹⁹. There is nevertheless an essential difference between this and the monistic model: the biology involved in these nodes does not dictate in itself the organization of the mental. It does not have an organizing role for the mental, but it works as a *constraint*, limiting and at the same time making possible the mental constitution (Van de Vijver, 2010).

So it follows that our appraisal of neuroscience is subverted: its progresses will not contribute to a clinical understanding of the subject, but, inversely, this clinical understanding can lead to concepts which might prove precious for « interpreting » physiology, for seeing through an excess of physiological data in a meaningful way - in short, for "explaining the body ». The aim is thus reversed: it is, in fact, *those concepts concerning the subject*²⁰, which will prove effective for interpreting physiology, which will gain consistency, and which will thereby give « substance » to a true mental apparatus with a proper architecture. Therefore, it is not the physiological substrate which demonstrates the clinical concept, but it is the clinical concept, which, since it is capable of bringing together a number of disparate physiological observations, acquires heuristic relevance.

We have previously proposed two possible nodes between the two levels, including the signifier (Bazan, 2007) and *jouissance* (Bazan and Detandt, 2013). These are at the same time two clinical dimensions of any transference relationship, including the irrational and the transgressive. Here are our proposals. The signifier is the phenomenon that reflects at the mental level what it means to be in the specifically human condition of language. Unlike any other form of animal language, the phonemes of human language are at the highest point dependent on their surrounding phonemes,

¹⁹ And even the idea is that these are direct nodes tying together the biological, the mental and *the social*.

²⁰ or concerning the mental, or concerning psychopathology

that is to say on context, for their interpretation. The highly contextual dependence of interpretation imposes a huge constraint on the natural propensity of brain functioning, that is to say, it imposes an inhibition on the systematic and spontaneous tendency of direct interpretation dictated by the stimulus (the phonological stimulus especially). Signifier phenomena "betray" the fact that we do not succeed in this inhibition all the time or in an exhaustive way: in psychotic decompensation, e.g., the subject is beset by the polysemia of language which explodes like a bomb in all-around associative effects; but outside of psychosis, symptoms structured by the signifier (phobias, rituals, preferences, dislikes, etc.) are also observed which betray the fact that language is not interpreted only contextually but can, in its quality as an emotionally charged object, shift meanings in a singular non-contextual way. At the biological level, the signifier is a phoneme fragment, at the mental level it is a mental tendency specific to the subject, and at the social level it is an irreducible dimension of human irrationality (and madness).

Jouissance is the phenomenon that reflects at the mental level the bodily condition of the drive. The first drive sources are located in the invertebrate body, the "bag" of viscera, with the respiratory system, the circulatory system, the digestive system, the excretory system, and the reproductive system. Needs or alarms of the internal body result in an excess of excitement that incites the external body, the vertebrate body - the skeleton and the skeletal muscles - to act. In many animal species, these two bodies are connected in a "natural" way: a hungry newborn foal, for example, can stand on its feet and move towards the nipple of the mare. In other animal species, particularly in humans, there is a real gap between the internal body and the external body. When there is an alarm in the inner body, the human is prompted to act (with its external body), but this action is not naturally targeted towards a form that would be appropriate in relation to the alarm: the hungry newborn, for example, begins to cry and to jiggle, actions which in themselves do not alleviate the hunger, and which simply reflect a non-directed tendency for discharge. When, by accident, or with the help of a *Nebenmensch*, an adequate action is found (for example, the mother puts the child at her breast), then this sequence of actions (e.g. suction) is rewarded biologically and encoded in the history of the body; this is thought to happen through the mesolimbic system (see Detandt and Bazan, 2013). This encoding has as a structural consequence, however, since, by disconnecting the action and its outcome, this encoding incites a repetition of the action as a motor sequence *in and for itself*, regardless of its outcome. In nature, it is seldom the case that one and the same action leads to results that are dramatically different from the inaugural result. In culture, however, context changes are frequent, and an action that was appropriate at the beginning (for example, the child who stands motionless in response to a stressed and irritable mother), can be at other times improper or even harmful (for example, an adult who withdraws in professional or social interactions). *Jouissance* "betrays" the encoding of action sequences (or of body postures) regardless of their result. Biologically, *jouissance* is the mesolimbic registration of the "adequate"²¹ action. At the mental level it is a compulsion to repeat specific to the subject, and at the social level it is an irreducible dimension of transgression (since the subject is attached to the act *in itself*).

²¹ but also of *any* action in case of trauma, since in that case any action is better than no action, regardless of its result – since in case of trauma any discharge, or any dischargeable form, of the excitation surplus is, in some ways, "adequate".

These two components with their heuristic potential would be able to found a mental architecture. Although a biological substrate can be proposed for both, the two nevertheless escape from the logic of the mirror: for both there is, beyond any tie to the biological, a particularly articulated theoretical deployment based on clinical observation, which is radically emancipated from the biological substrate. This theoretical deployment is then exclusively what gives conceptual weight to the idea of the mental apparatus, while the relevance of its biological articulation attests to the fact that the soul finds realization through man's bodily condition, *and* through the specific constraints that this body imposes.

Pleading for mental causality in favor of an ethics of subjective accountability

The concept of an autonomous mental architecture is required as a foundation for any ethics of subjective accountability. Indeed, the brain paradigm offers only two extremes for the question of accountability: either there is an exhaustive flexibility through unlimited neural plasticity, or there is an inescapable determinism through identity profiles, personality structures and the demonstrable non-existence of free will. Likewise, the social paradigm imprisons the subject in the same two fates: either everything is solvable through education and training, or we are the inescapable victims of liberal capitalism, meritocracy, the rat race and increasing egoism. What gets lost in both these paradigms is the idea of subjective accountability. Indeed, if there is an autonomous level of the mental, then, that implies that whatever the body and brain are, and whatever family the subject was born in, he still has a margin of freedom when it comes to deciding his life. How, then, can we conceive of this autonomous mental level on the basis of which the subject can claim accountability for his or her life? If we take seriously the idea of the two foundational nodes, the signifier and *jouissance*, then what they both amount to at the mental level is the dimension of the subject's *history*. For *jouissance*, this is very clear, since it is tied to actions that were once sanctioned for bringing (some) relief and thereby were encoded in bodily (neuro-)physiology inciting for their repetition. But of course, the whole historical dimension also runs through the highly particular grid of signifiers which are thought to organize a subject's singular action space (Bazan, 2007). Both the signifier and *jouissance* testify to the bodily inscription of a subject's history, but it is then solely at the mental level that a change or switch in the subject's position is possible. Indeed, if something is determined biologically, then it concerns motor action patterns (Libet et al., 1983; Libet, 1985; Haggard & Passingham, 2004; Brass & Haggard, 2007). Now there is something uniquely human which enables that condition to be at the same time determined in its movement, and yet also to possess freedom regarding its aspirations and fate: namely the extraordinary fact that (only) in the case of articulatory movements can one make point-by-point exactly the same movements but radically switch their meaning – as is the case for homonyms, polysemous words, ambiguous phrases etc. Therefore, it is through the switch from the determining signifier to a system of meaning that people can steer their lives within the margins for freedom that are given by linguistic ambiguity. And it is in so far as we have this margin of liberty, that we are bound to be accountable for what happens to us.

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