

Uses of the Neurosciences for Psychoanalysis¹

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François Ansermet and Pierre Magistretti have conserved the homonymy proposed by Éric Kandel between the trace left in the nervous system by an experience of associative learning and the traces Freud speaks of in his *A Project for a Scientific Psychology*. However, they imprint an essential twist in the Kandel model inasmuch as they put the accent less on the inscription than on the process of constant consolidation and reconsolidation uncovered by the nervous system's property of plasticity. They also subvert the Kandel model by including under the notion of the trace the stimulations that come from the interior of the body, making of the brain the organ of the homeostasis of these sensations, whether they proceed from the body or from the exterior.

They maintain the horizon of a possibility of accounting for psychic facts based on an association of traces left by experience in the nervous system, conceived of in this particular way. However, they stress that the subjective phenomenon as such escapes the reduction to a cartography of stimulus and behavior. They stress that the essential separation introduced by the constant re-association between the traces leads to the production of the unique, of the each-time-different according to the variation of states of the brain in the course of time. They generalize this approach in taking into account the epigenetic mechanisms. Hence, their formulas "the individual is revealed genetically determined not to be genetically determined"² and "the plasticity thus permits exploiting to the extreme the specter of different possibilities leaving its whole place to the unforeseeable in the construction of individuality, the individual being able to be considered as biologically determined to be free, which is to say, to realize an exception."³

Thus it would be possible to account for the connection of the subject who speaks with the functioning of biological activity,

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as such, that of the brain as well as that of the body, starting from the neurosciences, from the paradoxes of the system of learning and of the traces that it leaves and, therefore, in the final instance, starting from the laws of physics.

This is the point I wish to interrogate. I would stress, to begin with, that the Freudian project of "a scientific psychology" is in fact constructed starting from the state of neurology at the end of the nineteenth century. The theory of the inscription in the psychic system of a "facilitation" provoked by a discharge, and of the experience of satisfaction that it constitutes, indeed, comes from this. A quantity Q seeks to discharge itself by circulating in the nervous system up to the efferent paths. However, Freud's energetics is problematic from the start, for the quantity it supposes is marked by a specificity irreducible to biological quantities as such. It is reserved for experiences arising only from the sexual domain that Freud constructs. The libido is a quantity postulated as constant in the operations of displacement, condensation, and repression that mark the representations of the sexual in psychic activity. It accounts also for the phenomena of the excess or of the insufficiency [*défaut*] of the presence of representations in the dif-

ferent pathologies. The obsessional mechanisms of constraint are marked by an excess, by a radical "plus," while the *fading* [in English] of the hysteric's mechanisms refers to a minus, just as essential an insufficiency in the experience of satisfaction. However, as Freud's work is developed, the model of the pleasure principle conceived of as the discharge of the postulated libido is always put more in doubt. With the hypothesis of a "beyond" of the pleasure principle, the rupture with the biological mechanisms supposed in the *Project*⁴ is consummated and *Civilization and its Discontents*⁵ comes to confirm that it is in the articulation to the social link that one must seek to account for an impossible-to-discharge, the impossible at the heart itself of sexual satisfaction, as such. One, thus, passes in the progress of the work from the reference to biology to the hypothesis of an anti-biology where the articulation of the body to the social implies an essential relation to a death that is no longer the one biology accounts for. Psychoanalysis no longer arises, then, from the perspective of a Helmholtzian psychology, compatible with the laws of physics.

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This is what Jacques Lacan takes note of after the war in "*Propos sur la causalité psychique*." He refuses to localize the genesis of mental trouble as such in the nervous system, inasmuch as the mental arises from another dimension than that of the space of physics. This position is, in a sense, Cartesian because it refuses to confuse thought substance and extended substance. But Lacan's is a Descartes passed through Husserl and his *Cartesian Meditations*, one entirely marked by phenomenology. Jacques-Alain Miller stresses, in a commentary on these "*Propos* . . .,"⁶ the importance of the opposition between the notion of "psychic activity" that neuropsychiatry describes and the subjective function, as such, always marked by the flaw, insufficiency, lack. Lacan opposes to "psychic activity, doublet of the neuronal functioning" the "bastard chain of destiny and inertia, of throws of the dice and of stupor, of false successes and misrecognized encounters, which make up the text of a human life."⁷ Likewise, still more than in neurosis, the clinical phenomena of psychosis like hallucination put into play not only a sensoriality, but a personal signification that aims for the subject. "Madness is lived wholly in the register of meaning [*sens*]."⁸ As soon as man speaks, he is submitted to the question of his truth and his most intimate identifications come to respond to the paradoxes of his link to what he says and to what has been said to him. The materiality of the unconscious is made, not of learning, but of things said to the subject, that have hurt him, and of things, impossible to say, that make him suffer. The opposition between the principles of the nervous system's functioning, arising directly from the laws of biology and physics, and the register of another causality for founding psychology, is thus posed. Unconscious memory parasites the living [being] and alters its potency.

This is what is at stake in the after-the-fact reading of the "Project," a text that remained unedited during Freud's lifetime, and the publication which was made possible in 1951. This text will be read with passion in the psychoanalytic movement, and also in *Ego-Psychology* circles, along with those surrounding Ernst Kris and Lacan. Éric Kandel, frequenting the Kris family, will draw the lesson from his Freudian readings. He will complete the project of Kris's colleague

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Heinz Hartmann who wished to make psychoanalysis re-enter general psychology. Kandel makes it re-enter general neurology. Lacan will read the "Project" as a functioning of a particular memory. He will not link it to phenomena of facilitation, but to phenomena of an impossibility of paths. The cybernetics of the time gives him resources for situating the impasses of the functioning of memory. Jean-Pierre Dupuy has, indeed, noted that "Lacan [. . .] was interested, for example, as we have said, in the theory of reverberant closed circuits that McCulloch had taken up from Lawrence Kubie, and knew the work of the British neuro-anatomist John Z. Young aiming to test this theory on the octopus." Therefore, Lacan is going to break the direct link with the neuronal traces analogy, by considering at the same time that the Freudian "traces" are not inscribed on the nervous system and that they "are signifiers."⁹ They must, however, be linked to the system of the living being as such. The original solution he proposes is that this is effectuated by points of the impossible. The living being to which the symbolic system is connected like a parasite produces the impossible to represent.

The first consequence of this is that there is never a unified representation for the subject of the experience of *jouissance*. This experience cannot be wholly said [*ne peut se dire toute*] in its real, any more than the truth that cannot wholly be said. This perspective opposes itself to the cognitive point of view according to which the relation of the individual to his body and to the world is found to be unified. This can be in a form analogous to Aristotelian "common sense," as Stanislas Dehaene¹⁰ maintains, or as does Antonio Damasio¹¹ in exploring the biological foundations of the "knowledge of self;"¹² this can also be the modular multiplicity proposed by Daniel Dennett¹³ in radically criticizing any unifying perspective. The important thing is that all "psychic activity," unified or not, responds to the needs of the living body. Now, for psychoanalysis, nothing insures this adequation of the body and of the subject. Not even access to the image of the body annuls the initial fragmentation of the relation to the body, the experience of the fragmented body. However this image is Oh how unifying and fascinating! as is witnessed to by our society of images, in exploiting the resources of fascination in every manner.

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The discovery of mirror neurons has allowed us to think of a still wider extension of the powers of the imaginary field.¹⁴ Likewise, on the plane no longer of the image but of the signifier, "far from there being a function of total mental synthesis, mental integration is always fragmentary [*parcellaire*], and what is called subject is precisely what is fragmentary in this integration,"¹⁵ a flaw when there is no lesion, of the partial other, the impossible to totalize.

What, then, might authorize cognitivism to insure an exhaustive representation of psychic activity when this escapes a graspable knowledge? It is Chomsky's introduction of the notion of an "unknown rule" to account for the aporias of the learning of language. Starting from the impossibility of a subject learning a language, starting from what he has heard, he proposes, contrary to the hypotheses of associative learning, a radical cut. For the tradition of associative learning, demanded by Kandel, "the brain is malleable. It is reconfigured to adapt itself to experience. Organs of learning specific to the themes dealt with, which would calculate representations of different aspects of the world starting from different aspects of the experience of the animal, do not exist." Chomsky has suggested "that to the contrary, learning would pass through distinct organs of learning, each endowed with a structure that allows them to learn a particular sort of contingent facts concerning the world. Non-contingent facts, which is to say universal truths, are not learned; they are implicit in the structure of the organs of learning, a view alien to

the associative conception of learning (Hawkins and Kandel, 1984)."¹⁶ The specialized organ "learns" and the subject is presumed to follow a rule that remains *embedded* [in English], unknown to him.

As has been very well noted by Jean-Claude Milner,¹⁷ it is by the generalization of this notion of an "unknown rule" that cognitivism has proceeded. This conception is opposed in a radical fashion to the explicit and declared character of the rule, which remained essential for Wittgenstein.¹⁸ The modular conception of the mind, proposed by Jerry Fodor, after the introduction of the module of vision by David Marr, accomplished the passage of Chomsky's computational conception to a computo-representational conception of the mind.

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These two conceptions are radically separated on the relations of language and the world. For Chomsky, language "does not speak of the world." Words are by themselves deprived of reference. There is no inscription of reference, for this is an action accomplished by human agents. As Pierre Jacob says: "Unlike what a human being *knows*, what he *does* is, according to Chomsky, destined to remain a mystery. Generative grammar has opened the path to the scientific understanding of one aspect of what a human being knows: his faculty of language. But an epistemological ditch separates the *problems* raised by the understanding of what he knows and the *mysteries* called forth by the explanation of an intentional action . . . Freedom therefore confers on acts of reference (and on what Chomsky names the 'creative use of language') the status of a mystery and not of a scientific problem."¹⁹

In opposition to this, "according to the computo-representational theory of the mind, thinking is not always an intentional action: the cognitive process that transforms my auditory impression of the stimulus into a conceptual representation of dog—that is to say the occurrence of my mental symbol 'F'—is independent of any intention of referring to a dog."²⁰ This affirmation sweeps away Searle's objection²¹ based on the necessity of admitting that the rule might be known. Let us note that the modular multiplicity authorized by this conception now presents us with such a swarm that the conception seeks its Occam's razor; Fodor himself considers its current state "a modularism gone mad."²²

The computo-representational theory of the mind, contrary to Chomsky, wishes to create a bridge between naïve psychology and the computational models of the cognitive sciences. They want to function as laws that make a bridge re-linking the world of causes to the world of reasons. This is what Chomsky refuses; it is also what Donald Davidson refuses, stressing indeed that if there is only a single substance, it must be kept in the psychic field, ruled by reasons of a character "without law." He defines his position as that of an "anomal monism." I would like to put three positions in a series, to clarify the one by the other, in their radical differences: that of Chomsky regarding the mysteries of the "without law" of

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human action, the anomal of Davidson, and the approach by Lacan to the real in psychoanalysis through the impossible. I will take this path in order to speak of a real "without law."

The temptation in the cognitive approach to the psychic field is to erase its relation to the impossible. It operates in two distinct fashions. On the one hand, through game theory, it tries to produce a theory of decision governed by a principle of maximal utility "according to which

the agent chooses, among the actions open to it, the one that in probability guarantees to it the greatest utility [. . .] balanced by the subjective probabilities by which it affects the eventuality of the consequences of its different actions."²³ On the other hand, refusing to consider optimizing thought processes alone, one would like to reduce the subject to the only thing taken into account for the determinations of its activity as living organism. This would be to operate a naturalization of psychic processes as a whole. I would like to oppose to this naturalizing temptation the objections addressed to it by W.V.O. Quine throughout his work.

Sandra Laugier has defined very well the multiform anti-positivist strategy of the great analytic philosopher: "In 'Two Dogmas of Empiricism' (1953), Quine criticizes one of the foundations of logical empiricism, analyticity (in the sense defined by Frege then Carnap, as truth founded on the logic of linguistic conventions), and proposes erasing the distinction between empirical statements and *a priori* independent of experience. He goes farther in 1960 with his celebrated thesis of the indetermination of radical translation, since he destroys the idea of common significations in different languages, affirming that a linguist, in a radical translation situation (without previous contact, nor community, between his language and the indigenous language), can elaborate radical translation manuals contradictory and compatible with the data, hence there is nothing about which the translator might be either right or wrong."²⁴ He will proceed finally to a radical denaturalization in his *Ontological Relativity* of 1969.

The thesis of the indetermination of translation has itself received multiple interpretations, of course. It opposes itself radically to positivist translation according to Carnap. It does not say that translation is impossible, it says that it is only

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too possible. There are only too many translations, without our being truly able to choose among them. Still, more profoundly, it destroys the myth of signification, for translation is never exhausted. It never makes us leave either our language or sense. Any translating operation, any passage between languages, between distinct worlds, supposes being confronted with the incommensurable, at the interior itself of the system of reference. It confronts us with the oxymoron of a loss by excess. It reveals to us that there is no "exile out of the learned culture" and its language. This perspective renders null and void the perspective of the interlocking without solution of the continuity and re-translation of signs in worlds or "successive symbolic frameworks." Truth is wholly immanent in the activity of translation, "there is no extra-theoretic truth, no higher truth than the truth we are claiming or aspiring to as we continue to tinker with our system of the world from within."²⁵

In this conception of Quine's, language is not on the one side and the experience of the world on the other. All certainty about the world passes through language, but it is obtained by an experience. "The analyticity criticized in 'Two Dogmas . . . ' is in fact progressively replaced, for Quine, by a social concept, founded on the learning [of the language]"²⁶ The analyticity of a statement is not that it is independent of the experience, a statement is analytic if each of us learns that it is true in learning the words of the language [*la langue*]. Quine ends up giving a definition of the gradient between empirical statements and analytic statements that is very telling for psychoanalysis: ". . . each of us learns to count certain statements, outright, as true; there are sentences whose truth is learned in that way by many of us, and there are sentences whose truth is learned in that way by few or none of us. The former sentences are more *nearly* analytic than the latter. The *analytic* sentences are the ones whose truth is learned in that way by

all of us; and these extreme cases do not differ notably from their neighbors, nor can we always say which ones they are."²⁷ Our only "naturalness" is language as social link.

I will bring together the relations of the symbolic systems and of *jouissance* in psychoanalysis, and the Quinean system. In Lacanian terms, we will say that there is a point of real

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that never finds its ultimate symbolic translation. It insists. The subject encounters *jouissance* in a contingent fashion. This is a real that he believes in, that he poses as exterior to himself in the construction of the fantasy; this fantasy is a sort of theoretic system by which the subject is re-linked to the experience of *jouissance*. Sublimation or the sharing of the fantasy are of the same order as the Quinean construction: each of us encounters, in a contingent fashion, certain words or certain statements that are linked to our *jouissance*. There are fantasmatic statements that are shared by many, others by few or none of us. The former are more sublimated than the latter. Certain of the most intimate traits of the experiences of *jouissance* of great artists end up being shared by almost everyone. They are sublimated.

An example of an encounter between a statement and an experience of *jouissance* is given by a precious memory recounted by Michel Leiris. This is a screen memory published at the beginning of his great work *The Age of Man in Strokes [Biffures]*. It comes to mark his relationship with good fortune [*bonheur*], or more exactly with bad fortune [*malheur*] and with women. When he is playing with his little soldiers in the same room where his mother is, a soldier he particularly loves falls down. He sets it back upright, and exclaims to himself "tunately" [*reusement*"]. His mother corrects him immediately: "One does not say 'tunately,' one says 'fortunately' [*heureusement*"]. We know from his life that the relationship with good fortune was never easy for him. He undertook a psychoanalysis in the aftermath of a particularly severe attempt at suicide after a complicated night with Georges Bataille. Furthermore, he constructed an admirably styled literature, marked by a rigorous clarity. He never again allowed anyone to correct him on usage; he became a master of it. The state where language comes to mark the limit impossible to cross from the origin of the knotting between symbolic, imaginary, and real is that of a language from before the routinized uses of "good usage" that may be learned. Lacan calls this state of language *lalangue* in a single word, which marks the most private, the most intimate relationship, with language [*la langue*]. It is the noise of the language for each of us at the interior itself of the public language that he utilizes. Psychic reality is that of *lalangue*, a

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point of the real where public language and private language are knotted. The contingency of the encounter that creates *lalangue* is also the foundation of the interpretive activity of psychoanalysis, always contingent.

However, we must not believe it possible simply to denounce the *semblants* that the system of reference of public language constitutes so as to only to be content with the fragmentary elements that constitute the private fantasy so as to attain *jouissance* directly. This would be what Lacan calls a "cynical" point of view: the denunciation of the public language's *semblants* in the name of the *jouissance* of a private language. It corresponds with what on the ontological plane would be a radically skeptical position. In fact, skepticism, to be tenable,

supposes of knowledge [*savoir*] that it is the only knowledge that, as such, can lead there. "It is science itself that teaches us that there is no absolute knowledge [*connaissance*]."28 The theory of knowledge [*connaissance*] has its origin in doubt, certainly, but it is also knowledge [*savoir*] that produces doubt: "skepticism is a product of science."29 Believing and knowing have two logical grammars, with distinct uses. Nonetheless, knowledge [*le savoir*] does not eliminate the register of believing, as the end of Quine's article on the "Two Dogmas of Empiricism" shows brilliantly.30

It is, in particular, because the learning of language repeats the learning of science that each of us, for Quine, continues indefinitely learning and revising his language. A logic of the same order operates in the fantasy. The fantasy's knowledge never ceases aiming for the missing of *jouissance* by the symbolic system. Yet there is no other access to it.

The isolation of the private elements of the fantasy, in what is most real about them, is obtained only at end of an analysis. This path cannot be avoided. To be able to address himself to the partner, the subject offers him feelings, beliefs, and expectations in reaction to what he says and he wishes to act on the beliefs and expectations he anticipates. The deciphering of meaning in the exchanges between analysand and analyst is not the only thing in play. There is the aim of the one who says. It is a question of recuperating from his interlocutor something lost. This recuperation of an object gives the key to

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the Freudian myth of the drive. It founds the transference that knots the two partners. Lacan's formula according to which the subject receives from the Other his own message in inverted form includes both the deciphering and the will to act on that to which one addresses oneself. In the final instance, when the analysand speaks, he wants, beyond the meaning of what he says, to attain in the Other the partner of his expectations, beliefs, and desires. He aims for the partner of his fantasy, without being able to attain a *jouissance* that would be the right one. The discovery of psychoanalysis is first of all that of the impotence of the subject to attain full sexual satisfaction. This impotence is designated by the term castration. Beyond this, psychoanalysis, with Lacan, has formulated the impossibility of there being a norm of the rapport between the sexes. If there is no full satisfaction and if there is no norm, it is left to each of us to invent a particular solution, which is supported by his symptom. Each of our solutions can be more or less typical, more or less supported by tradition and common rules. The solution may, on the contrary, want to arise from a rupture or from a certain clandestinity. It remains no less that, fundamentally, the relation between the sexes has no solution that might be "for all." In this sense, it remains marked with the seal of the incurable, and there will always be an insufficiency. Sex, for the speaking being, arises from the "not-all."

Starting from this point, J.-A. Miller stresses the originality of the dimension of the real in Lacan. "Lacan had approached something like a sort of first real, which he formulated as 'there is no sexual rapport.' Already, in saying this, he isolated a trait contravening the idea that there is a *savoir* in the real [. . .] Lacan translated the absence of the sexual rapport, in man, in the species, as a tearing of the real, as a hole in the real: 'Freud guided us in that what he calls sexuality makes a hole in the real.'"31

The not-all, the impossible, the hole, mark the situation of the symbolic in its relationship with the body and define the field of the real of the experience of *jouissance*. The use

psychoanalysis can make of the neurosciences must be able to take them into account. There is an immediate use of the different approaches of the neurosciences that closes the hole

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of the experience of *jouissance*. There is an immediate use when Mark Solms affirms: “The recent neural cartographies are consistent with the description Freud gives. The central region of the cerebral trunk and the limbic system—responsible for instincts and drives—correspond to the *Id* of Freud. The ventral frontal region which controls selective inhibition, the dorsal frontal which controls conscious thoughts, and the posterior cortex which perceives the external world correspond to the *Ego* and the *Superego*.”³² There is an immediate use when the current trend of *Ego-Psychology* proposes rethinking psychoanalysis starting from consciousness. In an article entitled “A missing link in psychoanalytic technique: Psychoanalytic consciousness,”³³ Mr. Busch is astonished that what is of so much interest to the neurosciences, consciousness, does not interest psychoanalysts. He wants to remedy this: “It is my position that inherent in every interpretation of the unconscious in clinical psychoanalysis is an implied definition of psychoanalytic consciousness. Whenever we interpret something unknown to a patient we express our belief it is knowable.”³⁴ It likewise seems to me that the direct use Daniel Widlocher makes of the work of emotional cognitivism, particularly of that of Mr. Damasio, to found his ontology of signification, is subject to caution. “Affect is not easily directly locatable in the intimacy of the session [. . .] But what affect are we talking about? Those that would have to mark each of the mental states succeeding one another in the course of the session, those given to emerging from the evocation of such or such associative chain [...]?”³⁵ The “double labor of locating the affect in the other’s psyche as in one’s own” that he proposes describing directly encounters emotional “mapping” [in English].

The direct utilization of the neurosciences is always susceptible of being brought back to a metaphoric usage making psychoanalysis function as a metalanguage and Mr. Lionel Naccache³⁶ has presented some very pertinent criticisms of attempted direct uses from this perspective.

I propose instead a mediate use of the neurosciences for psychoanalysis, mediated by one of the quasi-immediate consequences of the contributions of the neurosciences; that is, medications. If one believes the report recently published by

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The Academy of Medical Science, commented on in *The Economist*, the work we hear about these days from Mr. Le Moal on “opposing processes” or on “Addiction and the Brain Antireward System,” or that of Ms. Alberini on “the consolidation and reconsolidation of traces” is in the process of joining the work of pharmacodynamics onto the by-products of glutamate. They are going to give birth to a new generation of medications promising to fix memories better, or on the contrary, to be able to undo them, on the condition of accepting the synonymy between the consolidation/reconsolidation of the trace and the fixation/forgetting of the memory.³⁷

Already in February, Alex Berenson gave an account in the *New York Times*³⁸ of the work of Dr. Schoep who worked for more than ten years on glutamate after having, as he says, fallen in love with dopamine. He worked for a long time for Eli Lilly, but in 2007 he left it for Merck which offered him more means for passing from preliminary efforts to the marketplace.

At the moment when dopamine seems less seductive, glutamate is going to allow for the production of new medications. This hope announces itself after the putting into question of the effects of fluoxetine or of antidepressants of the same family in the study of Erik Turner of the University of Oregon published in January 2008 in the *New England Journal of Medicine*. The efficacy of the medications may be put into question by the results of meta-analyses whose methodology is not impeccable. One is knocked down a peg [*on tombe de haut*] because it, nonetheless, remains the case that the psychotropes, once they are produced, are loved, adopted, and utilized with passion outside of the [various] indications assigned to them. Everyone remembers the enthusiastic tone of Peter Kramer's *Listening to Prozac* (1994) or, more soberly, the dependence Elisabeth Wurtzel describes in her autobiographical novel *Prozac Nation* (2001). Subjects take over these substances and make of them their object of comfort, addiction, or measured use. Whether specifically of Prozac, or of medications for erectile dysfunction or attention deficits, "off label" [in English] use testifies to the fashion in which the medication becomes an instrument for the exploration of the body and of its *jouissance*, through its multiple uses. It is for their by-product capacities [*capacités de*

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dérive] that they are used, that they inscribe themselves in our lives, *unbedded* [in English]. The journal *Nature* launched, in the first trimester of this year, an informal study on the use of Ritalin among its readers; of the 1400 readers who responded, one out of five declared that they had used Ritalin, ProVigil, or the beta-blockers for non-medical reasons. *The Economist*,³⁹ of a liberal orientation, thinks that these deviant uses need not be regulated too much. After all, the reporters write, "[g]enetic variations between people are associated with different levels of working memory. People using ProVigil or Ritalin may eventually be found to have a legitimate but previously unknown need for the drug." Through epigenetic arguments, they too rediscover the particularity of each subject, even his uniqueness, which François Ansermet and Pierre Magistretti lodge in the plasticity of the nervous system. The mediate use of the neurosciences is again that which insures the highest degree of freedom to the subject and to psychoanalysis for accounting for what always presents itself as flight, slippage, and deviance in the subject's experience of *jouissance*. The use by psychoanalysis of the neurosciences is also what is made of it by the psychoanalyst. He also addresses it to the psychoanalyst in making a metaphorical use of the theoretical contributions of the neurosciences. He inscribes them in his own language. Moreover, he does not learn of, but has an experience of, new objects that it produces with the theory that is linked to it to begin with. Analyst and analysand find themselves again on the same side where it is a matter of preserving the contingent singularity of an existence.

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Endnotes

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¹ Communication during the colloquium organized on May 27, 2008 at the *Collège de France* by Pierre Magistretti, under the title "Neurosciences and Psychoanalysis, a Meeting concerning the Emergence of the Singularity."

² Answermet F., Magistretti P., *À chacun son cerveau, plasticité neuronale et inconscient*, Paris, Odile Jacob, 2004, p. 22.

³ *Ibid.*

⁴ Freud, S., (1895) *A Project for a Scientific Psychology*, SE 1, 283-397.

⁵ Freud, S., *Civilization and its Discontents* (1929), SE 21, 59-145.

⁶ Miller, J.-A., *L'orientation lacanienne*, III, 10, lesson of January 30, 2008, TLN n° 376.

⁷ Lacan, J., "Propos sur la causalité psychique," *Écrits*, 1966, Le Seuil, [translated as "Presentation on Psychic Causality," in Lacan, J., & Fink, B., *Écrits: The first complete edition in English*, W.W. Norton & Co., 2006, p. 123-158], p. 159 [Fink, p. 130], commented on by Miller, J.-A., lesson of January 30, 2008, *op. cit.*

⁸ Lacan J., *ibid.*, p. 166.

⁹ Dupuy, J.-P., *Aux origines des sciences cognitives*, Paris, La Découverte, 1994, p. 114. He refers to the January 1955 session of the *Séminaire Livre II* where Lacan evokes the octopus in the framework of considerations on memory and the phenomenon of feed-back.

¹⁰ Dahaene, S., *Les neurones de la lecture*, Paris, Odile Jacob, 2007.

¹¹ During the colloquium, Antonio Damasio presented a very precise communication on this point.

¹² These debates actualize the greeting of the German students encountered by Victor Hugo toward 1840, during his exploration of the Rhine: "– Tell us, master, in what part of the body did the ancient philosophers situate the soul. I returned the greeting and I answered: – Plato in the heart, Empedocles in the blood, Lucretius between the two eyebrows. The three young people smiled and the eldest cried: – Long live Gaul, our queen! I replied: – Long live Germany, our mother! We waved to each other again and I departed." (Hugo V., *Le Rhin, Lettre vingtième, OEuvres complètes*, Robert Laffont, 1987).

¹³ Dennett D., *Kinds of Minds*, Phoenix, Science Masters, 1996.

¹⁴ During the colloquium, Marc Jeunnot presented a communication on this point.

¹⁵ Miller, J.-A., *L'orientation lacanienne III*, lesson of February 6, 2008, TLN n° 378.

¹⁶ Gallistel, C. R., "L'apprentissage de matières distinctes exige des organes distincts," in *Chomsky*, ouvrage collectif, Paris, L'Herne, 2007.

- ¹⁷ Milner, J.-C., *Introduction à une science du langage*, Paris, Le Seuil, 1989.
- ¹⁸ *Ibid.*, note 62, p. 252.
- ¹⁹ Jacob, P., *La portée et les limites du naturalisme*, in Chomsky, *op. cit.*
- ²⁰ *Ibid.*
- ²¹ Searle, J. R. *Minds, Brains and Science*. Cambridge, Mass: Harvard Univ. Pr, 1985.
- ²² Fodor, J., "Modules, Frames, Fridgeons, Sleeping Dogs, and the Music of the Spheres," p. 27, in Garfield J. (Ed.), *Modularity in Knowledge Representation and Natural-Language Understanding*, Cambridge Mass., MIT Press, 1987.
- ²³ Andler, D., Fagot Lareault, A., Saint-Sermin, B., *Philosophie des sciences II*, Paris, Gallimard, Folio Essais, 2002, p. 770.
- ²⁴ Laugier, S. "Quine, la science et le naturalisme," *Les philosophes et la science*, under the direction of Pierre Wagner, Ed., Gallimard, Folio essai, 2002, p. 715.
- ²⁵ Quine, W.V.O., "On Empirically Equivalent Systems of the World," *Erkenntnis*, 9, 1975, p. 327, cited in Laugier, S., *op. cit.*, p. 735.
- ²⁶ Laugier, S., *op. cit.*, p. 744.
- ²⁷ Quine, W.V.O., *The Roots of Reference*, La salle, Open Court, 1973, p. 80.
- ²⁸ "The Nature of Natural Knowledge," in S. Guttenplan, ed., *Mind and Language*, Oxford, Oxford University Press, 1975, p. 68.
- ²⁹ Laugier S., *op. cit.*, p. 749.
- ³⁰ Quine W.V.O., "Two Dogmas of Empiricism," *The Philosophical Review* 60 (1951): 20-43. Available online at <http://www.ditext.com/quine/quine.html>.
- ³¹ Miller, J.-A., "Pièces détachés," *Le Séminaire de Jacques Lacan, La Cause freudienne*, N° 61, Paris, Navarin / Le Seuil, 2005, p. 143-144.
- ³² Solms, M., "Psychoanalysis et neurosciences," in *Pour la Science*, n° 324, October 2004.
- ³³ Busch, F., Joseph, B., "A missing link in psychoanalytic technique," *International Journal of Psychoanalysis*, 2004; 85:567-78, available at <http://www3.interscience.wiley.com/cgi-bin/fulltext/119821788/PDFSTART>.
- ³⁴ One can read a critique of this point of view in É Laurent., *Lost in cognition*, Nantes, Cécile Defaut, 2008.
- ³⁵ Widlocher, D., "Affect et empathy," *Revue Française de Psychanalyse*, 1999, tome 1, p. 174.
- ³⁶ In this Colloquium.
- ³⁷ Cf. "All on the Mind," *The Economist*, May 24, 2008.
- ³⁸ Cf., Berenson A., "Daring to Think Differently About Schizophrenia," *The New York Times*, February 24, 2008.
- ³⁹ Cf., "Smart Drugs," *The Economist*, May 24, 2008.

