

Neuron-Z, Philosophy of the Mind and Symptom¹

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ABSTRACT

Attempts to locate mathematics inside the human brain have fascinated certain educators. Which neuronal connections are responsible for the mathematical operations and abstractions? Once the gene that ensures the formation of such connections is located, many teaching problems may be viewed under a new light. Foundations of teaching methods and academic control of research on mathematics education may be justified. This paper shows why such a scientific discovery and the theory it supports are anxiously awaited and seized as definitive by many of their readers.

Neurons, genes and mathematics

Despite nearly a century of efforts dedicated to mathematics instruction, the following question has not yet received a satisfactory answer: why do some like and learn mathematics while others, the majority, hate it, venerate it as difficult and apparently never manage to learn it? What form of intelligence is this “mathematics”? How is this intelligence distributed in the population and transmitted from one generation to the next?

For Hippocrates (460-379 AD), intelligence resided in the brain; for Aristotle (335 AD), in the heart. In recent decades, due to advances in computerized tomography and magnetic resonance imaging, we have witnessed an explosion in the production of knowledge about the inner working of the human brain.³

“The challenge of cognitive neuroscience is to describe the relationship between the brain and the mind, *i.e.*, to reveal how structural neural elements are driven into the psychological activity that results in perception and cognition. (...) The neural correlates of higher mental functions, such as language or mathematical reasoning, need to be sought directly in awake humans” [Levänen, 1997:19].

Following this approach, the eminent British mathematics educator David Tall describes a connectionist model of the brain⁴ and concludes that:

“(...) the broad action-process-object-scheme (APOS) has a natural biological underpinning. (...) APOS theory seems to have a deep underpinning in biological structure. (...) In counting, there is the action of repeating the number words and beginning to accompany this by pointing at objects in turn. Later, various learning sequences set up neuronal connections in the brain, routinizing the procedure, seeing it as a process when it is realized that different orders of counting the same set give the same number, and then “encapsulating” the process into the concept of number” [Tall, 1999:112, 114].

Greater or lesser facility in learning mathematics can then be explained by the greater or lesser readiness of the brain to establish neuronal connections. However, in order to explain the

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³ See, for instance, Milestones in Neuroscience Research, <http://faculty.washington.edu/chudler/hist.html>

⁴ “The human brain, at least when healthy and mature, is a system of neuronal networks that are both interconnected among themselves (hence the name ‘Connectionism’) and conjoined to the sensory input systems and the behavioral reactive output systems” [Lyons, 1995:lxii].

distribution and transmission of such ability among the population, it is necessary to invoke another science: genetics. It had its basis launched by Darwin, who published *The Origin of Species* in 1859. It was founded by Mendel in 1866 as a subfield of biological knowledge. Two years before, Herbert Spencer (1820-1903) had reformulated Darwin's concept of *natural selection* and invented the expression *survival of the fittest*. Such an apparently innocent shift allowed him to extend Darwin's theory to the social domain, inaugurating what is now called *Social Darwinism*. This theory asserts the hereditary transmission of social qualities; in one word, the fittest become richer. In 1883, Francis Galton (1822-1911) took one step forward by introducing the word "eugenics" and suggested the improvement of the human race by selective breeding. Eugenics would certainly include the higher mental processes such as mathematical ability among its aims.⁵

Chromosomes were discovered by Walter Flemming in 1882; the genes that determine the individual characters were spotted in the chromosomes by Thomas Morgan in 1910; DNA was discovered as hereditary material in 1944 by Oswald Avery and Maclyn McCarty; and the genetic code was deciphered by François Jacob and Jacques Monod in 1965.⁶ Since then, genetics has thrived. The Human Genome Project, started in 1990, enrolls more than five thousand scientists from the US, Europe and Japan, and aims at identifying and determining the location in the chromosomes of all human genes. Such knowledge will have an enormous impact on the understanding of physiological processes of the human organism, on health and the cure of diseases, and hence on medicine in general.⁷ Among its effects, The Human Genome Project retrieves the hopes of social Darwinism.

"A biologist from Princeton (...) Joe Tsien has published the results of his research (on mice) in the periodical *Nature*, August 2, (1999). The research has proved that the gene NR2B is fundamental in the control of brain ability to associate one event to another, a basic learning skill. (...) It is known that humans possess a corresponding gene but its effect on intelligence has not yet been determined. (...) The discovery opens the way to future use of genetic manipulation in the treatment of human beings" [Moon, 1999, 56].

And also, "the American neurologist Steven Pinker asserts that language is 'congenial to humans as the trunk is to the elephant' and that therefore there must be a 'grammatical gene'" [Kurz, 1997: 196]. It then becomes natural to inquire about the existence of a corresponding mathematical gene.

The Neuron-Z theory

Recently, scientist S. Zanati, of the International Center of Brain Injury (ICBI) succeeded in determining the gene responsible for the development of neuron-Z in human beings. As is well known, neuron-Z is in fact a group of neurons that are activated whenever an operation based on mathematics is performed. Neuron-Z has been named after Planet-X, a never observed hypothetical planet whose existence is deduced from certain abnormalities in the orbits of Uranus, Neptune and Pluto. The existence of neuron-Z had been postulated by neuro-educators of the ICBI in order to explain the difference between people who know and love mathematics and those who do not know and seem to never be able to learn it. Neuron-Z would be responsible for elementary local operations such as the question "*Who is the father of John's son?*", whose answer is so simple for some and so difficult, almost impossible for others. Neuron-Z would chiefly be responsible for the operational synthesis described by Piaget and re-stated by the APOS theory as the "encapsulation" of processes as objects. Instances of such an encapsulation include: synthesizing the numerator and denominator to form the concept of fraction, synthesizing the three quantities involved in the concept of percentage, synthesizing the operators of multiplication and sign change to form the concept of integers, synthesizing the independent and depend variables to form the concept of function, synthesizing direct and inverse operations such as differentiation and anti-differentiation, etc.

⁵ I am indebted to Pedro Garcia Duarte for remarks on this paragraph.

⁶ See, for instance, Genome Research Project. <http://dev99.advanced.org/28920/>

⁷ See, for instance *Programa Educacional em Multimídia na Internet*, Escola Paulista de Medicina, Universidade Federal De São Paulo, <http://www.epm.br/ge/capa.htm>

Since the discovery of gene-Z, located in chromosome 17, responsible for the development of neuron-Z, it has been possible to determine that only 10 to 15 per cent of men and 5 to 8 per cent of women are neuron-Z carriers. The gender distribution of neuron-Z in the population also explains why the majority of mathematicians are men. Studies are being carried out in the US to determine the percentage of carriers among the African-American and Mexican-American minorities. It is suspected that it is considerably smaller than among among the white population. In fact "the American scientists Richard Herrnstein and Charles Murray, in the study called *The Bell Curve*, had already created a correlation between race, genes, and intelligence coefficient that excluded American Negroes from the cognitive elite" [Kurz, 1997: 196]. From a teaching perspective, individuals who are not neuron-Z carriers have generally been designated names such as "low-achievers", "risk students", students with "special difficulties" and of "average intelligence".

"Mathematics teaching in elementary school (...) should be conceived for students who, in their great majority, will not go beyond high school. (...) It should be construed and executed aiming at students of current or average intelligence, with no special gift for mathematics. Ability for mathematics is like ability for music: both can be naturally found in a minority of students, both can be stimulated to a certain extent in a small percentage of students, but at the elementary school level, students in evident majority, do not have learning ability either for mathematics nor for music" [Nachbin, 1981:18].

The discovery of neuron-Z provides an immediate explanation of why so many people find mathematics difficult and feel aversion towards it. This is due to the great effort that non-carriers have to make in order to produce adequate answers using non-specialized alternative neurons. These students have to develop rote methods and blind-rule searching. *Can I cut above and below? Only if the sign is times. If it is plus or minus I can't.* A non-carrier child will face difficulties operating with ordinary fractions and will tend to replace them by decimal fractions that can be performed on calculating machines, for which non-specialized neurons suffice. In college, non-carriers will face great difficulties in anti-differentiation and will tend to rely on tables of integrals and systematically use integration by parts even when this method obviously fails, because it is a routine kind of operation that can be carried out by alternative neurons. The absence of neuron-Z makes it almost impossible to form the concept of function, so that, when it comes to applying differential calculus to solve extreme-value problems, students experience a discontinuity in the level of difficulty of the calculus course: to find the function to be differentiated is almost impossible for non-carriers. Also in the definition of the limit of a sequence, for instance, in the absence of neuron-Z the student gets stuck at the first part (*for every epsilon there is an N*) obsessed with this N without connecting it with the property that it is supposed to satisfy (*for every $n > N$ the absolute value of the difference is less than epsilon*).

The need to memorize more and more rules ends up producing dissatisfaction and finally aversion. It has been noted that this difficulty is much greater than usually assumed: "In general, encapsulating processes to become objects is considered to be extremely difficult (...) and not very many pedagogical strategies have been effective in helping students do this in situations such as functions and cosets" [Dubinski et al, 1999:100]. The reason for this is now clear: the difficulty is genetically rooted.

However, from the point of view of education, the most noticeable consequence is that current traditional teaching methods can now be justified, both from cognitive and political perspectives. Here is a characterization of such methods:

"Classical instructional approach is characterized by curricula that is taught directly, systematically, and incrementally in small structured and guided steps that progress from basic to more complex learning; instruction focused on specific academic content (not process or outcomes); repetition, practice, and memorization used to derive automaticity; and students receive immediate feedback and correction" ⁸.

From the cognitive point of view, this method is justified by the argument that the most talented students (i.e. neuron-Z carriers) will be able to form operational synthesis among the several partial and local acquisitions and will emerge as those who are mathematically gifted. The political justification rests on the argument that even those who are not carriers will have the opportunity

⁸ *Texas Public Foundation's Policy Action Update*, volume 3, n°. 12, May, 1999.

and the time to learn how to use their alternative neurons in order to produce correct answers by rote learning and *ad hoc* rules. These will take advantage of an apparently high standard curriculum to increase the sing-value of their certificates. From the NZ-theory, traditional teaching can now be justified as a genetically-based social agreement.

The teacher should stand in front of the class, explain the subject matter on an overhead or blackboard in such a way that carriers will understand immediately. Matrix disposition of children in the room will assure equal opportunity to all. Children must remain quiet and silent because the establishment of neuronal connections requires serenity of the body. Notebooks and spreadsheets must receive blue marks so that parents will not be upset by the eventual absence of neuron-Z in their children. Grades should be limited to results, so as not to impose impossible methods on non-carriers. This model should be reinforced by the media whenever a classroom is shown on TV.

Insofar as traditional teaching assumes a scientific character, just like any science, it indicates its ideological past; that is, the dispute that it came to settle. Such a past is formed by the fight against alternative teaching methodologies such as “new math”, “group work”, “whole math” and the like, generally called “fuzzy math”. Supporters of such methods did not believe in the existence of neuron-Z. They assumed that mathematics was not the specific function of a group of neurons, so they assumed that it could be learned equally by all, as long as they went through adequate controlled experiences. Constructivism, stemming from Piaget's experiences was, perhaps, the most persistent of such ideologies. The NCTM Standards are their last offspring. Here is a nice summary of such methods.

“In 'standards-based' math programs students direct their own learning; work in groups to teach one another; construct their own math language, facts, and computations; are not taught or required to memorize facts or formulas; are taught to use calculators as the first and primary form of computation; and, are taught that deriving correct solutions lacks importance” [ibid.].

In such teaching strategies and curricular directives, only neuron-Z carriers have a chance of responding and finding their way through it towards knowledge. The discovery of neuron-Z reveals the extreme cruelty of imposing new methods on non-carrier children. “Fuzzy math has been shown to hurt children academically, specially disadvantaged and minority students” [ibid.]. In such methods these students feel completely at a loss. During group work, for instance, the operation of suspending one's own point of view in order to explain the reasoning of somebody else, the simple act of listening to somebody else's opinion or entering into effective dialogue is almost impossible for a non-carrier. Therefore, the parents, among whom the percentage of neuron-Z carriers is as low as among the population in general, rightly react against teaching reform attempts. They demand routine exercises that children can do by repeating until they assimilate it by drilling. They refuse to accept that a method of work or thinking may be imposed on their children and demand that only the final answers of the exercises be graded. The child who worked with decimals and instead of $\frac{49}{20}$ has found 2,45 must score because “it is correct”. Parents know very well that operating with ordinary fractions is a tremendous task in terms of non-specialized neurons.

Current school systems can now be justified also as adequate social contracts especially designed to take into account a heterogeneous distribution of neuron-Z among the population. Strict pass/fail rules based on precise testing should be enforced, so that the ghost of failure will press non-carriers to work hard and do their best. However, what has now been proved, has always been implicitly admitted, namely that the majority of students will not succeed no matter how much effort they make, because they do not have neuron-Z. Therefore, the school system has carefully developed a way to give a chance to non-carriers. “What to do for low achieving students? (...) Provide these children extra assistance, summer school, if need be (...) and then promote” [Bracey, 1999]. Via the subsidiary promotional criteria, the school apparatus can cope with the reality of a heterogeneous population: strict pass/fail rules make up the façade, but a scheme of social promotion should be set up in the background. The school system has rightly developed into a hierarchical elitist system, well suited to the upper classes (carriers) as well as an equal-opportunity democratic system suited to the lower classes (non-carriers).

The discovery of neuron-Z sanctions this social contract: the class division in school can now be genetically justified. Up until now, such an arrangement between social classes could not be fully revealed. The interests of non-carriers could not be stated overtly. "Social promotion", meaning the practice of promoting a youth based on age and "sitting time" rather than on acquired skills, offers too explicit a support of non-carriers' interests. It risks revealing the whole plot. So U.S. federal funds have been targeted to schools doing away with this practice. Interests of non-carriers for promotion had to be disguised as an opposition to "retention" defined as the use of failure as a pedagogical technique. Retention (failing) had to be condemned either emotionally as a "disaster", as having "significant negative emotional outcomes", economically, as "the increased cost of retaining lots of children", or cognitively, as having an "impact on education achieving" [Bracey, 1999]. With the discovery of neuron-Z, retention can now be bluntly condemned on the basis that it simply breaks the social contract, depriving non-carriers of the accorded chance they must have in the school credit system.

The enforcement of the school social agreement has already been submitted to court. "The lawsuit (...) alleges that Tempo High School did not properly teach Jonathan Govias chemistry, math and physics (...) Without the necessary knowledge he had expected to obtain in high school he had to withdraw from the (engineering) course" ⁹. The lawsuit began in 1995 and had not come to trial in July 1999. The discovery of neuron-Z inverts the cases. A simple DNA exam will reveal if the student is a carrier or not. If not, the lawsuit may be directed against the engineering school, holding it responsible for failing to provide Jonathan with opportunities of rote learning strategies with which he succeeded in elementary and high school. The engineering school will have violated the social pact.

The neuron-Z theory also explains other forms of student behavior. When facing a different point of view, non-carriers, unable to argue back, tend to see opposition not only to their ideas, but also to themselves personally. Violence is then a natural reaction. The political thinking of non-carriers tends to be oversimplified: if the Berlin Wall fell, it is because capitalism is better; I voted for the Right because the Left would be worse; if guns kill, forbid guns; if ethics is missing in schools, introduce classes about ethics.

However, on one point the Neuron-Z theory has not brought comfort to the American population. Recent international comparative studies¹⁰ have shown that mathematical abilities of children in the U.S. are situated just below the international average, behind the abilities of some Asian and Eastern European nations, including Japan. Independent studies show similar U.S. deficiencies with respect to China [Ma, 1999] and Germany [Stigler & Hiebert, 1999]. In the face of such results, educators who did not believe in the existence of Neuron-Z suggested and tried to implement reforms in curriculum and teaching methods. Those who never lost faith that Neuron-Z would someday be discovered rejected such changes and stressed the need to reinforce current traditional teaching methods. The Japanese lead has been most stirring in U.S. While neuron-Z believers refer to the innovations as "fuzzy math", reformers refer to traditional teaching as "parrot math". The debate is known as the "math war" [O'Brien, 1999]. With the discovery of neuron-Z, the matter can finally be settled. If the percentage of neuron-Z carriers among the population in China and Japan is in fact greater than among the American White population, Chinese and Japanese will forever perform better, unless inter-racial marriages are promoted.

⁹ The National Post (Canada) Wednesday, July 14, 1999.

¹⁰ For instance, the Third International Mathematics and Science Study (TIMSS) tested half a million students from 41 nations during 1995, sponsored by the International Association for the Evaluation of Educational Achievement (IEA), <http://ustimss.msu.edu/>

A decisive test

The reader is probably anxious to know whether s/he is an NZ-carrier as well as her/his offspring. So here is a decisive test. If you believed this story about neuron-Z then you are certainly not an NZ-carrier. The international Centre of Brain Injury never existed, S. Zanati is an anagram of a well known ideology, and 17 is my phone extension number (at ICBI, of course).

The presentation of neuron-Z theory has raised considerable excitement in the audiences that have been introduced to it ¹¹. Some have reacted with anger, others have shown some sympathy. People who have read the draft of this paper tended to ignore the above paragraph and attribute the theory's authorship to me. One colleague with some knowledge in neuroscience told me that I was not sufficiently qualified in neuroscience to produce such an involved theory. Another one complained that the theory was flawed: "*How can a group of neurons be 'absent'? These guys are nuts.*" Nevertheless, NZ-theory proved itself highly credible. Why?

"Two things contribute in order to really deceive the reader: the text composition is very "official" and the fact that the whole presentation is filled with bibliographical references that, in fact, do not exactly refer to the theory but whose frequency in the text is sufficient for the reader to process them as if they did" ¹²

However, there is probably something beyond the mere form of the composition causing the commotion. We can invoke at least three arguments. The formulation of NZ-theory presented here corresponds to one of the three ways of facing a myth [Barthes, 1985]. We may receive the impact of the myth, acting as if NZ existed, as most people do, or we may attempt to avoid the myth's effect. In this case, we may either try to decipher the myth, arguing against the possibility of a neuronal solution to the mind-body problem, or we may proceed as we did here, taking the myth "seriously" and obliging it to confess itself plainly. From another point of view, we can say that the hypothetical theory completes an ideological field by exhibiting its *central subject* [Althusser, 1976]: a group of neurons in the name of which long established intellectual vertical (father/son) and horizontal (brotherhood) social relations can be justified. The process of social exclusion can then be justified as a process of natural selection through school with the survival of the fittest. The theory "identifies, in the ideological building, the element that represents its own impossibility" [Zizek, 1990:158]. Still from another point of view, we can say that NZ-theory realizes what Hegel calls the *dialectical moment* of concept development. It means the self-suppression of finite determinations characterizing traditional teaching and their passage into their opposites [Hegel, 1994:343]. However, two questions remain:

1. Why do so many people take NZ-theory for granted and some even cheer for it?
2. Why, despite knowing it is fake and has fascist motives, do people continue to behave as if they believed it?

1) In fact, NZ-theory is just a crude formulation of the general old mind-body problem [Lyons, 1995 ¹³]. For a long time, philosophers and scientists have been looking for the psychophysical connection that would explain how the brain produces consciousness. Up to now, the solution is dismaying: the mind-body problem is a *non-mysterious mystery*: "I would like to suggest that the nature of the psychophysical connection has a full and non-mysterious explanation in a certain science, but that this science is inaccessible to us as a matter of principle" [McGinn, 1995:284].

So, after almost three hundred pages, philosophers profess faith in a future inaccessible science, a mystery that would dissipate the mystery. However, they do not abandon their belief in the physical objectivity of this pair of abstractions: "mind" and "body". "Everything physical has a purely physical explanation" [ibid, 282]. New light may be shed on the problem if we take up a Marx-Lacan-Zizek line of reasoning about how abstractions are formed. "As a rule, the most general abstraction arises only in the midst of the richest possible concrete development, where one thing appears as common to many, to

¹¹ VI ERMAC, Departamento de Matemática da Universidade Estadual de Londrina, PR, September 1st. 1999, I Encontro Brasiliense de Educação Matemática, Brasília DF, September 19, 1999, XIX Semana da Matemática, UNESP, Rio Claro, October 8, 1999.

¹² From a reaction to a draft of this paper by Eduardo N. Baldino, e-mail in October 13, 1999.

all” [Marx, 1973:104]. Marx was studying the problem of commodities, one of which is money. Whenever two owners meet in the market in order to exchange their commodities, a *real abstraction* takes place. Their commodities are reduced to their exchange-values regardless of their empirical particular shapes (use-values). This real abstraction is taken as the departure point of an epistemological reflection:

“Before thought could arrive at the concept of a purely *quantitative* determination, the *sine qua non* of modern science of nature, the pure quantity was already in action in money, this commodity that makes it possible to measure the value of all others, whatever their particular qualitative determination be. (...) The repressed *social* dimension of his act [of exchange] emerges next under the form of its contrary, the universal reason focused on the observation of *nature* (the net of categories of ‘pure reason’ as the conceptual framework of natural sciences). (...) ‘*Real abstraction*’ is the *unconscious of the [Kantian] transcendental subject*, the support of the objective-universal scientific knowledge. (...)” [Zizek, 1988:171].

This author quotes Alfred Sohn-Rethel, who stated the effect of real abstractions on the way of thinking in still sharper words: “The abstraction of exchange is not thought itself, but it has the *form* of thought” [Rethel, 1970 in Zizek, 1988:137]. This is a possible definition of the unconscious as a form of thought exterior and irreducible to the content of thought. The unconscious is “Another Scene, exterior to thought, in which the form of thought is articulated beforehand” [Zizek, 1988:174].

We may then understand why, once the abstractions “mind” or “consciousness” and “body” are formed, people cannot avoid thinking of them in terms of cause and effect. Their (unconscious) form of thinking has already prepared the answers for which they make the questions. “Every human behaviour is reducible to the function of neuronal nets. It is obvious that the whole human being is inside the skull-box, otherwise we would be forced to believe in God. And what is inside the skull box can be explained because it is a finite amount of matter”¹⁴ [note 13]. This thinking only needs questions to complete it, because the answers are already determined by its form. It is clear, then, how NZ-theory came to fill a need: it provided the right questions for previously established answers: *what is the percentage of carriers among the population? How to identify talented students? How to keep America great? A colleague who was enthusiastic about the theory showed some distress when he realized that it was a fake. How else could we explain individual differences?*, he complained. Yes, given a certain *form of thought*, unconsciously established from *real abstractions*, there is, in fact, no other explanation.

2) The persistence of the faith in NZ-theory even after the machination has been revealed, relates to the persistence of the mind-body problem. How are these abstractions, “mind” and “body”, formed and why do people insist on their objectivity? In order to explain this, we have to take a turn through money. Money has a physical, tangible body formerly expressed in gold coins, then in paper bills and nowadays in plastic cards. Washed out coins, torn bills and broken cards do not lose their money value. Money has a sublime indestructible material body granted by some *symbolic authority*, generally a “bank”. Money has a *bodiless body*. This sort of abstraction is a consequence of everyday real exchange. It is easily made by the most simple and illiterate of all creatures.

“In a certain relation, the same happens with man. Since he does not come to the world with a mirror as the Fichtean philosopher, I - Myself, in principle he only recognises himself in another man. It is only in his relation with the man Paul, as a man equal to him, that the man Peter relates to himself as a man. This is why it is Paul, with his skin and hair, in his Paul’s body, that is worth Peter as the form of appearance of the male gender” [Marx, 1976:586].

It is in front of a mirror that one day Paul pointed to Peter’s image and told him: *That one is you. That is the one whom you should love, because that is the one I love*. At this moment a double identification occurred. On the one hand, Peter identified himself with the image in the mirror as how he should look in order to be loved by Paul. This is the imaginary *identification*, in the sense

¹³ This book was indicated to me by Romulo Lins after the reading the first draft of this paper.

¹⁴ Idem note 11.

that this word has on "identity card" for instance. On the other hand, Peter identified himself with Paul's point of view: *I have to look at myself the way he does because it is from his standpoint that I deserve love*. This is the symbolic or ideological identification, in the sense of "identify with". The symbolic identification is the builder of the unconscious. Peter has to believe that he is developing his own opinions, not copying Paul's.

Peter attempts to imitate something about Paul that is impossible to imitate: his thinking. He also tries to keep his image distinct from Paul's so as to build his own identity. The effort to copy Paul's *mind* and distinguish his from Paul's *body* is what constitutes Peter as a human subject integrated in a social-symbolic field. Then mind and body are assumed to be objectively "*common to many, to all*". The complete Cartesian formula of the interplay between the two identifications would be: *I think* (like you), *hence I am* ((in love with) that one in the mirror). Minds are equalized insofar as bodies are differentiated.

It is not the mind-body relation that has to be explained. What has to be explained is how this relation became a problem. How is it possible to ignore the different origins and developments of these two abstractions? How is it possible to throw both inside the mirror as part of the objective world? The answer is: by work of the unconscious. "This combined game between the imaginary and symbolic identifications, under the domination of the symbolic identification, constitutes the mechanism through which the subject is integrated in a given social-symbolic field" [Zizek, 1990:138]. The social-symbolic field lies entirely inside the mirror, the place where Peter is equal to Paul, where both can speak objectively about each other, about the world, and nature. It is the place of science, of *statements* where, according to Sohn-Rethel [1970], thought already has a *form*, determined by the abstraction of exchange. The authors of scientific statements dwell on this side, outside the mirror, the place of *enunciation*, they dwell in the "Other Scene", the scene ignored by the objective scientific statements. "The Freudian concept of unconscious is (...) of an *entity whose existence implies a certain not-to-know*. (...) Its ontological consistency relies from end to end on a certain unknowing" [Zizek, 1988:176]. It is the refusal to know about the symbolic authority that presided over the two identifications, the authority who says "*hence*", a mark that precedes the "I think" and the "I am"; it is a refusal to know about "la zone d'un savoir létal" [ibid.] that sustains the objectivity of the mind-body problem.

Classical political economy focused on money, unable to decipher where its "intrinsic" properties come from. They were first attributed to physical properties of gold. Modern philosophy of mind focuses on the mind-body relation only to conclude that it is a mystery to be deciphered by an inaccessible science. Mind is to body just as the bodiless character of money is to coins. This abstraction shapes people's (unconscious) thinking in the modern capitalistic society. It is from this perspective that NZ-theory derives its fascination effect. Whatever cannot be put into such a form, cannot be stated; whatever can be stated in such a form, fulfils it and becomes permanent, even if it is a fake.

The mystery is expressed in the form of thought assuming that consciousness is first with respect to language: "Surely language and the propositional attitudes are more complex and advanced evolutionary achievements than the mere possession of consciousness by a physical organism" [McGinn, 1995:287]. This form of thought assumes that there is a direct route to mind, independent of language. The problem then consists of filling this form of thought with adequate questions so that the discourse can go on, repeating itself in several stages. What is Rodin's *Le Penseur* doing? What is it like to be a bat? Are we made of matter or soul-stuff? [Lyons, 1995: LIII;159;133]. In the end, a mystery...

Such a persistence in focusing on an abstract problem as if it were an objective one, evident in the debate about the philosophy of mind, is reproduced in small scale with the NZ-theory. In order to explain this persistence, we have to resort to the concept of *symptom*.

"The 'symptom' in the strict sense is this particular element that denies the Universal of which it is a part. Instead of functioning as an 'insufficient realisation' of this universality and being a remainder to be abolished by its ulterior radicalisation, (the symptom) functions rather as a constitutive moment of it" [Zizek, 1988:176].

NZ-theory sets up an ideological realm through some promises of happiness. Difficulties in mathematics can be explained, some people will be relieved from the suffering of being submitted to certain methods, the social pact can be sustained, and so on. Then, on a second level, some disturbing consequences emerge. DNA tests would replace exams, genetic manipulation would replace efforts to learn. Then, on a third level, the stage is open to social Darwinism, eugenics, controlled breeding, racial improvement. Finally, what seemed a remainder, an excess that could be avoided by an adequate conduction of the process, reveals itself as the convergence point, the attractor that is actually constitutive of the whole story: a shrilling cry in unison: *Heil*. This was the real point of attraction for all readers, the empty spot necessary for the hypnotic fascination effect.

It is useless to interpret the symptom in terms of statements because the unconscious that supports the symptom is structured as the language of enunciation, the language of the Other Scene, precisely the scene that the form of thought refuses to incorporate. One reader explicitly recognized that he chose not-to-know. "The theory is so credible that it generates a very emotional response, which the paragraph on the decisive test is not sufficient to dismantle. The reader chooses to file this paragraph in the 'not understood, think of it later' folder " ¹⁵.

Interpreting a symptom does not help a psychoanalytical patient, just as explanations do not help mathematics students. The subject has to elaborate the meaning of the symptoms and deal with his/her *refusal to know* [Cabral, 1997]. Why is this so difficult?

"Why, in spite of its interpretation the symptom does not disappear? Why does it persevere? Lacan's answer is naturally *jouissance* ¹⁶. The symptom is not just a ciphered message, it is also a way for the subject to organise his *jouissance* – this is why even after a complete interpretation, the subject is not ready to renounce his/her symptom" [Zizek, 1990:209].

It is certainly not due to lack of NZ !

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¹⁵ Idem note 11. The full text is: "Touché. In the way it has been presented the theory is believable. It is perfectly acceptable that the scientific community could produce such a theory since many scientists in the neurological field are nuts. Two things contribute in order to really deceive the reader: (i) the text composition seems very "official" and (ii) the fact that the whole presentation is filled with bibliographical references that, in fact, do not exactly refer to the theory but whose frequency in the text is sufficient for the reader to process them as if they did. Besides, there are the names of scientists and institutions. It's the old myth of authority and competence. I fell for it like a child. The true decisive test is not having believed it. The true test is to have continued believing it even after reading the paragraph about the decisive test... The theory is so credible that it generates a very emotional response, which the paragraph on the decisive test is not sufficient to dismantle. The reader chooses to file this paragraph in the 'not understood, think of it later' folder. Get ready because this thing is going to cause polemics. Truly. Eduardo Baldino.

¹⁶ We follow the tradition and use the French word in italics since the corresponding English word "enjoyance" is not in the dictionary.

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