

2020

The Schrödinger's cat paradox in the mind creative process

Dionéia Motta Monte-Serrat

*Faculty of Philosophy, Sciences and Letters of Ribeirão Preto, University of São Paulo, FFCLRP-USP
University of Ribeirão Preto, UNAERP, Brazil, di_motta61@yahoo.com.br*

Brenno Caetano Troca Cabella

São Paulo State University, UNESP, Brazil, di_motta61@yahoo.com.br

Carlo Cattani

Engineering School, DEIM, Tuscia University, Viterbo, 01100 Viterbo, Italy, di_motta61@yahoo.com.br

Follow this and additional works at: <https://digitalcommons.aaru.edu.jo/isl>

Recommended Citation

Dionéia Motta Monte-Serrat, Brenno; Caetano Troca Cabella, Brenno; and Cattani, Carlo (2020) "The Schrödinger's cat paradox in the mind creative process," *Information Sciences Letters*: Vol. 9 : Iss. 3 , Article 1. Available at: <https://digitalcommons.aaru.edu.jo/isl/vol9/iss3/1>

This Article is brought to you for free and open access by Arab Journals Platform. It has been accepted for inclusion in Information Sciences Letters by an authorized editor. The journal is hosted on Digital Commons, an Elsevier platform. For more information, please contact rakan@aarj.edu.jo, marah@aarj.edu.jo, u.murad@aarj.edu.jo.

The Schrödinger's cat paradox in the mind creative process

Dionéia Motta Monte-Serrat^{1,*}, Brenno Caetano Troca Cabella² and Carlo Cattani³

¹Faculty of Philosophy, Sciences and Letters of Ribeirao Preto, University of Sao Paulo, FFCLRP-USP University of Ribeirao Preto, UNAERP, Brazil

²Sao Paulo State University, UNESP, Brazil

³Engineering School, DEIM, Tuscia University, Viterbo, 01100 Viterbo, Italy

Received: 27 Feb. 2020, Revised: 22 June 2020, Accepted: 26 June 2020

Published online: 1 Sep. 2020

Abstract: This article, through Schrödinger's cat theory, points to a conflict between individuality and universality in the creative process that would appear to be an inconsistency of cognition. We chose the axiomatic-logical concept of language as a system of oppositions of places and values for this discussion, understood as a complex phenomenon mediating between the human mind and the environment. Creativity involves language and cognition and is of interest to artificial intelligence, AI, thus, an in-depth look at creative aspects of the human mind helps to better understand the structure of natural language and gives wagers for new AI challenges. There is an interdisciplinary approach, highlighting aspects of language that leave room for creativity and differentiation, paving the way for them to be adopted by artificial intelligence. We found that the broad concept of language reveals the 'way of thinking' that unveils how creation occurs in its statu nascendi, facing the choice between opposite states to establish the new, the creative: The origin of creation is not in the elements that are part of it, but it is in the path taken by the creative process. Schrödinger's cat experiment illustrates how the creative process takes place: Either the supposed creation will reveal a tendency to take 'probable knowledge' as 'fact of knowledge', or real creation breaks this perspective and settles in the subjectivity of the subject. These considerations lead us to place bets on processes that would serve to replicate creativity in artificial intelligence, making it more intuitive, removing its curse of dimensionality and reducing the need for human intervention in machine learning.

Keywords: Creative process, Language, Cognition, Interdisciplinarity, Artificial Intelligence.

1 Introduction

Yes, mathematics has two faces; it is the rigorous science of Euclid but it is also something else. Mathematics presented in the Euclidean way appears as a systematic, deductive science; but mathematics in the making appears as an experimental, inductive science [...] the second aspect is new in one respect; mathematics 'in statu nascendi', in the process of being invented [1, p. vii]

In Polya's words there exists a dialectic co-existence of the abstract formal imaginary world and the experimental real sensible world. The special way between the subjectivity and real world is the creative process of human mind. In this article, we discuss what creativity is from the point of view of mathematics, and

more in general of a scientific discipline (see e.g.[2,3,4,5]). In artistic creation the new mixes with what already exists [6,7]. The creative work houses a continuity and at the same time a break with it, presenting a turnaround, something unexpected that surprises even its author.

Creativity involves language and cognition and is of interest to artificial intelligence, AI, since a machine learning that imitates human intelligence is sought. An in-depth look at creative aspects of the human mind helps to better understand the structure of natural language and gives wagers for new AI challenges.

Language is the ability to use a set for the purpose of encoding and decoding information. Mathematics and linguistics deal with the representation of thought through symbolic language. Computer language, in turn, is formal, symbolic and depends on the linguistic principles of natural language. Thus, computing regulates the

* Corresponding author e-mail: di.motta61@yahoo.com.br



behavior of the machine by imitating the underlying structure of natural language.

This article aims to highlight some creative aspects of natural language, processed by cognition, in order to be useful for the development of intuition in artificial intelligence [8]. The latter, when working in probabilistic terms, usually falls under the curse of dimensionality, not reflecting reality [9]. The comments in this article show the logical-axiomatic aspect of natural language that, at the same time, includes a generalization and the particularity of the creative process.

Computer language does not arise from an evolution like natural language. Human intervention, through mathematics, will produce this formal language from a combination of elements. It is at this point that this article intends to interfere to clarify aspects of natural language that may be useful to the machine so that it performs tasks in a more intuitive way.

Normally, great importance is given to the characteristic of the logical sequence of language, as a finite set of rules that organize speech, writing and, also, space. However, in the real world, the human body is subject to the perception of physical forces acting on the sensory organs [9, pp. 56-57]. The cognitive apparatus organizes and interprets these stimuli and becomes able to respond to them. Computational language, in turn, creates systems that organize information trying to imitate the way that natural intelligence organizes information obtained by the human body.

It is important to understand the cognition process as something that emerges from a generic pattern (as a combination of stimuli) until it forms a combinatorial creativity that will characterize individuality. This understanding is believed to guarantee an ideal research path for AI to find a new line of development. For that, it is intended to show, through Schrodinger's cat theory [10], that human cognition houses an intriguing and apparently paradoxical structure, being universal on the one hand and individual and creative on the other.

Philosophical discussion is necessary, as this area of knowledge discusses creativity. However, the theme of creativity must not remain philosophical [11,12]. This article is interdisciplinary and highlights aspects of language that leave room for creativity and differentiation, paving the way for them to be adopted by artificial intelligence. The interdisciplinary discussion of the human creative process avoids scientific fragmentation, which is detrimental to the understanding of this complex phenomenon. The compartmentalized and encapsulated rationality reduces the creation process to a unidirectional perspective, being, in fact, a process characterized by the diversity and complexity of human reality.

We begin clarifying what is understood as a generic concept of language and cognition, so that the reader is not restricted to accepting language as a communication process, based on logic and as an idealized competence of human beings for produce and understand sentences. This

idealized concept of language neglects specific performances of natural language, which encompasses universality and allows creativity to be unexpected and unforeseen. Language and cognition are not linked to the realm of reason. Therein lies the possibility of creation.

The creative process is taken as a starting point as something that relates mind and meaning, and that, being a 'process', we approach it from the perspective of the structure of natural language (which houses axiomatic aspects of the system's biological dynamics and logical aspects). This article unfolds on the following topics: 2. The creative mind in which we discuss the difficult tasks to define the phenomenon of creativity beyond logical reasoning; 3. The Schrodinger cat theory to explain the apparent inconsistency in cognition; 4. Alignment of mind and sense that shows a fusion between mind and sense and that the external environment and the individual's interior are part of the creativity process; 5. The role of logic in language, describing language as a system of oppositions of places and values that influences the ways of doing and saying; 6. Aesthetics versus logic to explain that aesthetics in the creative work is about value and the logical aspect of language makes 'see too much' installing a defective relationship between what is seen and what is understood; 7. Breaking language in which we describe the complicity relationship between positive science and the subject's unconscious that escapes a 'regime of thought'; and 8. Conclusion: The origin of the creative work, where we explain the path taken by the creative process, putting bets for the artificial intelligence to be creative and intuitive.

2 The creative mind

The creative mind remains unknown, despite scientific advances in neuroscience. Discussions on this subject arise in several disciplines, always addressing it in a specific way and restricted to some elements. Just to illustrate, we can find evolutionary approaches to mind creation involving the components of individual cognition (intelligence, learning, memory, personality and motivation) and the sociocultural environment [3] suggesting that creative products are accommodated in a multidimensional single space of basic properties, with different individual elements associated with supporting cognitive processes. Warr and O'Neill [7] give a unified definition for 'creativity' and 'innovation' by relating them to social influence. Gabora [4] explains the cognitive change that occurs as the creative process proceeds, stating that the information is retrieved from a large region containing many memory locations. Bindeman [2], in turn, studies creativity from psychological and philosophical perspectives, correlating noematic (or static) data related to the experience of the creative act with noetic (or dynamic) data about the nature and meaning of the creative act itself.

In this article we present a new perspective: A characteristic of wholeness in the creative process which we believe is a fundamental step to understand that creation is the result of 'relationships' of elements and not of the 'existence' of elements that are part of it through a summation activity.

Ranci re [13, p.11] places art in thought by stating that aesthetics is not 'science or discipline that deals with art', but rather a *way of thinking* that develops about the things of art and that it seeks to say in that they consist as 'things of thought'.

Life as a dynamic system provides elements for us to make interdisciplinary bets on the creative process. The investigation of how creation is produced in the human mind will be done according to what some authors say about artistic creation and according to linguistics (Michel P cheux), psychoanalysis (Lacan), neurolinguistics and mathematics, in order to seek a meaning for what Andre Breton (1937) calls 'hasard': Encounter, chance, event (as opposed to a structure).

3 The Schr dinger's cat experiment

In the creative process there are two opposing mental states, such as the coexistence of life and death in Schr dinger's cat experiment [10, p.812]. It is a virtual experiment given by Erwin Schr dinger in 1935 to criticize the quantum superposition where two quantum (opposite) states might co-exist at the same time. The interpretation of quantum mechanics is that, after a while, the cat is both alive and dead. Schr dinger's cat is an experiment in which a cat, a bottle of poison or a radioactive source are placed in a sealed box. If the bottle is broken, there is a release of poison that will kill the cat. The interpretation of quantum mechanics is that, after a while, the cat is both alive and dead. However, when someone looks inside the box, they see the cat 'alive or dead', not a paradox of an 'alive and dead' cat. This shows that reality determines only one possibility alternative to another which is opposite to the first. The Hamlet soliloquy "to be or not to be" teach us that our challenging life is continuously facing the choice between opposite states while in our creative process the opposite states coexist alike the quantum superposition. The human experience constantly undergoes "the will to doubt" [11, p. ix] so that the human knowledge is at most an uncertain guess (hazard), among a variety of equivalent alternative events so that the uniqueness is not a characteristic feature of the reality: 'Doubt is no mere negative of belief; rather it is a very vital part of belief, it has a place in the believer's experience and volition'.

Doubt is intrinsically linked to the cognitive process, through which personal individuality is formed. Under a routine, this individuality becomes predictable, but there are situations in which, somehow, human cognition recognizes something as having a very positive value, especially valuing different conditions, or different

relationships, putting in doubt the routine to establish different views of things. This process leads to overcoming or denying previous states, making it essential for progress, to establish the new, the creative.

Cognition is insistent on individuality, becoming independent in a specific way, when real life demands the particular and the different through which the individual is assumed to be necessarily identified, experiencing the 'living, integral exponent of the unity of experience' [11, p.232].

In this case, there is a conflict between individuality and universality. There seems to be inconsistency in cognition. However, this inconsistency is only apparent. Universality in the human mind is not for the universal in an abstract sense, separated from details; on the contrary, it brings together all the particular elements brought about by the stimuli experienced by the body and registered in the mind, ready to 'translate' any particular relationship or experience. Better to say, somehow some experiences reach a state of higher worth or meaning for the individual, standing out from all other real or possible relationships or experiences. The universal of cognition is not denying or betraying the particular experience, on the contrary, it is encompassing all other factors or elements that could be part of that special experience, highlighted as if it were a unit of experience or reality. The universal is abstract in the sense of being all the details; the individual is possible 'in' and 'through' difference, and can be appreciated as a higher development, something of value: Creation. Creativity, therefore, has its origin in a tension of difference with the universal. It is not something independent.

The existence is an illusory task, because it is based on experience which is a collection of samples, so that the only proof of the existence can be given by the enumeration, i.e. a mathematical induction, infinite descent and the inductive inference. As shown by B. Russell [14] and K. Popper [15] with the inductivist turkey any principle or proof, based on mathematical induction, it can fail, and the proof of existence as well.

On the contrary the creative process gives us a complete paradigm of the reality, based on the existence which characterizes any product of our imagination. In other words, in the mathematical creative process the proof of the existence always hold. In fact, we can show either the existence of a postulate or its negation (logical complement), and in both cases the existence is proven.

4 Alignment of mind and sense

In this section we discuss the difficult task of defining the phenomenon of creativity beyond logical reasoning. Breton associates creativity with an alignment of the unconscious with desire. Schulrick says that creation results from an encounter between desires and fantasies. Blanchot states that there is a fusion which is experienced by the individual. Everyone agrees that there is an

alignment between mind and sense and that the external environment and the individual's interior are part of the creativity process. The relationship between thought and externality to create meaning is possible via the natural language, that is, the entire apparatus of the human body necessary to capture stimuli, take them to the central cognitive system and express it through actions, including creative expression. Cognition is not just a brain process, but it involves the brain, the body and the environment in which the latter is. It also involves language, because reality is 'translated' through the complex system of natural language, replacing that with cognitions and actions. Cognitive processes are aimed at building meaning, so that human beings are able to interpret the reality around them. For this, the human body uses dynamic systems coordinated between brain, body and environment. Therefore, cognition is not static, but it is always updating in order to support more complex cognitive functions, of a higher order, the creative process being among them.

4.1 Blurred borders

Breton [16] defines the French term 'chance' or 'hasard' as a form of manifestation coming from an external need, which makes a way in the human unconsciousness to try to reconcile and interpret a certain subject. The author makes it clear that, in this process, there is a coincidence of desires and fantasies with something not perceived or foreign to the subject [8, p.43], that is, in this 'encounter' there are, at the same time, elements of desire and the stranger. In this phenomenon there is something about reality that interferes with the 'alignment' of the subject's desire [16]. Schlurick [8] states that in this process there is a confusion between the external and internal limits of consciousness, blurring these limits and linking them to the element of surprise, which, as reported by Breton [16], replaces those limits and makes this leave to be a simple 'encounter'.

Blanchot [17], on the other hand, states that this phenomenon fuses the experience giving it a greater meaning than something empirical, because everything exists at once: Life, knowledge, thought, speech, love, time, society in short, the whole itself, a pure practice of experience. In this context, 'stubborn' facts can be identified that disturb the amateur of textuality [8, p.51]. Schlurick establishes [8, p.47] a difference between what we have so far called encounter (which reigned in the 19th century) and the most recent attempt to "emancipate all rules", stating that, in the latter, there is a 'domestication' of the encounter through the implementation of postmodernity and the rules of computer programs for producing text, for example.

4.2 Giving meaning to what seems devoid of meaning

Human language underwent a process of sanitization, in the sense that ambiguity, lapse and non sense were neglected [18]. This process gave greater importance to logical reasoning, putting aside subjectivity in language.

Rancière gives importance and a role to this subjectivity discarded by language scholars. He [13, p.10] affirms that 'there is a sense where it seems not to have, something enigmatic in what seems evident, a load of thought in what seems to be an anodyne detail'. This sense, according to the author [13, p.11] reveals, in a way, a 'relationship of thought with non-thought', 'thinking in sensitive materiality', 'involuntary in conscious thinking' and the 'meaning in the insignificant', a relationship that is capable of making the unconscious effective in a 'privileged way'.

What seems to happen in this case is that the creative process interferes, by another 'via', with the construction of the meaning in the interpretation process. Human reasoning takes precedence of a logical argument in the construction of meaning, whose steps are provided by implications normally given by the rules that govern language. The strategies or meaning formation in the syllogism stand out in relation to the content, as they help to develop an orientation on 'how' to think about something. Science seeks an explanation of how subjectivity intertwines in this logical reasoning.

5 The role of logic in language

In this topic we approach language as a system of oppositions of places and values. Since the science of linguistics was founded, language studies have given it a structure oriented to the expression of clear and transparent ideas [18]. This makes the logical structure of conventional language (a system of rules that discipline writing) direct the construction of meaning, influencing the ways of doing and saying.

Whorf [12] says that language imposes limits on the point of view that we adopt restraining the scientific spirit as a wholeness which entails viewpoints unprecedented in science. It is in this sense that the inexorable laws of pattern of language works; they are patterns that are unperceived and intricate in the language process, of which we are not aware. For this reason, this article has the mission of alerting the reader to take into account a broader sense of language, natural language, with its axiomatic features (related to the stimuli received by the body, which are taken up to the central cognitive system) and logic (relative to the logical system of the human mind).

Mathematically explaining the logical function of language, one can think of a set with a mathematical structure imposed on it, which takes the form of certain

relationships amongst the elements of the set within a pre-established context. What is proved is a mathematical reasoning itself. The language with its rules stands out from the context of reality to build meaning within the set of these rules. Sets allow one to reduce greatly the number possible meanings, turning almost all of them predictable by logical reasoning.

Classical logic, on which linguistic reasoning is based, admits statements as true and, from them, comes to a true conclusion. There is an "implication" reasoning in which one true statement leads to other true information [19, p.10]. If the hypothesis is valid, so is the thesis; there is a 'correct' order of language to provide a kind of necessary certainty, anticipating an interpretation. The principle of bivalence governs classical logic, which is: every proposition is true or false [19,20].

6 Aesthetics versus logic

Aesthetics is about value. Something that has a special value, that stands out from a generic whole, has an aesthetic value. The domain of knowledge of the sensitive, according to Rancière [13, p.12] is opposed to the domain of knowledge of logic, because it is a "confused knowledge" [13, p.13], 'a thought present outside itself', something that shelters the contradictory. In this way, the author [13, pp.19,21] identifies a problem arising from logical reasoning: It is the problem of anticipation, which makes 'see too much' what 'should only be said' and makes 'know early too much what should remain ignored'. He [13, pp.21] adds that, in this case, there is a 'defective relationship between what is seen and what is said, between what is said and what is heard' and that there is an excess concerning 'the mark of thinking about bodies'.

We look for a way to link this excess concerning 'the mark of thinking about bodies' (confusing knowledge according to Rancière) to the part of the logically stabilized knowledge of human cognition. For this purpose, it is necessary to start from a prospective perspective, which makes use of the dynamic context of the subject that produces the creative work. This stance makes our investigation complex. Finding a route that works both perspectives - axiomatic (biological) and logic of the human mind - in the creative process can help us understand that human language has a perfectly satisfying and clear sequence of implications, as well as an implicit sequence of what is given, the latter having its origin covered by the former.

Language is a structure with a system of oppositions of places and values, an oriented structure [21, p.309] It is through language that man expresses himself through any work of signs, producing repetition in an always intelligible and ideal space; an irreducibly oriented space in which there is a prevalence of one direction in the other in the movement [21, pp. 408,409]. It is in this sense that Pêcheux [22, p.194] affirms the "work of the thoughtless

in thought" determined by science. And, in the words of Signorini [23, p. 128], there is a 'force field' that influences 'ways of saying/doing', there is the imposition of metapragmatic standards (doing it right, acting properly) [23, pp.128,129]. On the other hand, there is a resistance to the logical standards established by the communication rules [23, pp.128,129]. Either the implications for the meaning formation come from these imposed rules, or they stem from encapsulated axioms giving rise to an order of supposed 'inequality' compared to the rules' standards. This order of inequality would be related to the order of the imaginary, in which an 'interval' or a 'change' appears as a supposedly 'negative' complement to the conclusion desired by the pattern previously established by the rules that govern the meaning formation in the oriented structure of language.

Creative work is not limited to two-dimensional space. Mathematically speaking, space is not just rational and Euclidean. There is also non-Euclidean geometry that goes beyond mathematics, as it houses different sets of axioms [19, p.16] serving as a paradigm for working mathematics on real objects. Stiny [24,25] claims that space has grammar, has its elements organized according to its own syntax and semantics that will characterize a style.

Opposing the configuration of a given space by the grammar of the form [24,25] there is the spatial syntax, which allows the configuration of a given space understood as a dynamic and non-static entity. 'The form is static, but the connections between spaces introduce dynamism in space' [6, p.10]. This dynamism provides the emergence of new values, new meanings to a space that at first was considered static: Form (style) and meaning (functionality) constitute a set that gives corporeality to space [6].

7 Breaking language

The concept of language in this topic differs from the previous one. Instead of working with language as a system of oppositions of places and values, we start from the concept that language is a system that mediates between the human mind and the environment, allowing man to interpret the world that surrounds him and, therefore, is part of the creative process in which there is unpredictability.

7.1 The order of word representation: Between the sayable and the invisible

According to Lacan [26], the subject, when constituting itself in language, undergoes an alienation. The author [27] states that if the subject chooses to be, he loses his own meaning; if one opts for meaning, he loses being, because meaning is constituted in the field of the Other.

The individual, immersed in culture and under the influence of a symbolic system, is subject to the logic of language to express himself:

The signifier plays and wins, so to speak, before the subject realizes this, to the point of, in the game of Witz, from the joke, for example, he surprises the subject. With his flash, what he illuminates is the division between the subject and himself. [26, p. 854]

Lacan says that the human being is a divided subject, in the sense that he houses an unconscious (revealed through lapses, flawed acts, forgetfulness) which diverts the continuity of the representation of what is understood by that subject's identity (consciousness), that is, the self. The logical and philosophical notion of subject was given by Lacan [28] within the theory of the signifier. He transforms the subject of consciousness into the subject of the unconscious, of science and of desire. It was in 1960 that Lacan, based on the Saussurean theory of the linguistic sign, established a relationship between the subject and the signifier, undergoing a cleavage process [29, p. 742]. For Lacan, the unconscious is established in otherness (op. cit., p. 377).

Lacan relates subject, language and unconscious:

Lacan emphasized that the unconscious [has] 'the radical structure of language' [...]: 'The unconscious is structured like a language', followed by another formulation: 'Language is the condition of the unconscious'. The Lacanian idea of a primacy of language - and, therefore, of the signifier - rests on the primordial fact that the individual does not learn to speak, but is instituted (or constructed) as a subject through language. The child, therefore, is immediately subjected to a third order, the symbolic order [...] Because he is captured in a significant universe, the child begins to speak long before knowing consciously what his speech says: 'Language, therefore,' writes Joël Dor, 'it appears as the subjective activity by which we say something totally different from what we believe to say in what we say'. This 'something totally different' is fundamentally instituted as the unconscious that escapes the speaking subject, as it is constitutively separate from him. [29, p. 378]

Lacan's theory [30] is based on the concept of a subject divided by his own discourse. Lacan's way of demonstrating this was to invert the Cartesian 'cogito, (ergo) sum' to 'I am where I don't think'. The subject of the unconscious emerges among the signifiers, 'escapes', without realizing what constitutes it. To the subject of the unconscious, 'who does not know what he says or even who is talking', [28, p.815] Lacan gives the effect of 'fading', 'by his concealment by an increasingly pure signifier' and sees alterity (context, environment) as a 'place of the signifier' [28, p.827], origin of the meaning given by the unconscious.

Pêcheux in turn, describes this same phenomenon of the cleavage of the subject addressing the relationship between ideology and the unconscious. The author [22, p.152] states that there is a dissimulation of the subject within the discursive functioning, at the same time it is produced a 'web of subjective evidence'. The subject, when constituting himself from forgetting what determines him, identifies himself with a dominant discursive formation (DF) and reinstates, in his own discourse, elements of the 'already said' that 'provides-imposes "reality" and its meaning' [22, p.164]

This is a contradictory and paradoxical effect of the discourse and can only be observed, according to Zoppi-Fontana [31] from the original way in which Pêcheux deals with the concepts of language, discourse, ideology, history and subject, showing that the relations of domination and resistance are inscribed in linguistic forms [31, p.55]. Thus, the subject, challenged by ideology, produces sentences with a meaning, without, however, having control over the process of producing the meanings of what he speaks.

The most common concept of subject is that which designates individual. In Philosophy, the 'subject is defined as the man himself as the foundation of his own thoughts and acts [...] the essence of human subjectivity, in what it has as a universal and singular subject [...] of knowledge, of law or of conscience' [29, p.742]. Meanwhile Pêcheux supports the concept of subject as a social place constituted by history and influenced by ideology, which determines what can and what must be said. Individuals occupy their subject positions according to the social formation and discursive formations (DF) in which they are inserted [22, p.161]. When challenged by ideology, the subject 'places' the 'form of the subject', which 'is the form of the historical existence of any individual, agent of social practices'; the subject identifies himself with a discursive formation that constitutes him receiving 'the meaning so evident' of what he hears, says, reads or writes [22, pp. 157,183]: The subject 'establishes an active relationship within a given DF; as he is determined, he also affects and determines him in his discursive practice' [32, p.23]. At the same time that the subject is constituted in his speech, he goes through a double illusion, according to Pêcheux [22] that he has autonomy and conscience in his speech: The subject is constituted by ideology and the unconscious, that is, the subject ignores that there is a pre-existing discourse to his; and, he supposes that what he says is exactly what he thinks.

Pêcheux's linguistic theory and Lacan's psychoanalytic theory agree with the fact that there is a symbolic relationship that interferes with the identification by which the subject recognizes himself as a human being. This identification process results from the rules that establish the formation of meanings in language, promoting an erasure of subjectivity to give rise to a symmetrical form under the appearance of objectivity [22].

If we transpose these findings from linguistics and psychoanalysis (in relation to the formation of meaning in the human mind) into mathematical theory, we can consider that the axiom (taken human being as a biological and dynamic system) has the function of generating an order increasing number of instances within the logical process in order to be integrated into a conclusion. If the 'value' of the axiom prevails in relation to the syllogism, the axiom would function as a basis for the construction of the latter, it would influence the construction of logical deductions in such a way that the conclusion is only true if it considers that imposed value by the axiom (biological body, environment). On the other hand, if the 'value' pre-established by the rules that regulate the formation of meaning in language prevails over the 'value' of the axiom (taken as a dynamic system), that value pre-established by the syllogism will impose 'the truth' in the conclusion, that is, it will impose the previously predicted sense, regardless of what the subject experiences in the environment (dynamic system). There would be a reduction in the dimension of the meaning construction process by the human mind, which would, instead of being three dimensional, be two-dimensional.

7.2 Breaking language representation regime

In section 5 we discussed a logical discipline existing in the structure of conventional language (which contains rules to express thought) and in section 4 we addressed aspects of natural language (biological dynamic system that captures stimuli outside the human body and takes them to the system central cognitive function, transforming it into information). In this section we talk about a break with the conventional language representation regime, which, through its rules, previously establishes a value in the construction of meaning, imposing 'the truth'. The creative work would be related to the break with this previously established truth, allowing its author to conceive it through a private way of language and thought.

7.3 The essence of the word: To make a point

Taking language as a symbolic system that houses subjectivity (arising from language as a dynamic system) and also logical reasoning arising from rules, we suggest that the principle of induction guides the search for meaning in the event that those rules do not apply. In this case, the induction principle would be taken as a paradigm to perceive the underlying meanings.

According to Rancière [13, p.22] the order of language representation - located in the 'order of the relations between knowledge and action' - determines the relationship between the saying and the invisible, so that

the word has as its essence 'to make a point'. The author (idem), however, warns of the fact that this occurs according to a 'double retention' process, in which, on the one hand, there is the manifestation of an expected meaning and, on the other hand, something remains 'out of sight'.

7.4 Essence reversal of the word in the aesthetic revolution

Rancière [13, pp.25-27] suggests that, as a rule, 'thought as action is imposed on a passive matter'. However, this relationship can be abolished when knowledge is no longer tied to an 'objective ideality', in a way that starts to install a solidarity between 'certain affection, a passion' and the things of thought, causing, finally, an 'aesthetic revolution' that defines art itself:

Now, it is precisely through this identity of opposites that the aesthetic revolution defines art itself. At first glance, it seems only to oppose the norms of the representative regime as an absolute power of doing. The artistic work results from its own production law and is sufficient proof of itself. But, at the same time, this unconditioned production is identified with absolute passivity [...] In the aesthetic regime, this identity of knowledge and non-knowledge, of acting and suffering [...] constitutes itself in the very way of being of art. [13, p.27]

Rancière understands language and the sensitive world from the idea of Giambattista Vico (1725) [33] that words and things have a common capacity to unfold and to manifest the essence or the power that makes them exist [34, p.19]. This idea breaks with the representation regime, subjected to a convenience resulting from the meeting of social hierarchy, characters, history, actions, discursive modes and gender [34, p.19]. Thus, the creative work can be conceived as a particular mode of language and thought, in which there is no predetermination of form or expression [34, p.19]; as a 'dumb language' of music, common forms, the work of the unconscious [34, p.20].

Rancière recognizes, in language, a specific status that cannot be reduced to the materiality of the written sign; he also recognizes that there is the opposite of the word, which would be a word 'in action, a word guided by a meaning to be transmitted and an effect to be assured' [13, p.34]. Following this reasoning, Rancière defines [13, p.36] the power of meaning of the 'dumb word', basing this power on the fact that everything is 'trace or fossil', bringing marks that will be reconstructed. In short, 'everything speaks', 'there are no negligible "details" ... on the contrary, it is these details that put us on the path of truth ... everything is equally important, equally significant' [13, pp.36-37]



In this way, the creative work, whether expressed in words or by other signs, mediates between the subject and the environment: 'Consciousness is the voice of the soul, passions are the voice of the body' [21, p.30]. Externally, 'logos' does this mediation task, establishing a parallel between signifier and signified [21, pp.24-30]. A good deed will be morally good when it is done as it is and not as others do it, which explains the basis of imitation: It comes from the subject's desire to transport himself out of his own being [21, p.292].

8 Conclusion: The origin of the creative work

The origin of creation is not in the elements that are part of it, but it is in the path taken by the creative process. We were able to observe, through various branches of science, that, for there to be creation, language cannot be separated from its context. Natural language has axiomatic and logical characteristics, making either creative work reveal a tendency to be based on the probable knowledge of the truth, or it breaks this tendency, linking itself to stimuli and information coming from the context, getting in tune with them. Thus, the cognitive process values the context in order to show individuality and not generality in its product.

As we stated earlier, the machine's language is formal and obeys logical reasoning, which is only one aspect of natural language. For the machine to be creative and intuitive, it must be able to reproduce the axiomatic aspect of natural language, which takes into account the context.

Schrödinger's cat experiment illustrates well how the creative process takes place. There is no paradox, reality determines one possibility or another: Either there is creation or there is not. The fact that language mediates perception processes through its axiomatic (dynamic system, biological system) and logic (system of rules that regulate language) characteristics makes it possible to conclude that there is no way to assess the adequacy of thought to reality without language. This same mediating language is responsible for determining one of the two possibilities in the creative process and not a paradox. The creative process, in short, follows one of two possibilities:

- 1.1- Either the creation will reveal a tendency to base knowledge on probability, when 'probable knowledge' is taken as 'fact of knowledge' [5, pp.532-533], as 'pragmatic criterion of truth', giving priority to logical reasoning as the only possible way to reach reality [5], preventing meaning from deriving from a direct relationship with the environment;
- 2.2- Or creation breaks this perspective and settles in the subjectivity of the subject. In this way, because the meaning of the creative work is not linked to a previously given concept or value, it does not constitute an imitation. The previously given value is associated with the idea of a knowledge that is independent or private experiences, it is determined

from inferences that act in some way, in language, building meanings (values) to what is stated. The obstacles of syllogism take the energy out of creative expression, erase the passion for creativity to establish a supposed harmony, depriving the work of a true character and installing a contradiction in it. True creation resonates with the subject, with the environment. The value of creating of the human mind lies in the movement to avoid transforming combinations into possibilities of logical reasoning. The author of the creative work must remove the combinations provided by the synchronicity of the logical process, replacing them with inspiration. In this way he founds the verification process, which will reveal the creativity *textitatu nascendi*.

All these considerations about the importance of context in the production of language in the creative process lead us to bet on processes that would serve to replicate creativity in artificial intelligence. Mathematically speaking, the fractal structure and the deep learning structure would be the most appropriate options for working in the machine language dimension, in order to maintain self-similarity, that is, exhibiting the same patterns in its development. The fact that both do not detach from the context, replicating language at different scales, makes artificial intelligence more intuitive, removes the curse of dimensionality and reduces the need for human intervention in machine learning.

The fractal theory accommodates real and virtual language phenomena observed in simultaneous oscillation: On the one hand it houses a flexible and constantly changing structure and, on the other hand, a stable and finite structure. Accepting language as a phenomenon in constant transition, in a flow of constant change, fractals offer good foundations on the role of natural language, covering its two aspects, axiomatic and logical, in order to point out paths to discoveries related to creativity and intuition in artificial intelligence.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

References

- [1] G. Polya, *How To Solve It. A New Aspect of Mathematical Method*, Princeton University Press, New Jersey, 1973.
- [2] S. Bindeman, Echoes of Silence: A phenomenological study of the creative process, *Creativity Research Journal*, **11** (1), 69-77, 1988.
- [3] C. Findlay, C. Lumsden, The creative mind: Toward an evolutionary theory of discovery an innovation, *Journal of Social and Biological Structures*, **11** (1), 3-55, 1988.

- [4] L. Gabora, *Cognitive mechanisms underlying the creative process*, in Proc. C&C 02 P, the 4th Conference on Creativity & Cognition. 126-133 2002.
- [5] O. Kenshur, Doubt, Certainty, Faith and Ideology, in The flight from science and reason, *Annals of the New York Academy of Sciences*, **775** (1), 1995.
- [6] S. Eloy, Ferramentas de apoio à análise da geometria do espaço arquitetônico: sintaxe especial e gramáticas de forma *Boletim da Aproved*, **29**, 3-14, 2012.
- [7] A. Warr, E. O'Neill, *Understanding design as a social creative process*, in Proc. C&C 05, 5th Conference on Creativity and Cognition, 118-127, 2005.
- [8] B. Schlurick, *Chance encounters and the limit of textuality*, in The Limits of Textuality, L. Erne and G. Bolens (Eds.), Gunther Narr Verlag, Tübingen, 2000.
- [9] E. T. Hall, *The hidden dimension*, Anchor Books, London, 1966.
- [10] E. Schrödinger, Die gegenwärtige Situation in der Quantenmechanik, *Die Naturwissenschaften*, **23**, 807-812, 823-828, 844-849 (1935).
- [11] A. Lloyd, *The will to doubt: An essay in Philosophy for the general thinker*, S. Sonnenschein & Co., Usa, 1907.
- [12] B. Whorf, Language, Mind and Reality, *The Theosophist*, (1-4), 167-188, 1942.
- [13] J. Rancière, *L'inconscient esthétique*, Galilée, Paris, 2001.
- [14] B. Russell, *The problems of Philosophy*, Henry Holt and C., New York, 1912.
- [15] K. Popper, *Logik der Forschung*, Julius Springer, Berlin, 1935; Engl. Transl. *The Logic of Scientific Discovery*, Hutchinson & Co, London, 1959.
- [16] A. Breton, *L'Amour fou*, Ed. Gallimard, Paris, 1937.
- [17] M. Blanchot, *L'Entretien infini*, Ed. Gallimard, Paris, 1969.
- [18] E. Orlandi, *O que é linguística*, Editora Brasiliense, São Paulo, 2002.
- [19] P. J. Eccles, *An introduction to mathematical reasoning: Lectures on numbers, sets, and functions*, Cambridge University Press, Cambridge, 2007.
- [20] C. Mortari, *Introdução à lógica*, Editora UNESP, São Paulo, 2016.
- [21] J. Derrida, *De la grammatologie*, Ed. Minuit, Paris, 1967.
- [22] M. Pêcheux, *Les vérités de la Palice*, François Maspero, Paris, 1975.
- [23] I. Signorini, *Construindo com a escrita "outras cenas de fala"*, in Investigando a relação oral/escrito e as teorias do letramento, Campinas: Mercado das Letras, I. Signorini, (Ed.), 97-134, 2001.
- [24] G. Stiny, Ice ray: a note on Chinese lattice design. *Environment and Planning B: Planning and Design*, **4** (1), 89-98, 1977.
- [25] G. Stiny, Kindergarten grammars: designing with Froebel's building gifts. *Environment and Planning B* **7** (4), 409-462, 1980.
- [26] J. Lacan, *Position de l'inconscient au Congrès de Bonneval*, in J. Lacan, *Écrits*, Éditions du Seuil, Paris, 829-850, 1960.
- [27] J. Lacan, *Le Séminaire de Jacques Lacan, livre XI. Les quatre concepts fondamentaux de la psychanalyse*, Éditions du Seuil, Paris, 1964.
- [28] J. Lacan, *Subversion du sujet et dialectique du désir dans l'inconscient freudien*, in J. Lacan, *Écrits*, Éditions du Seuil, Paris, 807, 1966.
- [29] E. Roudinesco, *Dictionnaire de la Psychanalyse*, Fayard, Paris, 1997.
- [30] K. Malone, S. Friedlander, *The subject of Lacan: A lacanian reader for psychologists*, State University of New York Press, New York, 2000.
- [31] M. Zoppi-Fontana, M., *Objetos Paradoxais e Ideologia, Estudos da Linguagem*, **1**, Vitória da Conquista, 41-59 (2005).
- [32] M. Ferreira, O caráter singular da língua no discurso, In Discurso, Língua e Memória, *Organon, Revista do Instituto de Letras da Universidade Federal do Rio Grande do Sul*, **17** (35), 189-200, 2003.
- [33] G. Vico, *The First New Science*, Cambridge University Press, Cambridge, 2002.
- [34] M. Jalbert, Le malheur et le bonheur de ne parler qu'em mots, *Spirale*, **220** (5-6), 19-20, 2008.