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***ESSAYS FROM PORTUGAL
ON CYBERLITERATURE &
INTERMEDIA***

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Published 2014 by the Center for Literary Computing.

Cover image by César Figueiredo.

ISBN-13: 978-1-938228-74-2 (pb)

978-1-938228-76-6 (elec)

978-1-938228-75-9 (pdf)

CONTRIBUTION TOWARDS A QUANTUM THEORY OF CYBERTEXT⁵

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The whole universe must be considered a quantum system with visible-real and invisible-virtual states. (Schäfer 89)

Quantum theory—originally conceived as a physical theory to be applied to the inner structure of matter and the paradoxical properties of the microparticles (electrons, protons, atoms, and molecules)—contains philosophical assumptions that open a new way of thinking about reality. We know the risk involved in often fanciful extrapolation of this theory onto other levels of organization of reality. However, the quantum chemist, Lothar Schäfer, is adamant that these properties do not merely manifest in the field of microphysics: “Molecules are the basis of life and molecules are quantum systems” (86). The mathematician Roger Penrose corroborates: “Quantum mechanics is omnipresent even in everyday life and is at the heart of many areas of high technology, including electronic computers” (55).

Without the intent to invade a domain that is not our specialty, we are interested in the epistemological assumptions of this theory and not its scientific operability. Although our boldness will not reach far beyond the right to quote, we propose a homology between the quantum model and text theory, whose applicability to computer generated texts we find particularly rich in potential.

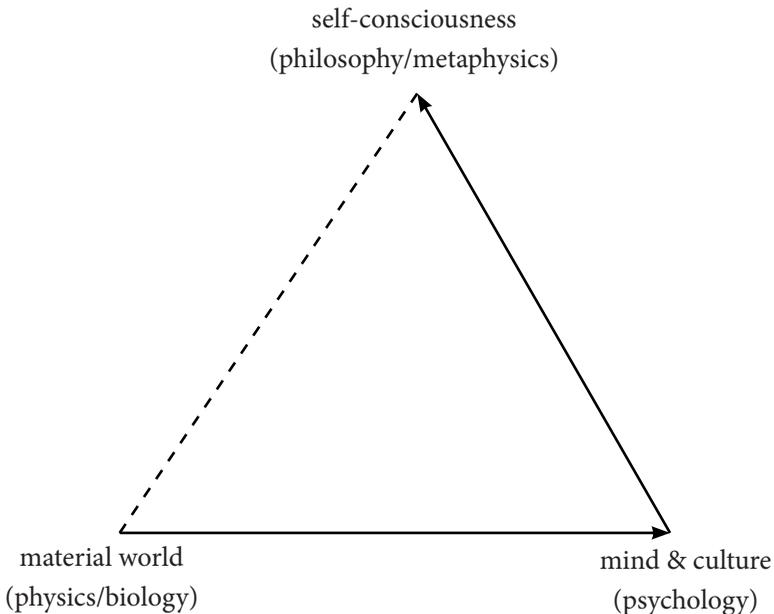
I will often use the expression quantum text. Why quantum? For a fad? Well, first of all as a metaphor but one that is not strictly a metaphor at all. Later on, this apparent contradiction will be better understood. For now, we will refer to a paradigm shift.

It all starts when we consider the computational text, not within the atomistic-structuralist paradigm, but within a different paradigm, akin to quantum thinking. This leads us not only to consider each word as an atom of sense,

⁵ This text was published as “Contributos para uma teoria quântica do cibertexto” in *Revista de Estudos Literários*, a serial publication of the *Faculdade de Letras da Universidade de Coimbra*, Number 2, Special issue organized by Manuel Portela with the title *Literatura no século XXI*, pages 121-184, 2012. ISSN 2182-1526. [First published as “Aspectos quânticos do Cibertexto” in *Cibertextualidades*, 1, pages 11-42, 2006. ISSN 1646-4435.]. Translation by Isabel Basto.

but the whole speech as a production of meaning, made word by word, with all the words interacting with each other in a holistic manner. From one word to another, there is what we may consider a leap of meaning, or a qualitative leap of informational energy, which is comparable to what the quantum model considers in electronic orbits, the quantum leap.

Thus, from one word to another, there is a real leap of meaning in discourse, an informational quantum leap (allowing the analogy), but always in such a manner that the network interrelation and entanglement of all the words in the text creates the full production of meaning in discourse. In a sort of nonlocality, or supra-spatiality, even the last word of the text may interact with the first word, changing the meaning of the whole. All words are linked together in a complex network of progressive interactions during the act of reading, just as all microparticles of matter may interact regardless of the distance between them in the universe. And when we suggest the idea of a supra-spatiality in the text, this is nothing more than a leap from one dimension to another in the textual structure: from the signifier level onto the level of signified, and from this to the level of meaning. In this leap, one arrives exactly at a dimension that exists only in the psychic realm, or consciousness, and no longer exists in the level of matter (sound or writing). This dimension is beyond space and time, and is extensive but



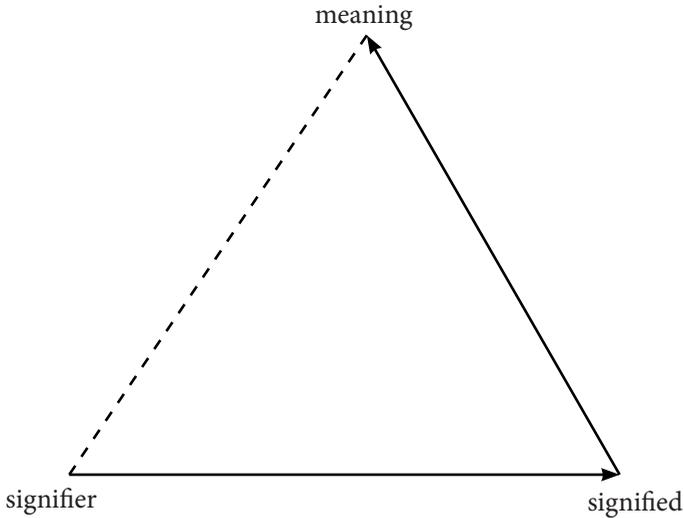
not local. The leap moves from the corpuscular state (letter or phoneme) onto the wave-like state, from matter to energy, and from there to the mental plane, where it transmutes into information.⁶

In this line of thought, the semiotic transit underneath the text—

signifier → signified → meaning

—would roughly correspond in the natural world to the passage equivalent to the triad:

matter → energy → information.



And this leads us to the theory of the three classical worlds: matter, life, spirit (atoms, cells, mind). Or: inorganic, biological, and psychic worlds.

In short, the three epistemological domains of official science are as follows: physics, biology, and psychology (matter, brain, and information).

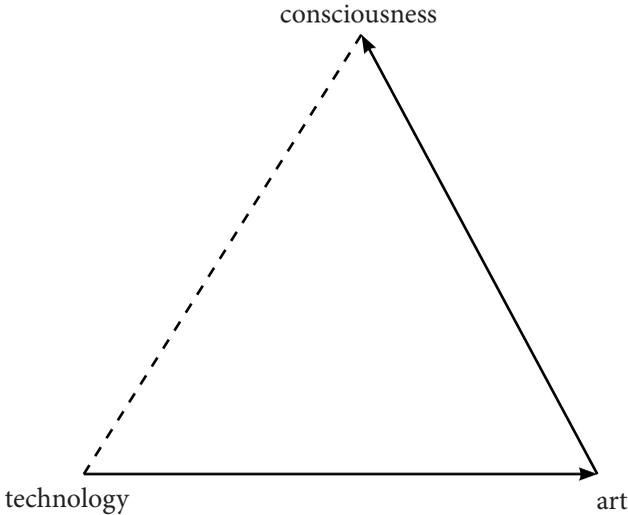
⁶ This is local/corpuscular character versus extensive/undulatory character. In quantum theory, quantum systems have both local properties—punctual and traceable characteristics of the corpuscles—and non-punctual properties of extension, which are attributes of waves. It should be noted that at the quantum level, there is a difference between the concepts of particle and corpuscle: a particle is a quite complex system possessing extent and location while a corpuscle is an entity characterized only by its position.

But it is now possible and even advisable to extend this triadic model in a strictly materialistic or scientific manner.

- World 1, i.e. the material world, consisting of atoms and energy, inserted in space-time, includes matter (physics, chemistry, astronomy) and cell (biology, neurology, brain). It corresponds in language to the signifier level.
- World 2, i.e. the mental and cultural world, includes psychic phenomena and information fields; mental phenomena, non-spatial and non-material. It corresponds in language to the signified level.
- World 3, i.e. the level of consciousness and the self, includes spirituality, soul, and consciousness (philosophy, metaphysics). It corresponds in language to the meaning level.

These three worlds are sealed off to each other, while hierarchically interdependent: the third depends on the second and the second is based on the first.

- World 1 is inorganic: matter has never created life in the laboratory; life seems to emerge from life itself. Only life generates life by reproduction.



- World 2 exchanges information, it is where dictionaries encode meanings, and it is with this information where minds communicate with each other and make culture, creating the social field.
- World 3 is strictly personal, non-shareable, the intimate setting for the self and consciousness (individual but trans-personal), and remains tightly sealed when a body with a brain lacks consciousness (when in a coma, for instance).

The worlds considered here do not correspond exactly to the three worlds described by Popper, but they correspond to the three vertices of the semiotic triangle (signifier, signified and meaning).

Hence, there are three sealed levels that are hierarchically interrelated, even considering the continuous complexification of matter and structural jumps according to the dialectic law of transformation of quantity into quality.

- Matter level (mechanism): the inorganic realm (in language, the signifier: the sound, the image, the letter, the “ink painted papers” according to the poet).
- Vital level (vitalism): animals react, feel pain, think, etc., they express mental phenomena in different degrees (in language, the signified and syntax dynamics).
- Mental/consciousness level (animism): the intimate experience and not shareable “self” and consciousness (in language, the meaning and semantic immateriality).

In the field of aesthetics, these levels are represented as Technology—Consciousness—Art (TAC).

Atomism, in the science of matter, inspires atomism in the science of language (Structuralism). Language was considered an infinite hierarchical combination of signs (phonemes, letters, morphemes, lexemes, words, phrases, etc.) just as chemistry from the nineteenth century saw substances in nature as an infinite combinatory of a small number of elements on Mendeleev’s restricted table. Linguistic structuralism demonstrated its effectiveness in the understanding of language mechanisms at the level of the signifier and the signified (and, therefore, at the level of their junction in syntax).

Nevertheless, at the level of meaning, structural semantics seems to gain much more functionality if the atomistic-structural paradigm shifts to the quantum paradigm—much like physics and chemistry in the twentieth century. That is, instead of only treating words like atoms, isolated from meaning, it also treats them as waves, whose vibratory power splayed throughout the whole length of the text, interacting in a complex pattern whose intersection results in the final meaning.⁷ In this wave-like theory of meaning, any word—due to its extensional wave-like properties—would be seen interacting with the others from the whole text, from first to last, overlapping and intersecting like the undulations and currents of water in a lake.

Quantum systems may be dual, but they still have properties of corpuscle, location, and wavelength. Depending on the experimental situation, one or another aspect is manifest. I likewise propose the consideration of words under this double feature of duality: corpuscular and wave-like.

Having said that, the scope of textualities is especially apparent in the advent of computer technology, as is the case of computer-animated poetry, virtual text, automatic text, generative text, and hypertext and hypermedia. In correspondence, a different way of looking at language and the construction of meaning is required.⁸ The basic assumptions of quantum thought turn out to be significantly operative for this new theory of the text. Among them, we highlight the following:

- the introduction of the notion of information in the structure of matter and dynamics of nature (in addition to the two classical notions of matter and energy);
- the value placed on randomness in the interaction of elementary particles, also seen as an intimate property of the natural world, and the

⁷ This is thoroughly illustrated in *The History of the Siege of Lisbon* by Saramago, where the extensive power of a simple typo introduced by a proofreader, the word “no,” alters and subverts the whole meaning of the history fictionalized in the novel.

⁸ In this respect, one must recall the essay: “*Un modèle fonctionnel des textes procéduraux*” (*A functional model of procedural texts*), by Philippe Bootz, digital poet and theoretical physicist. Bootz uses an assumption of quantum theory, the interference of the observer on the observed object, and applies it to computer animated poetry. Among many possibilities for learning about the richness and creative variety in this line of digital poetry, we suggest the personal page of Manuel Portela: <http://www1.ci.uc.pt/pessoal/mportela/>.

unpredictability of their effects leading to the notion of knowledge as probabilistic order;

- overcoming the logical principle of identity or non-contradiction, which seems to open up towards a new convergence of coincidence of opposites (the case of unitary duality of quantum particles, as in the famous metaphor of Schrödinger's cat);
- the revival of the old concepts of virtuality and actuality;
- and the importance awarded to the observer in the real manifestation of the physical properties of matter.

These assumptions open doors to approaching the real and also to the concept of text: as an organized matter of signs, with which we store, convey, and exchange information.

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