

A CERTAIN BRANCH OF POETRY, NAMELY CYBERNETICS: BOETTI MEETS VON FOERSTER

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Abstract: *Heinz von Foerster (1911-2002) is one of the founder fathers of cybernetics. Alighiero Boetti (1940-1994) is one of the most influential Italian artists of his period. After a brief presentation of some of Boetti's artworks of mathematical interest, unexpected and deep links between the work of Boetti and some elements of the thought of von Foerster are discussed. The focus is maintained on key-concepts of both cybernetics and constructivist epistemology.*

1 TWO INTRODUCTIVE EXAMPLES

In most of Boetti's works, basic mathematical ideas are in force: they range from numbers and counting to combinatorics, symmetry, logics and paradoxes, series and progression, cryptography, algorithms; but even more complex concepts related to fields such as topology, recursion and fractals can be found (Giunti 2004). As an introductory step, two works are illustrated and briefly discussed: *Serie di merli...* and *Alternando da uno a cento e viceversa*.

Some aspects are particularly emphasized. First: Boetti usually conferred to his mathematical objects a sort of *existential dimension*; they look like childish and joyful toys, which he devised in order to give us amazement and happiness or thoughtful hints but even dramatic announcements. Second: his aptitude to use mathematical imagery elements is totally genuine and innate (mathematically speaking, and more generally in scientific fields, he had no particular background and was totally *self-trained*). This is probably the reason why his elemental and amusing mathematics is never pedantic, boring or sterile intellectualism: *lightness* is indeed the most relevant quality of his expression.

2 THE CYBERNETIC POEM

The close link between Boetti's thought and works on one hand, and some grounding ideas of cybernetics on the other are then considered. Particularly, a comparison with some typical arguments by Heinz von Foerster will be developed. All of his papers referenced here are collected in his recently published *Understanding Understanding* (von Foerster 2003). The comparison will follow some keywords of cybernetics (Heylighen and Joslyn, 2001). As far as I know, Jean-Christophe Ammann is the only art critic who explicitly linked Boetti with cybernetics (Ammann 1996, though with a little mention). Several writings of Giovan Battista Salerno emphasize the importance of themes such as recursion and self-reference (for instance Salerno 1986). He and Michelangelo Notarianni also meaningfully mimicked Gregory Bateson's *metalogues* in a text celebrating Boetti's 40th birthday (Notarianni and Salerno 1980). As a general text on Boetti's human personality, see Sauzeau (2006), which includes in DVD the historical documentary film by Emidio Greco (1978).

Most of Boetti's works can be viewed as particular implementations of simple assigned rules, which leave a certain degree of freedom. On the other hand, Boetti often focused his attention on showing the whole range of the possibilities offered within a certain assigned system (e.g. his postal works based on combinatorics). Sometimes Boetti implemented more than once the same set of rules, giving rise to results even spectacularly different one another. Further, he often committed the actual execution of works to someone else (frequently more than one single person and sometimes with additional rules to govern their interaction). Examples are shown in order to highlight the function of the rules (*as constraints*) in relation to all the different possible outcomes (*as the variety*).

Boetti's best known works on the Order/Disorder subject (admittedly one of his most important themes) are those of the series *Ordine e Disordine*, made of 100 or 200 (according to different implementations) little squared embroideries of the same words *Ordine e Disordine*. The different systems of rules in force in these versions (mainly regarding the colouring of letters and background and the disposition of the embroideries on the wall) make the idea of an antisymmetric Universe visible, which is borrowed from Taoism (a thorough description of the rules can be found in Lauter 1998). However, Boetti also produced works with a marked *thermodynamic look*, where acting processes will create or dissipate order, thus quite openly related to *entropy and information*. Works such as *Da mille a mille* and *Storia naturale della moltiplicazione* are briefly presented. Von Foerster's principle of *order from noise* (see his 'On self-organizing systems and their environments' of 1960) will be also recalled, with reference to Boetti's work *Alternando...* Still on the Order/Disorder topic, von Foerster addressed his crucial question: 'Order/Disorder. Discovery or Invention?' in an homonym paper of 1981. His argument, based on the functional isomorphism of Maxwell's Daemon and Turing's Machine will be schematically recalled, with a special attention for the strict dependence of order on the chosen language. Interestingly, there is a striking and interesting parallelism with Boetti's thought, which will be illustrated through works such as *Le Quattro operazioni*, some of his writings, such as *AIIEOOEIBGHLRTT*, and other invented orders such as those regarding 1970 (intended as both a number and a year).

In the 1976 paper ‘*Objects: token of (eigen-)behaviours*’ von Foerster formalized his ideas about the cognitive process through a recurrence equation, derived from Jean Piaget. It described the cognitive activity in terms of a typical recursive looping, where what is observed at time $t+1$ is the outcome of cognitive and sensory-motor operations on what is observed at time t . Then he introduced the concept of eigen-value, in order to explain how this recursive process can reach stable results (cognitive homeostasis), and carefully exemplified it. This very perspective led him (and many other scholars, such as Maturana and Varela) to the concepts of *closure* and *autonomy* characterising our cognitive activity (and not only that). *Circular causality* and *circular dynamics* are also in force in several works by Boetti. Examples will be given where he clearly guessed the idea of *self-application* and even that of *eigen-value*. His phrase *Tutti i numeri finiscono in tre* (Salerno 1996) will be particularly considered, along with some of his lovely and playful writings about numbers (such as *UENNEDIICII* or *Cinque X Cinque Venticinque*), which can be easily obtained as eigenvalues of recurrence equations. The concepts of *closure* and *autonomy* are also openly and explicitly in force in some of Boetti’s works, such as in the series *Tra sè e sè* (where the recursive looping of the reflexive activity is metaphorically depicted). More abstract references to closure and autonomy will be shown in works like *Autonomo* and *I verbi riflessivi*. Finally his *Albero delle ore* will be presented, as a striking visual synthesis of von Foerster’s *token of (eigen-)behaviours*.

Von Foerster had a peculiar aptitude to express his ideas by means of effective and provocative aphorisms. In the paper ‘*On constructing a reality*’ of 1973 von Foerster abridged his theory on cognition through the formula: ‘*cognition=computation of computation*’. This is an example of what he called *second-order concepts*. Many other examples can be done, and most typically that of *language*, because language must be able to speak of language and it must contain the words ‘language’ and ‘word’. Another example is *perception*: through the classical experiment of the *blind spot* we understand that we don’t see what we don’t see. The title of his book ‘*Understanding Understanding*’ is another good example. A similar involvement seems to be in the focus of Boetti’s research. Indeed he produced works which seem to be literal visual translation of those very concepts: the writing *Codice* (a candid sort of binary code, used in a message that, to some extent, codes the code itself) or the embroideries of the series *I Vedenti* (a word used by blind people to indicate those who can see. It is a Braille-like writing almost imperceptible to the sight but well perceptible to the touch; thus implicitly the resulting paradoxical statement that the blind is the true seeing). But the very progenitor of all of Boetti’s second-order statements is in the ball-point pen work *Mettere al mondo il mondo*. The appearance is that of a blue sky with commas-stars spread in it. Following them with a cartesian-like method (another *invented* order by Boetti) we read the *cosmic* untranslatable sentence of the title: the meaning is: *Giving birth to the world*, but literally sounds like *Putting the world into the world itself*.

These arguments naturally flow into the very heart of the constructivist epistemology of cyberneticians: ‘*What we experience, cognize, and come to know, is necessarily built up of our own building blocks and can be explained in no other way than in terms of our ways and means of building*’ (von Glasersfeld 1984). Meaningfully one of the most important works by Boetti, *I mille fiumi più lunghi del mondo*, provides examples which help making this point clear. Indeed Boetti and Sauzeau (co-author of the work) with their

utopian effort of classifying the thousand longest rivers in the world show that a concept like *the length of a river* and even the *river* in itself are pure inventions of thought with only loose (if any) connection with whatever they really could be.

3 CONCLUSION

With the present paper I didn't want to enlist Boetti under the banner of Cybernetics, which of course would be a non-sense, nor to state that he shared to some extent the constructivist viewpoint, which probably he never knew. Rather I wanted to analyse some aspects of his work by using conceptual tools usually foreign to art critics, in order to show the depth, the richness and the wide range of his thought. I hope I am contributing to further deepen the knowledge of those Boettian themes discussed here.

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