Studies in Diagrammatology and Diagram Praxis

Edited by Olga Pombo and Alexander Gerner

This volume puts together most of the papers given at the interdisciplinary workshop on DIAGRAMMATOLOGY AND DIAGRAM PRAXIS held at the University of Lisbon, 23-24th March 2009. The workshop was organized by the Research Project *Image in Science and Art* of the Center for Philosophy of Science of the University of Lisbon (CFCUL), namely by its task number two whose aim is to analyze the place of image and diagrammatic thinking in three different epistemological and semiotic programs (Leibniz, Frege and Peirce).

Unfortunately, the volume does not include the papers delivered by Irene Mittelbergs (HumTec RWTH Aachen), Paulo Urbano (University of Lisbon) and Miguel Cardoso & Santiago Ortiz (bestiario.org), Tiago Lança (architect), and Nuno Nabais (University of Lisbon). But we were able to incorporate additional papers of four invited speakers that unluckily were not able to be present in the Lisbon: Sybille Krämer (Freien Universität Berlin), Christoph Ernst (University of Erlangen-Nürnberg), Valeria Giordano (Institut Jean Nicod, Paris) and Anghel Nepumoceno (University of Sevilha).

The articles are organized in three main sections. In the first, **FUNDAMENTAL ISSUES OF DIAGRAMMATOLOGY**, we open with a paper by **Olga Pombo** untitled *Operativity and Representativity of the Sign in Leibniz.* The paper offers an historical account of the roots of diagrammatic thinking in the cognitive conception of language and in the semiotics which Leibniz worked out in the XVII century. Olga Pombo claims that it is necessary to go back to Leibniz in order to understand the requirement of both operativity and representativity of the sign as an attempt to combine the heuristic virtualities of written characters as stable and manipulative devices with its capacity of making visible, or as Leibniz says, of "painting" (*pingi*) the signified ideas in all its presence and complexity of relations.

Somehow in the same line - but now located in the pos-iconic turn - the paper of **Sybille Krämer**, *Epistemology of the line. Reflections on the diagrammatical mind*, faces the need of recognizing the constitutive contributions of iconicity to our faculty of cognition. The stressed idea is that we are today confronted with a multiplicity of hybrid phenomena which combine language and imagery, digital and the analogical. On that basis, the author stresses the need of enlarging the concept of diagrammatic in order to embrace "all forms of intentionally created markings, notations, charts, schemes and maps". But, if so, it is necessary to recognize the biological and anthropological nature of graphic activity as a spatial-visual-tactile form of thinking

In the line of representationalist approaches, **Jan Wöpking**, *Space, Structure, and Similarity. On Representationalist Theories of Diagrams*, proposes to think the cognitive power of diagrams on the basis of two independent claims: the first concerns what he calls nomic similarity, a kind of structural correspondence (in Leibnizian terms, we would say "expressive") between the diagram and what it represents; the second relays on the two-dimensional graphical dimension of diagrams, their spatial schematic structure. Two claims and key distinctions

which are used by Jan Wöpking in order to analyze and classify the several definitions of diagram and to revise some of Peirce's ideas on diagrams.

Frederik Stjernfelt, who gave the opening lecture in the 2009 Lisbon workshop, offers a paper titled *The extension of the Peircean diagram category. Charting the implications of a diagrammatical revolution in semiotics.* First this revolution launched by Peirces´ diagrammatology, as described by Stjernfelt, will be *ontological* – because it reemphasizes the connection of semiotics to mathematical and logical idealities as well as empirical universals. Stjernfelt argues that the uses of prototypical signs in logics, algebra, pictures, linguistic grammar and linguistic semantics are diagrams, thus opposing the common sense notion of diagrams as a printed or drawn appearing on a support as concrete sign tokens, that in his view merely give access to the type of diagram. The other "revolutionary" aspect of this view is that diagrams are fundamentally cognitive phenomena, involved in giving access to generalization, idealization, abstraction and thus providing direct perceptual access to an "ideal type". Stjernfelt builds his argument on Peirce with cross-reference to Husserl, as for Stjernfelt this cognitive notion of the diagram is providing direct perception-like access to ideal structures, that in Husserlian terms is described as "categorical intuition".

Ahti-Veikko Pietarinen, *Is Non-visual Diagrammatic Logic Possible?* develops the very interesting possibility of making a propositional logic based on sounds. For that, he goes back to Peirce and to his large conception of diagrams in order to show that diagrams should not be restricted to visual forms of representation. The question is thus formulated in order to question the extreme possibility of constructing a mental yet diagrammatic logic without any visual or written support, no symbols, no marks, no language.

The second part, **VISUAL DIAGRAM PRAXIS,** includes four case studies on diagram practices, namely in mathematics, logics, quantum-physics and scenographic media.

Augusto J. Franco de Oliveira, *Picture-proofs in mathematics: A chapter in James Robert Brown´s philosophy of mathematics, with examples*, questions the role played by pictures, figures or diagrams in mathematics, identifies some of their purposes as visual aids, focus their disturbing or even highly misleading effects and passes in review some of the conflicting positions concerning this issue. From one side, Euclides' belief in geometric pictures, from the other Bolzano's efforts to avoid the intuitive properties of continuous functions, from one side the geometric intuition of curves underlying Newton and Leibniz calculus, from the other Dedekind, Cantor and Weierstrass endeavors in order to ground infinitesimal calculus in purely analytical terms, from one side Lagrange "paranoid" fear of figures and Dieudonné severe refusal of any geometric intuition, from the other side Brown's proposal of pictures as possible rigorous evidence. As Franco Oliveira shows, "with the development of computers, computer generated graphs (for instance, in fractal geometry), experimental mathematics and computer generated proofs in mathematics the discussion has been revived". However, as he also states, the relevant question persists: Is visual thinking merely a psychological aid, facilitating grasp of what is gathered

by other means, or does it also have epistemological functions, as a means of discovery, understanding, and even proof?

Ángel Nepomuceno-Fernández, in a paper untitled *Concept script and diagrams: two ways of using images in scientific reasoning*, compares the conceptual writing proposed by Frege with Peirce's diagrams stressing the complementary nature of those two forms of picturing logical structures.

The paper by **J.R. Croca's,** *Diagrammatic thinking in Physics Visual: Some examples*, emphasizes the need of using diagrammatic thinking in fundamental quantum physics. Face to the huge, say infinite, number of solutions for differential equations describing the physical situation, diagrammatic thinking appears as able to provide good reasons for choosing the right solutions.

Finally, **Matthias Bauer,** *Diagrammatology, Scenographic media, and the Display Function of Art*, argues that diagrammatic reasoning is not restricetd to Logics and that art, in its fundamental display function, is itself a diagrammatic procedure. The papper offers then an interpretation of Rembrandt's famous painting "The Night Watch", of Peter Greenaway's "Nightwatching-project", and of Oliver Stone's feature film "JFK" as three examples of artistic works with clear scenographic or diagrammatic nature.

The third part, **ON MAPS**, opens with an article by **Valeria Giardino**, *The world in maps: looking for treasures, neurons, and soldiers*. Enlarging the concept of map from geographical maps to new cases of maps such as cortical maps in neuroscience and graphs, Valeria Giardino reflects upon the different components that must be considered in a map, its specific spatiality, its unavoidable incompleteness. The map appear then as a procedure which necessarily lies and, at the same time, are able to provide a more or less precise description of what it is.

Alexander Gerner, *Notes on Diagrams and Maps* is an exploratory journey that hinges on the very question of what a map is. Gerner draws on the work of Stjernfelt, Perkins, Krämer and, mainly, Deleuze and Peirce. It is his argument that these authors' work open up seminal ways of interpreting diagrammatic fixtures common to different notions of the map - as a diagrammatic spatial knowledge tool or as an ontological category preceding any representational semiotic operations. The diagrammatic operational and the ontological map reading, though evidently at cross-purposes, should not ultimately be seen as mutually exclusive. The journey into the map territory in the second part of the paper reflects on contemporary map artists (Beltrán, Barrio, Hirschhorn & Steinweg) and on their artefacts. Art seems to surge as the place where a map can be accepted as the "Map of itself" (Terry Atkinson & John Baldwin 1967). However, that is not to say that this notion of self- indexicality of the proper map is absent in scientific maps. It is simply not visible, focused on or accepted as such. The "all knowing map" that Perkins (2008) describes as "scientific", is seen here as a contradiction towards the notion of map as a fundamental diagrammatic or ontological orientation tool, that necessarily has to leave out certain "knowledge" to constitute orientation. With Deleuze, even the "chasm" between different operational cultures of map use (Perkins 2008) becomes questionable.

Christoph Ernst, *From images to diagrams" – Diagrammatic reasoning in Gilles Deleuze's Film Philosophy and its Relevance for General Media-Theory,* stresses the deep similarity of Peirce's concept of diagrammatic reasoning and Deleuze's concept of the thinking-image. In general, Christoph Ernst's paper aims to "illustrate the relevance of Peirce's semio-pragmatic concept of diagrammatic reasoning for the further clarification of the category of the thinking-image in Deleuze's film-philosophy". According to Deleuze and in the line of his critique of rationalist understanding of human reasoning, thinking-images can no longer be described in terms of "figurative" images. Within the medium of film, thinking may now externalize its own potentialities, it may now produce the visualization of its own knowledge, it can be observed "in progress", happening on screen. We understand why Deleuze's film-philosophy supposes a strong reference to Peirce's diagrammatic reasoning. Two main questions may then be formulated: do Peirce's ideas on diagrammatic reasoning help clarifying Deleuze's film-philosophy? How does Deleuze's film-philosophy, or media theory in general, benefits from making use of Peirce's ideas?

Finally, **Catarina Nabais** in an article untitled *Deleuze's Rhizome-Thought* , presents Deleuze´s specific non-representational account of the rhizome. Instead of an arborescent, hierarchical and static model of thought, the "rhizome" appears as an endlessly bifurcating system pointing to a nomadic movement of thought, a dynamic and heterogeneous way of thinking in process.

Stressing the Deleuzin thesis of the creative, experimental character of thought, Catarina Nabais shows in which way Deleuze cannot accept Peirce' s reduction of diagram to icons, indexes and symbols. She points for two main reasons: first because Deleuze aims to emphasize, not the signifier-signified relations but the territoriality-deterritorialization relations; second because Deleuze wants to deny the representative nature of diagrams and to highlight their capacity for constructing "a real that is yet to come". We understand why for Deleuze, "diagram is a creative device. Not a graphic representation of relations but a creative agent of reality". Able to threaten the arborescent western culture, the concept of rhizome appears thus as a whole new diagram of thought, not moved by a good will of truth, but a constructivist performance or experience of becoming, that is, a model which proposes new political ways of thinking by multiple, subterranean and innovative proliferations.

The paper from Catarina Nabais functions thus as a proposal for an "open end" to this book and to its attempt of dealing with many unanswered question on Diagrammatology and Diagram praxis.