N-OPPOSITION THEORY AND GRAPH THEORY

The investigation of the foundations of negation by some critics (as Slater, 1995) and some defenders (as Béziau, 2003) of paraconsistent logic yielded as a remarkable and unexpected by-product the discovery of a new branch of science, at the intersection of logic and hyper-geometry (Moretti, 2004). This new discipline, *n*-opposition theory (NOT), the mathematical foundation of which has been definitively laid in 2008 (Pellissier), is a generalisation of Aristotle's theory of opposition (for short, a generalisation of Aristotle's logical square and of Sesmat and Blanché's logical hexagon). This generalisation is both a powerful new tool (it enables a much more fine-grained treatment of general opposition phenomena) and displays elegant new series of geometrical-logical structures (giving visual and heuristic access to regularities previously unknown). These last structures, of which the backbone is given by the theory of the logical bi-simplexes of dimension *m*, admit several applications, the scope of which goes from modal logic (both abstract and applied) to bio-mathematics, via linguistics, semiotics, argumentation theory, psychology, cognitive science, artificial intelligence and, of course, philosophy. Now, a recurrent instinctive reaction to NOT consists in denying that it really deals with geometry: it is said, recurrently, that NOT truly speaking would deal with graphs (instead that with hyper-solids, as the NOT-theoricians keep claiming). In this paper, by making an accurate and systematic comparison with the main concepts and methods of that part of mathematics which is called graph theory, we re-state and argue strongly that things are not so: despite the appearances (which seem to suggest that "graph theory contains all the ingredients of NOT: segments, points, arrows, colours, …"), NOT is definitely not a part of graph theory. In particular – and this point is crucial – one of the main mathematical ingredients of NOT, the notion of geometrical simplex (which gives that of logical simplex), has to be firmly distinguished from its graph-theoretical very similar counterpart, the notion of clique: for the former internalises a metric and therefore supports naturally conceptual developments involving central (or spherical) *n*-dimensional symmetries (which is crucial to NOT), whereas the latter has no metric and therefore makes any consideration over symmetries (and hyper-symmetries) collapse. Relying on this important distinction (as well as on some others) we end by suggesting how NOT could (and will) be used in order to complement some existing approaches to the formal treatment of concepts, namely to Wille's Formal Concept Analysis, Sowa's Conceptual Graphs and Gärdenfors' Conceptual Spaces.

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