

Bi- Logic Via Infinite Singletons

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Bi-logic [1] describes two sides of the human thinking, the rational reasoning (asymmetric mode) and the symmetric mode, also termed indivisible mode, where any relation is symmetric and any set is infinite.

In a quantum model [2], we have characterized the class of finite sets for which the membership relation can be expressed as a finite propositional disjunction of equalities, in the object language. Finiteness can be recognized, at the object level, only when this happens. In particular, one can conceive an infinite singleton, dropping, in the object language, the closed term which denotes its unique element. Infinite singletons satisfy the symmetry property as well, since the class of sets where any relation is symmetric is exactly the class of singletons.

The logic of infinite singletons represents a symmetric kernel, in sequent calculus [3]. It has the features of the symmetric mode: absence of mutual contradiction and condensation, absence of negation, absence of time, and displacement. The direction of logical consequence becomes irrelevant. In this setting, one can develop the definition of a generalized quantifier, disappearing once consequence is recovered, that represents correlations. Considering the structural rules of sequent calculus, this suggests a possible approach to the problem of the representation of contextual reasoning and other kinds of human reasoning in artificial intelligence [4].

[1] I. Matte Blanco, *The Unconscious as Infinite Sets. An Essay in Bi-Logic*. Duckworth, London, 1975.

[2] -, *Quantum states as virtual singletons: converting duality into symmetry*, *International Journal of Theoretical Physics* 53 (2014) 3488-3502.

[3] Sambin, G., Battilotti, G. Faggian, C., *Basic logic: reflection, symmetry, visibility*, *Journal of Symbolic Logic* 65 (2000) 979-1013.

[4] -, *Symmetry vs duality in logic: an interpretation of Bi-logic to model cognitive processes beyond inference*, *International Journal of Cognitive Informatics and Natural Intelligence*, to appear.