

Supra-Logic: Using Transfinite Type Theory with Type Variables for Paraconsistency

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Abstract

We define the paraconsistent supra-logic P_σ by a type-shift from the booleans o of propositional logic P_o to the supra-booleans σ of the propositional type logic P obtained as the propositional fragment of the transfinite type theory Q defined by Peter Andrews (North-Holland Studies in Logic 1965) as a classical foundation of mathematics. The supra-logic is in a sense a propositional logic only, but since there is an infinite number of supra-booleans and arithmetical operations are available for this and other types, virtually anything can be specified. The supra-logic is a generalization of Łukasiewicz's three-valued logic, with the intermediate value duplicated many times and ordered such that none of the copies of this value imply other ones, but it differs from Łukasiewicz's many-valued logics as well as from logics based on bilattices. There are several automated theorem provers for classical higher order logic (finite type theory) and it should be possible to modify these to our needs.

Keywords

Paraconsistency, Transfinite Type Theory, Higher Order Logic, Many-Valued Logic

What I assert and believe to have demonstrated in this and earlier works is that following the finite there is a *transfinite* (which one could also call the *supra-finite*)...

Georg Cantor 1883

Quote from M. Hallett, *Cantorian Set Theory and the Limitation of Size*, Clarendon Press, 1984 (p. 39)