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On the Formalization of Theories

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Abstract We propose that the set theory ZFC slightly modified to allow for urelements, and extended with appropriate definitional schemata, constitutes a complete description of natural human logic and that it constitutes a *lingua characterica* and a *calculus ratiocinator* in the sense of Leibniz.

Keywords ZF^+ · Urelement · Axiom schema of replacement

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The current literature on mathematical logic may create two illusions: 1^o that natural human logic is well described by first-order logic; 2^o that in practice formalization of mathematics is impossible. I will argue that both statements are inaccurate. More precisely, that natural human logic is a certain conservative extension of the standard set theory ZFC (see [1, 5]), that I will define and denote by ZF^+, and that ZF^+ is rich and flexible enough to formalize *almost all* mathematics without elongating complete informal proofs. (The *almost all* will be clarified in Remarks 3 and 4.) Thus I believe that ZF^+ is a full implementation of the program of Aristotle and Leibniz; however, see Remark 6.

Roughly speaking *Natural Logic*, i.e., ZF^+, is a system of axioms and rules of proof for an *open* first-order multisorted language L extending the language of ZF.

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