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Intensional Paradoxes

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Abstract The topic of this paper is that class of paradoxes of self-reference whose members involve intensional notions such as *knowing that*, *saying that*, etc. The paper discusses a number of solutions that have been proposed by, e.g., Prior and several AI workers, and argues that they are inadequate. It argues, instead, for a dialetheic/paraconsistent resolution. A formal theory of propositions is given; this is based on arithmetic, and treats propositions as sentences. In the theory the paradoxes are accommodated in a satisfactory manner. An Appendix establishes that the contradictions in the theory do not spread to the underlying arithmetic machinery.

Introduction The paradoxes of self-reference are known and loved (or hated) by logicians. Attempts to solve them have provided the cornerstone of logic this century. The set-theoretic paradoxes were integral to the development of modern set theory; the semantic paradoxes to formal semantics. There is, however, a third clearly distinguishable group (though all three of these groups tend to merge into the others at the edges): the intensional paradoxes. Paradoxes in this group are just as venerable as paradoxes in the others (indeed, much more venerable than the set-theoretic paradoxes), since they are to be found in Buridan, if not in antiquity, in intensional versions of the liar paradox. Yet they have had little attention compared with their more illustrious cousins. Even after the brilliant papers of Prior [28] and Montague [13] on the subject, little heed was paid to them. The situation is now changing, however, due to the need to develop a formal theory of intensionality. The pressure for this comes largely from a, perhaps, somewhat unexpected direction: artificial intelligence. Workers in this area have confronted the problem of how an AI reasoning system should reason about what it and others know, believe, etc., and have run head-on into the problem of the intensional paradoxes (see Asher and Kamp [3], Morgenstern [15], des

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