# DEFINITIONS BY ABSTRACTION AND REFERENCE TO ABSTRACT OBJECTS

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Definitions by abstraction, of the sort championed by the neo-logicists, are usually construed as introducing particular kinds of abstract objects, such as numbers, directions, etc. The advantage of this way of proceeding is that the abstract objects so introduced are available as referents of the corresponding sort of singular terms. As a result they can be captured by the range of ordinary first-order quantifiers, and can stand in various relations to ordinary objects, thereby underpinning the applicability of mathematics and other formal disciplines to empirical science. The aim of this talk is to argue that these aims can be achieved under a "thin" notion of abstraction that does not require the introduction of sui-generis first-order objects, while preserving the mathematical role that they play, e.g., with respect to empirical science. We rehearse the proposal in the case of arithmetic, pointing out the conceptual difference between postulating a separate realm of first-order objects delivered by abstraction and the independent issue of commitment to higher-order entities (sets, functions, relations, quantifiers, etc.).