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CONTRIBUTIONS TO SYNTAX, SEMANTICS, AND THE PHILOSOPHY OF SCIENCE

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In the recent literature of the philosophy of science, much space has been given to the problem of analyzing theories of the deductive and natural sciences in a way which makes explicit some of the syntactic and semantic features which seem to be implicitly present in their structures. This paper is concerned with the same problem; however, some other problems of syntax and semantics are touched upon along the way. After some preliminaries, a very general method of constructing symbolic languages is introduced. The resulting languages are interpreted in either empty or non-empty sets and so in a way which permits them to contain terms which stand for nothing at all and an existence predicate which is not applicable to all terms. Also, certain variable binders are interpreted in a way which leaves open the possibility of interpreting them modally and a semantic operation of degree of truth for arbitrary formulas is introduced. An axiomless logic commensurate with a semantics of this kind and so one which contains a new treatment of definite descriptions is then constructed and shown to be both sound and semantically complete. Finally, theories and various concepts pertaining to theories are defined on the basis of this syntax and semantics. Among the concepts are operations which assign degrees of confirmation, explanatory powers, degrees of deductive simplicity, and degrees of adequacy to theories, relations and concreteness and abstractness for expressions, a relation of significance for theories, and operations which assign denotations and meanings to expressions.

1. PRELIMINARIES

On the assumption that the reader is acquainted with letters, arithmetic, and the rudiments of set theory, we begin with a convention and some preliminary definitions.

Convention 1. The letters '*a*' through '*z*' range over all existing entities.

Definition 1. If m is a natural number, then x is an m-term sequence just in case one of the following conditions is satisfied:

(1) $m = 0$ and x = the empty set

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