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ON INDUCTION

ROLF SCHOCK

Philosophers who worry about induction generally take for granted that induction is something like deduction, but carried out by means of certain peculiar inductive axioms or inference rules. Of course, deductive logic can be extended in a certain way into a sound and semantically complete logic of probabilities[1]. Nevertheless, such a logic of probabilities cannot justly be called an inductive logic since it is entirely deductive; that is, the so-called inductive inferences (from sample to population and so on) are not provable in it. Moreover, if the inductive inferences were provable in such a logic of probabilities, then, since most of them have innumerable counterinstances, there would be no good sense in which that logic would be sound. All of this suggests that the usual approach made to induction by philosophers is misguided.

A quite different approach was made by R. Carnap[2]; although he constructed a theory which he called inductive logic, his theory is in fact an extension of deductive metamathematics. Moreover, Carnap's inductive logic is an extension of that part of metamathematics which deals with concepts having to do with the interpretation of object language expressions. In other words, Carnap's inductive logic is a branch of semantics.

In this paper, we follow Carnap in dealing with induction semantically; however, the theory of induction which we construct is somewhat different from the one constructed by Carnap. Also, since our theory is both deductive and within semantics, we refrain from calling it either inductive or a logic.

1. SYMBOLS, TERMS, AND FORMULAS

Our object language contains the following symbols:

(1) the logical constants $\sim$('not'), $\rightarrow$('only if'), $\wedge$('and'), $\vee$('or'), $\leftrightarrow$('if and only if'), ι('the'), $\bigwedge$('for any'), $\bigvee$('for some'), and $\mathbf{I}$('is identical with'); we call the first five of these sentential connectives and the next three variable binders;

(2) a denumerable infinity of distinct

(a) individual variables,

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