definitions of these concepts use quantitative terms, viz. the degree of confirmation, while I tried, without success, to find definitions using only non-quantitative terms, e.g. L-terms. In each quotation Popper omits a few words which would have destroyed his argumentation ; and the sentence in (1") here italicised directly contradicts his assertion. (The discovery of the omission in (1) is not made easier by the fact that Popper refers to page 492 instead of page 482. The omission in (2) is not even indicated by dots.)

(b) Popper reports correctly (p. 158) that my definition of degree of confirmation (viz, c^*, *Probability*, § 110) leads to the result that the degree of confirmation for any universal law for a universe with infinitely many individuals is zero. Like many others, he regards this result as counter-intuitive. This is a serious problem, which I shall not discuss here. However, Popper continues (p. 159) : ' And Carnap himself admits that this result is counter-intuitive.' This assertion, which he repeats again later, is not correct. On the contrary, my whole discussion (in § 110 G) tries to show that the result, in spite of the first appearance, is not counter-intuitive. I can easily imagine that a reader might remain unconvinced by my arguments. But it is thoroughly puzzling to me how any reader could have the impression that I myself believed the proposition which I tried so hard to refute.

(c) Popper shows correctly (p. 160) that the following theorem holds for logical probability p :

(3) If x follows from y, then, for every z, $p(y, z) \leqq p(x, z)$.

He adds : ' which is, precisely, the invalid condition which Carnap uses on the bottom of page 474 of *Probability* as an argument to show the invalidity of a confirmation concept '. This is an error. If I had actually asserted the invalidity of (3) or rather of its analogue for degree of confirmation, as Popper thinks, then my theory would indeed contain a glaring inconsistency ; for I myself have asserted this analogue as a theorem (T59-2d, p. 317). The condition, which I showed to be invalid and used as stated by Popper (I call it ' special consequence condition ', as Popper mentions correctly), is in fact the following (in the simple form for initial confirmation, see *Probability*, p. 471 (H 8.21) and p. 464 (4), ' t ' is the tautology) :

(4) If x follows from y, then, for every z,

$$\text{if } c(y, z) > c(y, t) \text{ then } c(x, z) > c(x, t).$$

The conditions (3) and (4) have a certain similarity but are not the same. I have explained their difference in *Probability* page 475.

Popper's whole argument (p. 160) is based on the confusion of (3) with (4) and collapses with it.

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Reply to Professor Carnap

PROFESSOR POPPER writes : In section (a) of Professor Carnap's paper I am charged with misquoting him. I am sorry that I failed to insert three dots in order to indicate an omission in quotation (2), and that I referred to page 492 instead of page 482. I admit

these two mistakes and I apologise. But fortunately these regrettable errors do not affect the argument at all. Nor do they give grounds for Professor Carnap's complaint. This complaint is directed not against an argument of mine but against a mere *footnote* of eight lines (and he gives the reader no warning that the two mistakes both occurred in that footnote). The purpose of the footnote was to help the reader to find passages in *Probability* which support my contention : the contention that it is sufficient for me to discuss (iii), i.e. the 'quantitative' concept of confirmation, since no theory ('independent of (iii)', I ought to have added) of the other two concepts is offered. The purpose of my footnote was, no doubt, partly defeated by printing '492' instead of '482', and to a lesser extent by omitting the three dots. These two mistakes of mine are incontestable *facts*. All the rest is Professor Carnap's *interpretation*. The suggestion that I propped up my criticism by 'alleged quotations' is absurd. (Readers of the more 'substantial discussion' between Dr Bar-Hillel and myself will be able to judge whether my arguments are in need of such props to prevent them from collapsing.)

My reply to Professor Carnap's section (*b*) will be found, in this number, in sections (5) and (6) of my 'Adequacy and Consistency : A Second Reply to Dr Bar-Hillel'.

My reply to Professor Carnap's section (*c*) is this. Professor Carnap asserts that I confuse two formulae which he numbers (3) and (4), and he says that (3) is valid while (4) is false. But as I show, in section (8) of my 'Second Reply', (4) follows from (3). Thus Professor Carnap's assertion is logically inconsistent ; and he is seriously in error if he believes that my argument collapses because of the alleged 'confusion' of (3) and (4).

<div align="right">K. R. POPPER</div>

Further Comments on Probability and Confirmation

A Rejoinder to Professor Popper

(1) PROFESSOR K. R. POPPER, in his reply to my comments on a note of his, does not accept my view that the disagreement between him and Professor R. Carnap on questions of logical probability and degree of confirmation is mostly a verbal one. On the contrary, in this reply he goes on to make much stronger claims than he did in the first note and charges that Carnap's theory of confirmation, as presented in his two recent books,' is partly inconsistent, and partly inadequate from the point of view of *his own* requirements, not merely from that of *my* (Popper's) requirements' (*Reply*, p. 158).

Because of the severity of these charges and the great importance of the issues behind them—I think it is no exaggeration to state that the problems around the logic and methodology of induction occupy the central position in modern philosophy of science—and because of the fact that Carnap's works on inductive logic are not so well known among British logicians and methodologists as they deserve to be, in my opinion, it might be worth-while to dedicate more space to this discussion than I did in my very brief *Comments*.

Carnap himself will answer Popper's *Reply* in so far as it is based upon attributing to Carnap statements which he did not make. This will enable me to restrict myself