NOTES AND COMMENTS

Comments on ' Degree of Confirmation ' by Professor K. R. Popper

IN a recent issue of this *Journal*, Professor K. R. Popper [1] expressed his misgivings of the current identification of the degree of confirmation of x by y with the (relative) probability of x given y (p. 143), insisting that his disagreement is not a verbal one (p. 146).   I claim, and shall try to prove, that the issue *is* a verbal one and that Professor Popper's point has been fully anticipated and adequately been taken care of by at least one of the adherents of the criticised identification.   The main point of this comment is, however, not so much the clarification of a misunderstanding as an expansion of what seems to me a highly significant remark of Professor Popper's on scientific methodology.

I

It seems that Popper was the first to use the expression ' degree of confirmation ' (or rather its German equivalent : *Grad der Bewährung*). He introduced this term in § 82 of his *Logik der Forschung* (Vienna, 1935). Though he did not define it there very clearly, he stressed its being different from logical probability.   Professor Carnap, however, began using this term, perhaps as early as 1936, as the systematic explication for the presystematic explicandum ' logical (or inductive) probability '.   But thereby he did not disregard the point Popper had in mind.   On the contrary, in his most extensive treatment of this complex of problems, *The Logical Foundations of Probability*, Chicago 1950, he dedicated a whole chapter (viz. chapter VI : Relevance and Irrelevance) to a very thorough discussion of the concepts crucial to Popper's point, though under a different terminology. Though Popper's degree-of-confirmation and Carnap's relevance-measure are differently defined, there can be no doubt that their explicanda are identical.   The following dictionary should help to clarify the situation :

Popper's terms	Carnap's terms
absolute (logical) probability	initial confirmation
relative (logical) probability	degree of confirmation
degree of confirmation	relevance measure
supports	is positively relevant to
undermines	is negatively relevant to
independence	irrelevance

[1] K. R. Popper, ' Degree of Confirmation ', this *Journal*, 1954, **5,** 143-149

The case, regarded by Popper as crucial, in which a statement y undermines each of two statements x_1 and x_2 while supporting their conjunction, is explicitly discussed by Carnap (p. 394) as case $3b$, and an illustration given on the following page. It is far from obvious why ' we should have to say in such a case that y confirms x_1x_2 to a higher degree than it confirms either x_1 or x_2 ', as claimed by Popper (p. 144), rather than describe the situation in the way done in the preceding sentence or say, in Carnap's terms, that in such a case (the evidence) y is negatively relevant to each of (the two hypotheses) x_1 and x_2 and nevertheless positively relevant to their conjunction.

It is possible that some authors confused confirmation with relevance. Carnap certainly was not one of them. It is indeed slightly awkward ' to say that evidence y of which x is completely independent can yet strongly " confirm " x ' (p. 145), and this way of speaking seems to diverge from ordinary usage, but it is not absurd or necessarily misleading. Carnap, at any rate, has not been misled by it.

2

I come now to my second point. In addition to the argument from ordinary usage, Popper has another objection against using ' degree of confirmation ' as synonymous with his ' (logical) probability '. He points out that methodologists of science are accustomed to say that science aims at hypotheses with a high degree of confirmation. However, the argument continues, ' *Science does not aim, primarily, at high probabilities. It aims at a high informative content, well backed by experience. But a hypothesis may be very probable simply because it tells us nothing, or very little. A high degree of probability is therefore not an indication of ' goodness '—it may be merely a symptom of low informative content* ' (p. 146).

Now, I agree fully with the spirit of Popper's remark, though not with the letter and certainly not with his belief that he thereby succeeded in uncovering a serious fault in the current theory of degree of confirmation. *Prima facie*, it seems indeed as if high informative content is incompatible with high probability. Since high informative content is certainly a desideratum for scientific hypotheses, it seems to follow that the scientists do not aim at high logical probabilities for them, and are not interested in obtaining for them a high degree of confirmation, in Carnap's sense, which sounds very strange indeed. The situation seems to be, however, simply this : A ' good ' hypothesis is one that has high *initial* (or absolute) informative content, hence a low *initial* confirmation, in Carnap's sense, but a high degree of confirmation, in Carnap's sense, relative to the total available evidence, hence—and this sounds admittedly slightly paradoxical—a low informative content, relative to this evidence. Though degree of confirmation and measure of informative content (as a matter of fact, there are many

plausible measures of informative content, some of which have been discussed recently by Carnap and myself in a common paper [1]) are, roughly speaking, inversely proportional, a ' good ' hypothesis must indeed have high degrees of both, with contradiction easily avoided through the qualifiers ' initial ' (or ' absolute ') and ' relative to the available evidence', respectively.

Though the methodological situation may be adequately and satisfactorily described in terms of Carnap's degree of confirmation alone (informative content being definable on its basis), there is, of course, no objection to employing also the relevance terminology and saying, for instance, that good scientific hypotheses should have low initial information, hence high initial content, with empirical evidence (' experience ') being highly positively relevant to them.

Altogether, though Popper's recent polemic against the current theory of degree of confirmation seems to be unjustified and in spite of the fact that his positive proposals in this respect seem to have been effectively anticipated in Carnap's treatment of relevance, there can be no doubt that the complex position held by scientific hypotheses with regard to logical probability, informative content, and relevance of empirical evidence have been greatly clarified by Popper's remarks.

<div align="right">YEHOSHUA BAR-HILLEL</div>

The Hebrew University
Jerusalem

' Content ' and ' Degree of Confirmation ' : A Reply to Dr Bar-Hillel

DR BAR-HILLEL'S concluding remarks are gracious, and even encouraging. But since they do not quite match what he says in the body of his note, they are perhaps only meant as balm to my wounds. For if he is right in what he says in the body of his note then I cannot possibly have ' greatly clarified ' the ' complex position ' by my remarks. On the contrary, I must have left this position in a state of even worse confusion than it was left in by ' the current theory of confirmation ', as Dr Bar-Hillel calls it.

My note ' Degree of Confirmation ' which has given rise to Dr Bar-Hillel's comments was critical of Carnap's theory, because I had to make clear why I wanted to propose a new definition of degree of confirmation.

[1] Y. Bar-Hillel and R. Carnap, ' Semantic Information ', this *Journal*, 1953, 4, 147-157, especially 149-151