A PROPOSAL IN THE ANALYSIS OF QUESTIONS

Leo APOSTEL

Recent work, done by D. Harrah, A. Prior and others, has shown the beginning of the development of a logic of questions. Naturally it would be desirable to reduce the logic of questions to better known and already developed calculi. We wish in the present note to propose such a reduction, pointing out some of its advantages. We do not claim to have obtained decisive results, but we think we can make a case in favor of a moderate type of reducibility.

Let us explain the intuitive foundation of our proposal.

If x asks the question "Is p true ?", he seems to presuppose the following facts:

1. x does not know if p is the case and x does not know if not-p is the case.

2. x believes that he ought to know if p is the case or if not-p is the case.

3. x believes that the person he addresses himself to (let us call him y) ought to assert that p is the case or that not-p is the case.

4. x believes that it is possible for y to assert that p is the case or that not-p is the case, and moreover x believes that it is possible for y to know that p is the case or that not-p is the case.

We want to make some comments on the four mentioned presuppositions.

A. Our analysis of questions does not cover question-like statements that are not questions. The rhetorical question for instance "Is not Hitler an example of human virtue ?" certainly does not satisfy all our demands. Irony and pedagogy are not covered by the analysis presented.

B. In the demands 3 and 4 we do not necessary presuppose that x and y are different. After all, we can question ourselves. But in general the non identity of x and y is presupposed in the analysis of questions as types of communication.

C. In our second requirement we could have said either that x wishes to know that p is the case or that not-p is the case, or that x demands imperatively to know that p is the case or that not-p is the case. The logic of optatives has been commented upon by Karl Menger, and the logic of imperatives has very recently been studied in Rescher's "The Logic of Commands". It is however obvious that less is known about optatives and imperatives than about deontic modalities. For this pragmatical reason we formulate requirement 2 as we did, but fruitfull investigations could be made by replacing 2 by an optative 2′ or an imperative 2″.

D. We differentiate between the requirements 3 and 4 because we do not presuppose that knowing implies asserting, nor do we claim that asserting implies knowing. If the reader wishes to make stronger claims about the relationship between knowing and asserting, he can collapse our two last requirements into one.

E. We can not prove that the four requirements taken together give us a sufficient analysis for questions. We think all four requirements are necessary conditions for a question to be genuine. We can not think about any other obvious requirements of the same degree of evidence at the present moment. For this reason we wish to define in the present note the concept of question by means of the four requirements mentioned.

Formally this definition of question proposed here needs the following combination:

1. the theory of epistemic modalities,
2. the theory of deontic modalities,
3. assertion logic,
4. the theory of alethic modalities.

We need 1. to formalise the concept of believing and knowing, we need 2. to formalise the concept of ought, 3. to formalise the concept of assertion and 4. to formalise the concept of possibility. In a recent work "Topics in Philosophical Logic", by N. Rescher, we find in Chapter 5 epistemic modalities, in chapter 14 assertion logic, in chapter 16 deontic logic, and it is well known that various systems of general alethic modalities have been presented by R. Feys and H. von Wright. The only originality

we claim to have in this note is that we think it necessary to combine those various types of modality tor each a logic of questions.

Our definition will have the following form:
?xp $=_{def}$ the conjunction of

1. $\sim \mathbf{K}(xp) \wedge \sim \mathbf{K}(x \sim p)$,
2. $\mathbf{B}(x, \{\mathbf{O}(\mathbf{K}xp \vee \mathbf{K}x \sim p)\})$,
3. $\mathbf{B}(x, \mathbf{O}(\mathbf{Ass}\ y\ p \vee \mathbf{Ass}\ y \sim p))$,
4. $\mathbf{B}(x, (\mathbf{Poss}(\mathbf{K}yp) \vee \mathbf{Poss}(\mathbf{K}y \sim p)))$.

This definition naturally will have different implications for different systems of deontic, assertoric, epistemic and alethic modalities. It is not the least of its advantages that it allows us to experiment upon the logic of questions by trying out various systems of modalities. Whatever may be the underlying systems of modalities used, we can state however that the central idea of a presupposition of a question can now be formally defined as follows:

Let A be the name of conjunction of the four statements just written down. We say that q is a presupposition of the question "Is p the case ?" as asked by x, when the following statement is true: ["x believes A" implies "x believes q"].

The implication used should be an adequate natural implication, the best system for which can be found in the proposals of Anderson and Belnap. If this definition of presupposition can be accepted, the problem is reduced by means of epistemic modalities to the general notion of natural implication, and moreover the truth of the presupposition is not required for the genuineness of the question.

That this last feature should not obtain has been stressed in an unpublished PHD dissertation by Mr. M. Windross, whom we wish to thank for stimulating discussions on the present topic.

The distinction made between the *primary presupposition* and the *secondary presuppositions* of a question can be formulated as follows: "r is a secundary presupposition of the question ?xp if and only if $\mathbf{B}(x,A)$ implies that it ought to be the case that $\mathbf{B}(x,r)$."

The second main advantage of the analysis proposed is that the concept of an *answer* to a question and of a *partial answer* to a question can be defined easily.

We shall say that q is a complete answer to the question ?xp if the following conditions are satisfied:

1. if x believes q and knows q, then either x believes and knows p or x believes and knows not-p;
2. x believes at least that y has asserted p or that y has asserted not p;
3. one of the partial causes for the fact that x believes and knows p or that x believes and knows that not-p is the fact that y has asserted p or that y has asserted not-p.

Within these three conditions that have been mentioned, the relations between x, y and p are those that have been presupposed in our definition of the concept of question. We stress that we need, in order to define the concept of *answer,* yet another modality, namely *causal implication,* and even the difficult concept of *partial cause.* The reader may think that a partial causal implication is too weak to formalise the concept of answer. We may need the concept of *main partial cause* to give a satisfactory analysis.

The theory of causal modalities however has yet to be developed. The writer is preparing a monograph on the tropic, being convinced that some of the central concepts of epistemology, namely the concept of answer to a question and the concept of acting in accordance to a rule (see the intervention of L. Apostel in the *Brussels colloquium on legal logic,* December 22-23, 1969) can only be analysed using the concept of causal implication. We mention this topic here with reference to our definition of answer to show its unavoidability.

Let us now ask what could be a *partial* answer to a question. Again we need epistemic modalities. The idea is the following: A partial answer to a question is at least a statement that is implied by at least one complete answer to the question. This condition however is not enough: the infinite set of other synthetic or analytic consequences of a statement is much too large to allow any one of its elements to be a partial answer. To strengthen our requirements we propose the following: The

belief that q is a complete answer to a question ?xp implies, for the person who holds this belief either with necessity or with non-zero probability, that the same person believes the partial answer, and moreover, the fact that this partial answer is asserted, is believed to be a partial cause of the fact that in some future moment (not too far away) a complete answer will be asserted by some person whose assertions can be known by the person who asks the question.

All this can be formally expressed in the language used on page 378, supplemented by chronological modalities.

The analysis given here allows in our definition on page 3 to apply quantifiers to x and y. This application of quantifiers allows us also to distinguish between private and collective presuppositions, and to express the sociological features of the question-answer communication.

The analysis proposed can equally be applied to questions of the following form: "Who committed this murder ?". Namely we only have to state that a finite number of persons are possible candidates for the function of murderer. Let a,b,c,... be the names of these persons. Then the question "Who committed the murder ?" can be analysed as a disjunctive set of questions "Is the fact that a committed the murder true, or is the fact that b committed the murder true, or ...". These last questions are of the type that has been analysed in our definition on page 378.

We now think that we could have convinced the reader that our analysis of questions has certain advantages. Moreover the combination of these various types of modalities in one formal system seems to present an interesting formal problem. Philosophically the theory of questions seems to us to present the following primary importance: logical empiricism has rejected certain problems as being pseudo-problems because no answer could be given to them. We emphatically reject this point of view, but we are convinced of the fact that no rational discussion of it is possible without having at our disposal a theory of questions, answers and partial answers. At least at the present moment an up to date logical empiricist could say that the pseudo-problem is a set of related questions (questions being

related when they have partial answers presenting a sufficient number of common synthetic consequences) for which it is not even possible to have partial answer. In a general theory of action we could then ask if studying pseudo-problems can be an efficient means towards one of the many aims of the scientific enterprise. It is our conviction that a moderate study of pseudo-problems has a weak, but non-zero utility in the development of the scientific enterprise. It can not be, however, the aim of the present paper to pursue this topic. The remark may suffice to stress the importance of the logic of questions, and its insertion in the wider field of inquiry constituted by the logic of modalities.

University of Gent

Leo APOSTEL
January 1970