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QUESTIONS

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Just what is a *question?*

1. First quick answer: It's a sentence in the interrogative mood; whose mark in English is inversion of the order of subject and verb, and customarily a special mark at the end of the sentence (or in spoken English a certain tone of voice); and sometimes certain characteristic words such as "what", "when", "how many" and so on.

But to say this is misleading if it suggests that the *only* difference between questions and other sorts of utterance such as statements and commands is an unessential grammatical one. For some purposes we need to make a distinction which is independent of the mood of the main verb. For example:

(a) Rhetorical questions: "I ask you, gentlemen of the jury, can such a man be innocent?" is not really a question but a statement.

(b) An indicative sentence with a characteristic tone of voice: "This *is* the Canberra train I'm on?"—not really a statement, but a question.

(c) "Tell me how many fingers I am holding up!"—a command, but at least almost equally well considered as a question.

Endless examples of this sort could be given. And consider even some unspellable sort of utterance such as a grunt. If someone grunts, it at least makes sense to ask: "Is he trying to *say* such-and-such?" (is it an indicative grunt?): "Is he *asking* so-and-so?" (interrogative grunt?): and so on. These questions may be difficult to answer, but at least they can be asked.

2. Traditionally, logicians have seldom if ever recognized questions as logical entities. In passing mentions, it has seemed to be their main concern to reduce them to *statements* of some

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kind. The prevalent attitude seems to have been: Anything which isn't a statement is meaningless—questions aren't meaningless—therefore questions must be elliptical statements. The only problem left is to find out just what statements questions are.

Jeffreys, in his *Theory of Probability*[1], isn't even in any doubt. He says that the question "Is Mr. Smith at home?" can be expressed as the following three statements:

"I do not know whether Mr. Smith is at home."

"I want to know whether Mr. Smith is at home."

"I believe that you know whether Mr. Smith is at home."

These statements, he says, express the entire content of the question.

This can be countered in detail by pointing to contexts (e.g. examination questions) in which the statements proposed as a translation are not even such as would be claimed true by the questioner.

On quite a different front this attitude comes under attack from Wittgenstein[2]:

> If you do not keep the multiplicity of language-games in view you will perhaps be inclined to ask questions like: "What is a question?"—Is it the statement that I do not know such-and-such, or the statement that I wish the other person would tell me . . . ? Or is it the description of my mental state of uncertainty? . . .
>
> Of course it is possible to substitute the form of a statement or description for the usual form of question: "I want to know whether . . ." or "I am in doubt whether . . ."—but this does not bring the different language-games any closer together.

3. Nevertheless I regard Wittgenstein as a rather doubtful ally. There is a basic logical point about attempts to reduce a question in this way, and Wittgenstein seems to have missed it just as much as Jeffreys. The proposed reductions aren't accounts of the content of the question itself; they are accounts of the content of the situation in which the question is asked. If I ask a question, it may be true that something is implied about my state of knowledge or about my desire to obtain an answer; but if this is so it is implied not by the question itself but by the fact that I ask it. (If someone else asked *the same* question, it could scarcely be said that *the same thing* was implied, i.e. about my knowledge and my desires.)

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[1] H. Jeffreys, *Theory of Probability*, Oxford (1948), p. 378.

[2] L. Wittgenstein, *Philosophical Investigations*, Oxford (1953), p. 12.

A pointer to this is provided by the fact that in the proposed translations the question is not in fact analysed away: it has to be *referred to*. The question "Is Mr. Smith at home?" is supposed to mean "I do not know *whether* Mr. Smith is at home", or something similar. But the word "whether" is a relative interrogative word, and the noun-phrase "whether Mr. Smith is at home" is simply a noun-phrase representing the question concerned. It is simply as if we were told that the question Q means "I do not know the answer to Q"; where the definiendum appears as part of the definiens.

4. Incidentally in this connection it is interesting to compare the distinction made by Ryle[3] between "knowing that" and "knowing how". One part of the distinction can be put as follows: to say that someone "knows that (such-and-such is the case)" is to specify a *statement* and say that he knows it to be true. But to say that someone "knows how . . ." (or "knows whether . . ." or "knows when . . ." or "knows where . . ." etc.) is at most to specify a *question* and say that he knows the correct answer to it. This distinction is valid even if we recognize that "knowing how" is in many cases rather different again, involving for example the possession of a skill.

5. But why is it that people like Jeffreys (and to some extent Wittgenstein) make this mistake, in the case of questions, of confusing content with context? Neither, surely, would be guilty of it in the case of statements—of saying, for example, that p means "I believe p". It is almost as if there were a conspiracy to deny questions a *logic,* in the ordinary simple sense —a conspiracy so deep that even Wittgenstein, the rebel, has unwittingly taken part in it.

Thus it seems to have been assumed—and I have heard this view expressed explicitly—that questions introduce no new logical points; that to ask a question is simply as it were to make a statement and put a question-mark after it; that to ask the question "Are roses red?" is simply to *do something with* the statement "Roses are red". The distinction is taken, we might say, to be one of use rather than one of logic. In contra-distinction to this, the distinction I want to make here is a logical one.

6. If pressed to define a question, I should do so by saying that it is a sentence which requires an answer; or (I should hastily add) a refusal to answer, or the raising of a point of order. This means that if I am asked a question and if I neither

[3] G. Ryle, *The Concept of Mind*, London (1950), ch. 2.

give a proper answer to it nor in some explicit way refuse to answer nor take the question itself to task in some way, I commit a piece of bad logic. And of course it is also bad logic to say nothing at all. (Silence is the perfect logic only so long as no one asks you a question.)

Such a definition could be elaborated by giving an account of what it is to "answer" a question, and of what it is to raise a logical point of order, etc. But in place of this, since it is difficult to make definitions of this sort watertight, I prefer to put forward some postulates concerned with the logical status and relations of the terms "statement", "question" and "answer".

7. *Postulate* 1. An answer to a question is a statement.

It is necessary to say this only because people sometimes think that a question can be answered with something *less than* a statement; e.g. that if I am asked my name I can reply by simply giving my name, which is not a statement but merely a proper noun. All we need to say about this is that in the context of the question giving my name is equivalent to making the statement *that it is* my name.

Wedding vows aren't any the less binding for the fact that the words uttered are just "I do" instead of "I take this woman . . . etc.". Similarly the words "yes" and "no" customarily represent statements: we might say that they are statements in code. Compare the aptitude-test question, "If seven and four make twelve place a cross in the second largest square, otherwise place a nought in the second triangle from the left". In complicated cases it is possible that one might get the answer right but the code for the answer wrong; but this is hardly conceivable in the simpler linguistic cases, where everyone knows what statement is meant.

8. Next we must clarify the word "answer". It is obvious that given a question not every statement will count as an answer to it. Here I want to say:

Postulate 2. Knowing what counts as an answer is equivalent to knowing the question.

Notice however that the plausibility of this as a postulate is dependent on our prior acceptance of postulate 1. Suppose the question "In which continent is Luxembourg?" could be answered just by giving the *name* of a continent, and suppose that such an answer were not considered equivalent to making a statement about the location of Luxembourg. Then the set of possible answers "Europe", "Asia", etc. would not specify what the question was, since they could equally be answers to the question "In what continent is Ecuador?" So long as we accept postulate 1, however, we shall say that the possible answers to the first question are the *statements* "Luxembourg is in Europe", "Luxembourg is in Asia" and so on; and these clearly couldn't be answers to the question about Ecuador, or to any question other than the one asked.

9. Now notice the difference between a question and a statement. A question is not like a statement, it's like a statement-*form*, a statement with a blank in it: "Luxembourg is in the continent of . . . (Please fill in the blank)". It is like a statement-form, plus a question-mark.

When in practice we ask a question by means of an indicative sentence plus question-mark or tone-of-voice equivalent, i.e. a question typically answerable by "yes" or "no", the corresponding form is: "The truth-value of the statement such-and-such is . . . (Insert 1 or 0)": or in officialese, "Such-and-such is/is not the case. (Cross out whichever is inapplicable.)"

This is brought out most clearly by considering what happens when we negate a sentence. The negation of the statement S is the contradictory statement –S; and the two statements S and –S together represent the possible answers to the question "S?", the question formed by attaching a question-mark to the statement S. But if we now consider the question "–S?", the question formed by attaching a question-mark to the statement –S, we find that it has exactly the same pair of possible answers; and it follows that "S?" and "–S?" are *equivalent questions*. We can say this in spite of the fact that S and –S are certainly not equivalent statements.

10. *Postulate* 3. The possible answers to a question are an exhaustive set of mutually exclusive possibilities.

This needs to be illustrated by examples.

The necessity for the set of possible answers to be exhaustive is illustrated by the classical "Have you stopped beating your wife?", which is a logically improper question just because the indicated answers "yes" and "no" do not, on the usual reckoning, cover all the logical possibilities. The question "In which continent is Luxembourg?" is like this too, because it presupposes that Luxembourg is in a continent; and the presupposition is unimportant only because it happens to be true. If, instead, we were asked the question "In which continent is Honolulu?" we should be forced to invent the supplementary answer "No continent at all", i.e. the answer which if added would make the set of possible answers into an exhaustive set.

When the indicated answers to a question are not exhaustive one can of course alternatively say that the question is a perfectly proper one *relative to* a certain supposition, namely the supposition expressed by the disjunction of the indicated answers. Such relative questions are quite frequent: in the case of "Have you good vision? If not, do you wear spectacles?", the second question of the two is a relative one in a somewhat similar sense. I shall however not consider relative questions in what follows: my excuse is, first, that one cannot do everything at once, and, secondly, that non-relative questions are of more particular interest since they represent the simplest possible case. It is worth while noting that a relative question may always be converted into a non-relative one by the addition of a single "residual" answer to the list of possible answers.

To see that the possible answers to a question must be mutually exclusive, consider the following example: Suppose on being asked "In which continent is Luxembourg?" I were to reply "Either Europe, or Asia, or Africa". It might easily be objected that I had not given a proper answer in the sense that I had not given a *complete* answer. This objection might now be put another way: The answer "Either Europe, or Asia, or Africa" cannot be a proper answer, because it does not exclude and is not excluded by other proper answers, e.g. the answer "Europe". *Complete* answers are mutually exclusive, and this is simply one of the things we mean by "completeness".

11. Now to put these postulates to work for us. We can proceed to the following theorem:

If a question has only one possible answer, that answer is a *tautology.*

This is because no other sort of statement could on its own be "exhaustive", in the requisite sense (which will be explained in a moment). I first remark, however, that if we prefer we may take this as a definition of "tautology": a tautology is a statement which is the only possible answer to some question.

Now consider a question with, say, three possible answers, which we shall call A, B and C: there are no other possibilities, i.e. they are an exhaustive set. Thus it is necessarily true that either A or B or C should be the case. Thus the disjunction A v B v C is a tautology; and this follows simply from the fact that A, B and C together constitute an exhaustive set.

Now imagine the set of possible answers reduced to two, A and B. (We can think of the question as a yes-no question, with "A", say, standing for "yes" and "B" for "no".) B must now be equivalent to –A; it is necessarily true that either A or B should be the case. It follows that the disjunction A v B is a tautology; in this case it is the familiar tautology A v –A.

Now let us consider a question with only *one* possible answer, A. In what we have said above we have formed the general principle that if we form the disjunction of all the possible answers to a question we get a tautology. In this case the disjunction of all the possible answers is simply A itself. It follows that A must be a tautology.

12. A converse of this theorem can also be proved: If any answer to a question is a tautology, it is the only possible answer. In this case the proof depends on the fact that the possible answers to a question must be mutually exclusive.

The curious thing about these theorems, of course, is that they were hidden in the above three postulates. One of the things assumed was that self-contradictory statements are not permissible as answers to questions. This is of course eminently reasonable: if someone gives a self-contradictory answer to a question we call him to task about it, raise a logical point of order. Perhaps, of course, it could be said that the objection applies only to the fact of self-contradiction itself and has nothing to do with the fact that the self-contradiction is in answer to a question. This seems, however, something of a quibble, and one can hardly object if points about self-contradictory statements are built into the theory.

13. A further theorem: Every question has an answer.

If in the case of a question with only *one* answer it takes a tautology to exhaust the logical possibilities, then it is surely clear that a question with *no* possible answers could not possibly satisfy the requirements. Again this theorem was hidden in the assumptions made.

One might be tempted to try to build a sort of "contradictory question" out of a self-contradictory statement: Thus let C stand for some self-contradiction, and consider the question formed by placing a question-mark after it, i.e. the question "C?". This is a perfectly good question, but it is not a question with no possible answer—it has the perfectly good answer "No". This is in fact the only possible answer, and a tautology.

14. We can go on to develop a logical calculus of questions, analogous to but not identical with the logical calculus of statements (misleadingly called by some the "sentential calculus": questions are after all expressed in sentences too!).

For example, we can say that one question *contains* another when from every answer to the first it is possible to deduce an answer to the second. Thus the question "In which continent is Ecuador?" is contained in the question "What is the latitude and longitude of Ecuador's highest mountain peak?"; since from the latitude and longitude figures we could deduce the continent.[4]

From here we can define the notion of *equivalence,* used above as between "S?" and "–S?": two questions are said to be equivalent when they contain one another. Similarly we can define the *join* of two questions; roughly speaking, this is the question which is asked when the two questions are asked together. The join of two questions contains each of them.

A question with only one possible answer cannot contain any other question not equivalent to it, because from a tautology nothing is deducible except another tautology. It has, as it were, strength zero. To this extent it is analogous to a tautologous statement, which is weaker than any other statement. There is no corresponding analogy, however, with self-contradictory statements, i.e. there is no question which contains all other questions.

15. Summing up to date we might say: A question is equivalent to a decomposition (or section, or division) of the possible universes. The set of possible universes is split up into a number of subsets, each subset representing an answer to the question, i.e. consisting of exactly those universes consistent with the answer.

A yes-no question divides the possible universes in two. So, of course, does a statement. But a statement also says which subset contains the actual universe: it polarises the division. A yes-no question merely draws the dividing line, it does not polarise.

16. There are several things one could go on to consider. I want to conclude this account, however, by indicating that the theory of questions has at least one ready-made application waiting for it.

The "theory of information" of Hartley and Shannon[5] purports to measure the *information content* of messages transmitted over a communication channel such as a telegraphic or radio system. In very broad outline the definition of "informa-

[4] Taking the locations of the continents as axiomatic.

[5] R. V. L. Hartley, "Transmission of Information", *Bell System Technical Journal,* v. 7 (1928); C. E. Shannon and W. Weaver, *The Mathematical Theory of Communication,* Illinois (1949). I mention here only the key figures. A good short bibliography on the subject is given by E. C. Cherry, *On Human Communication,* London and N.Y. (1957).

tion content" is as follows. At each moment of transmission, it is argued, the sender has a choice of a number of possible alternatives. In the case of Morse, for example, he has just two alternatives, i.e. whether to have his key depressed, or not. In the case of telephonic communication the sender is in effect manipulating the magnitude of the voltage on the telephone wire; and the set of such possible manipulations is the set of possible telephonic messages. Physical limitations characteristic of the channel limit both the number of alternatives at any instant and the rate at which messages can be sent. Hence the sending of a message can always be considered as the selection of one of a predetermined finite set of alternatives, albeit perhaps very numerous. The "information content" of the message is the "amount of choice" involved: Hartley defines it simply in terms of the (logarithm of the) total number of alternatives—the more alternatives, the more choice and hence the greater the content.

The more sophisticated theory of Shannon—who incidentally emphasises that the theory is not a theory of "semantic content" —involves consideration of the *probabilities* of the respective alternatives. We need not be concerned with it here, except to remark that its success in application has prompted logicians[6] to attempt a "logical" version of the theory—and has incidentally led them up a blind alley in the process. Popper[7] had long ago suggested in another context a definition of the "logical content" of a *statement* in terms of its (logical) probability; and this notion, which had to some extent passed into currency, was pressed into service. But a considerable metaphysical fog is generated by attempts to bring the two concepts into alignment. The main point to be noticed is that, for Hartley and Shannon, the "information content" of a message is a function not just of the characteristics of a particular message but also of the number and characteristics of possible alternative messages.

The fog can be at least partly dissipated by pointing out that the definitions given by Hartley and Shannon are analogous to definitions referring not to statements but to *questions*. At each instant, the recipient of the message can be imagined to ask himself "What will the next piece of the message be?"; and, given postulates concerning the channel, this question has a set of possible answers corresponding with the set of possible

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[6] Y. Bar-Hillel and R. Carnap, "Semantic Information", *Proceedings of a Symposium on Applications of Communication Theory*, London (1953); also in *Brit. J. Phil. Sci.*, v. 4, 1953.

[7] K. R. Popper, *Logik der Forschung*, Vienna (1935); English translation, *The Logic of Scientific Development*.

alternatives envisaged by the technical theory. Hence what Hartley and Shannon in effect provide are measures of the "logical content" of questions. At the elementary level, corresponding with Hartley's definition, no mention of probability need be made—the logical content is a function simply of the number of possible answers.

The unit of "information content" usually used in the technical theory is the "binary unit" or "bit", and corresponds with the choice between two (equally probable) alternatives. This can be introduced in this context by considering how any question can be broken down into a string of yes-no questions after the manner of a guessing-game or a legal cross-examination. Each yes-no question, if we ignore the answer probabilities or assume them all equal, gives one "bit" of information, and the content of the original question is the minimum number of yes-no questions required. This is the basis of the use of the logarithm of the number of answers, rather than just the number itself, in the technical theory.

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