

THE CONTEXTUALIST APPROACH TO EXPLANATION

by
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INTRODUCTION

The fundamental problem in the philosophy of science is to provide an adequate account of the mechanisms scientific explanation. By 'adequate', I mean a theory capable of explaining the actual scientific *praxis*. The conception, which has prevailed for a long time, and still prevails among philosophers, is neo-positivism, and, more precisely, the deductive-nomological model (or D N model) we can find in Hempel's writings ⁽¹⁾.

In this paper, I am going to defend a new theory about explanation, opposed to neo-positivism, which has been propounded by Achinstein and Bomberger, the leaders of this new movement.

The numerous counterexamples to the D N model constructed by these philosophers of science, with others, seem to have given a fatal blow to the neo-positivist approach of explanation, as I shall show it in the first part of this paper.

One of the most fruitful solutions to the problem of explanation has been formulated by the contextualists, solution which avoids the difficulties encountered by the hypothetico-deductivist view of the D N model, though being sufficiently general to take into account all types of explanation, scientific and non-scientific, in reducing these differences to differences of context. The strength of this new approach, which shall be the object of my third part, lies in the fact that all explanations are answers to questions, and that questions are determined by the context in which they are asked. Such an obvious feature of explanation implies a shift in attention to contexts, i.e. to situations where an asking person is in relation to a respond-

(1) C.G. HEMPEL, *Aspects of Scientific Explanation*, 1965, Free Press.

ing one. If explanation depends on context, they depend on a questioner and a questionee, as well as on the knowledge the questioner possesses on the *quaesitum*. Consequently, as we shall see, the philosophers, mentioned above, have developed a theory of questioning as a necessary prolegomenon to any view of explanation, since to explain is to answer questions about phenomena, events, or whatever you want to have explained.

In the third part of this article, I shall consider the objections which can be brought against Bromberger's as well as Achinstein's theory about questioning and context. In response to these objections, I shall try to put forward an alternative view of questioning and context, of the contextualist conception of explanation, which will bring into light some unclear points we can find in Achinstein's account.

I. THE D N MODEL AND ITS INADEQUACY

For the D N theorist, an explanation is scientific only if it comprises one general law L(at least) and initial conditions C. If we try, for example, to explain why an oar under water appears to be bent, «the phenomenon is explained by means of general laws — mainly the law of refraction and the law that water is an optically denser medium than air — and by reference to certain antecedent conditions — especially the facts that part of the oar is in water, part in the air, and that the oar is practically a straight piece of wood. Thus, the question 'why does a phenomenon occur?' is construed as meaning 'according to what general laws, and by virtue of what antecedent conditions does the phenomenon occur?'»⁽²⁾.

The contextualists have shown that the criteria put forward in the D N model are too restrictive and fail to make their point, since the presence of laws, with which we *deduce* the explanandum, is neither necessary, nor sufficient to determine a scientific explanation.

(2) C.G. HEMPEL, *Op. cit.*, p. 246.

a. *The D N model does not supply a necessary condition for a scientific explanation.* Two counterexamples will be sufficient to show it.

The first one has been constructed by Bromberger ⁽³⁾: «Only men who are more than six feet tall leave footprints longer than fourteen inches. The footprints left by Gargantua on the beach are more than fourteen inches long. Therefore Gargantua is more than six feet tall.» It is evident that the fact that Gargantua has a height of six feet, rather than any other one, has not been explained by this syllogism: «the cause can be genetic, due to the kind of food he has eaten in his infancy, and what not, but, in any case, the hypothetico-deductive argument has not given any reason to explain that phenomenon.

We find the same lack of explanatory value in this example, provided by Achinstein ⁽⁴⁾:

c : At time t physician P examined the patient and declared that he would be dead within period $t + 24$. Physician P has many years of training and experience.

L : Whenever a physician with many years of training and experience examines a patient and declares that he will be dead within some time span, the patient does die within that time span.

E : The patient died within the time span $t + 24$.

It is also clear that it is not the physician's prediction which caused the death of that patient, unless one believes in the magic power of the physician making his prediction in using a D N argument.

b. *The D N model fails to provide the sufficient conditions of a scientific explanation.*

Let us suppose that Jones got a rash ⁽⁵⁾ and that someone asks the reason of this event. The answer is: «Jones got a rash be-

⁽³⁾ S. BROMBERGER, «Why-questions» in *Mind and Cosmos*, in the *University of Pittsburgh Series in the Philosophy of Science*, 1966.

⁽⁴⁾ P. ACHINSTEIN, *Law and Explanation*, Oxford University Press, 1971 p. 101.

⁽⁵⁾ Example constructed by A. COLLINS in «The use of Statistics in explanation», *British Journal for the Philosophy of Science*, 17 (1966), pp. 127-140.

cause he was injected with penicillin.» The proposition 'Jones was injected with penicillin» provides a correct answer to the question «why did Jones get a rash?» (...) Hempel replies to such counterexamples by denying that they provide satisfactory explanations. (...) What we need to know, Hempel would probably say, is why Jones got a rash when 38 percent of those who take penicillin do not. Jones must have some physiological condition, which in conjunction with the penicillin, produces a rash, and it is this fact, together with the law that all (or almost all) people in that condition who take penicillin get a rash, that must be cited in an adequate explanation. In this reply, *what has been done is to shift the question and the situation for which the original explanation is designed* (Underlined by us). The question has been shifted from 'Why did Jones get a rash?' to 'Why did Jones, who took penicillin, get a rash, when 98 per cent of those who take penicillin, do not?' The *situation*, for which the original explanation was designed, has been shifted from one in which someone, e.g. a physician, wants to know what particular event precipitated the occurrence of the rash»⁽⁶⁾. To make his point quite conclusive, Achinstein should have given a criterion enabling us to distinguish identical from non-identical questions, and, since he has never done it so far, we shall establish it later in this paper.

Any way, from that argument quoted above, we can see quite clearly Achinstein's ideal: what counts as an explanation depends on the questions asked, on the subject (the *quaesitum*) about which an explanation is requested. In other words, X will be an explanation, only in function of the situation of the questioner and his knowledge of the subject, i.e. to explain depends on the context. «Suppose we discover the following statement scrawled on a sheet of paper: 'All men are mortal. Socrates is a man. Therefore, Socrates is mortal'. Is this an explanation? If the D N requirements noted earlier are sufficient, the answer must be 'yes, since it contains a true law which, together with a second true statement, deductively implies the third statement. My position is that whether

⁽⁶⁾ P. ACHINSTEIN, *op. cit.*, p. 105.

it can be classified as an explanation depends on the context of classification in which is considered the type of person who did or might cite the first two statements in attempting, to render understandable Socrates mortality and the type of situation in which he might do so» (7). Hence, the necessity to know to which question this argument does answer, to see if it is a correct explanation of the *quaesitum*. «One must consider the sorts of questions raised, the concerns of those raising them, and their knowledge and beliefs.» (8).

Another sharp criticism against the neo-positivist view has been made by the contextualists: it fails to make a distinction between the two contexts of the scientific activity: the context of discovery and the context of justification. In the first context, a problem is understood and hypotheses are put forward; in the second context, the scientist explains the phenomenon to be explained by justifying the propositions put forward in the first context. The first context is that of understanding, the other one is that of explanation properly speaking.

Popper, for example, denies any difference which could be of any philosophical interest between the contexts. Like the other neo-positivists, he has a-contextual views. Hence, the title of one of his books, *Logic of Scientific Discovery*, in which he speaks of the justification of scientific hypotheses, labeling the very process of discovery as irrational, i.e. beyond the field of philosophy. The determination of relevant hypotheses does not belong, for them, to scientific reasoning, and does not constitute an inference. «Perhaps, then, all that should be required in the first phase is that all the *relevant* facts be collected. But relevant to what? (...) Let us suppose that the inquiry is concerned with a specified *problem*. Should we not begin by collecting all the facts relevant to that problem? This notion still makes no clear sense. (...) Empirical facts or findings, therefore, can be qualified as logically relevant or irrelevant to a given hypothesis, but not in reference to a given problem» (9).

(7) P. ACHINSTEIN, *op. cit.*, p. 108.

(8) P. ACHINSTEIN, *Ibid.*, p. 108.

(9) C.G. HEMPEL, *The Philosophy of Natural Science*, Prentice Hall, 1966, p. 12.

As a conclusion, the contextualist objects to the neo-positivist

1°) to consider explanatory arguments independently of the questions asked, and to provide formal criteria of what a scientific explanation should be.

2°) And, consequently, to fail to distinguish between the two contexts of the scientific activity, in asserting that discovery is irrational because its inference does not lend itself to the hypothetico-deductive formulation.

II. THE CONTEXTUALIST VIEW OF THESE TWO CONTEXTS IN THEIR RELATION TO QUESTIONING

As the title of this second part indicates, the contextualists have propounded a theory which would avoid those two main criticisms above, in putting the emphasis on questioning (1°) and contexts (2°).

First, we shall briefly speak of Bromberger's theory. It has been sharply criticized by Achinstein himself⁽¹⁰⁾. Though based on questioning, his «Approach to Explanation»⁽¹¹⁾, has been proved to be unsatisfactory. As to his other article⁽¹²⁾, it has also been invalidated recently by P. Teller, by means of several counterexamples. The conclusions of this author lead us back to a more contextualist approach of questioning, as intended to by Achinstein, a line of thought that Bromberger seems to have dropped. «The relevant connections between questions and explanations have no-where been more accurately revealed than in Bromberger's own «An approach to Explanation». (...) But if, as the foregoing counterexamples seem to indicate, Bromberger's treatment of why - questions cannot be made to work, where should we turn for an adequate treatment of this part of the analysis?»⁽¹³⁾. It is to that question

⁽¹⁰⁾ P. ACHINSTEIN, *op. cit.*, pp. 68 ff.

⁽¹¹⁾ BROMBERGER, «Approach to Explanation», in *Analytical Philosophy*, II series, R.J. Butler ed., 1965.

⁽¹²⁾ «Why-questions» in *Mind and Cosmos*, *op. cit.*

⁽¹³⁾ P. TELLER, «On 'Why-questions'» in *Nous*, nov. 1974, pp. 371-380.

this paper shall try to answer, after having shown in what respect Achinstein has failed to answer it.

As Teller says, «Bromberger's account, and for that matter Hempel's account, of explanations are already not purely formal; (...) It is natural to suspect that there are further non-formal aspects of contexts of discourse and explanation which are relevant to explanation and the relation of certain questions to their answers. (...). (Our) examples support the suggestion that contextual considerations which have not yet been clearly isolated must be taken into account.»⁽¹⁴⁾ Is Achinstein's view of the contextualist explanation, specified and qualified as a question view, more acceptable? It is to this question we shall now draw our attention.

To explain is to answer a question; Hence, the asking of a question is the expression of a lack of knowledge and a desire to suppress it. To answer a question requires the reduction of the unknown truth to what the questioner already knows or belief. As S. Stebbing put it, a long time ago, «what is familiar is usually taken to be understood, so that in its simplest form, the answer to the question consists in jointing out a connection between the fact to be explained and something that is familiar.»⁽¹⁵⁾

Achinstein uses this idea of reduction to the familiar, but in the light of the distinction between the two contexts, to which corresponds the dichotomy between explanation and understanding.

Achinstein's schemas of understanding and explanation are, now, well-known⁽¹⁶⁾:

Explanation: «A would attempt to explain q⁽¹⁷⁾ to those in situation S by citing E, or by citing a number of things which E is the most central».

Understanding: «A would attempt to render q understandable to those in situation S by citing E, or a number of things

⁽¹⁴⁾ P. TELLER, *Ibid.*, pp. 378-379.

⁽¹⁵⁾ S. STEBBING, *Introduction to Modern Logic*. 2nd ed., 1933, p. 389.

⁽¹⁶⁾ P. ACHINSTEIN, *op. cit.*, p. 62.

⁽¹⁷⁾ A question in its indirect form, like «why Socrates died».

of which E is the most central, as providing what A believes is or might become a correct answer to Q»⁽¹⁸⁾.

We shall now develop all the objections which can be brought against this formulation and try to put forward an alternative view, devoid of these defects, and able of filling the gaps it still leaves.

III. My new question view of explanation

Achinstein's schemas raise some problems.

First, let us suppose a professor attempts to explain a phenomenon to his students, he might make them understand it in misrepresenting somewhat reality and in giving a first approximation of the true answer, *though knowing at the same time, that he did not provide the true and correct answer.*

Second, let us suppose that A and the person in situation S are the same individual. It is easy to see that, in that case, if A succeeds in explaining a phenomenon new to everybody, he will have understood it, and vice versa. The distinction between these two schemas vanishes, though, there would be no reason, here, to suppress the distinction between the context of discovery and the context of justification.

Third, since the context determines what counts as an explanation, special attention has to be drawn on the problem of emphasis. For example, in a certain context, I might ask why Jones got an indigestion on *tuesday*, and not why he got *an indigestion* on Tuesday. In the first case, I am interested in the reason why he got it on that day rather than on any other fact rather than on the time it took place. The problem of emphasis leads, therefore, to another problem: the identity of the object of explanation. Hence, for Achinstein who studied it⁽¹⁹⁾, the problem of identity of questions had to be elucidated too. As he did not do it, we shall provide a criterion of iden-

⁽¹⁸⁾ Q is the question in its usual form, like «Why did Socrates die?

⁽¹⁹⁾ «The Object of Explanation», in *Explanation*: ed: S. Körner, Yale University Press, 1975.

tify of questions, and see how emphasis affects identity.

Fourth, and that is the most important objection, Achinstein in his book, as well as in his «Object of Explanation», speaks of this object as being a question. In this book, he writes that what is explained is *q*, and that *q* is a question: «it will simplify the presentation if we can suppose that any *q* that is explained is, or is transformed into, a question or set of questions in *oratio obliqua* form. Instead of 'A would attempt to explain this phenomenon', we can say, 'A would attempt to explain how (why) this phenomenon occurs.»⁽²⁰⁾ But does it mean that a question is explained, that it is the object of explanation? No, the object of explanation is to answer a question about something. For Achinstein, who fails to see the difference, the object of explanation cannot be either an event, nor a linguistic description, but merely a question, as he tries to defend it in the «Object of Explanation.»

But we do not explain questions, not even indirect ones, we want to explain facts, events or statements by answering those very questions we ask about them. If A asks why Socrates died, and if A answers to it, A shall not have explained the question, but the *quaesitum* about which the question is asked. This confusion leads Achinstein to say that the *oratio obliqua* form of a question, i.e. *q*, can be many things⁽²¹⁾. If to explain is to answer a question, to answer it is not to explain the question itself, but what is asked in and by the question. The confusion made by Achinstein is probably due to the fact that questions have a definite logical structure. «The presupposition of a why-question is, roughly, the fact(s) for which an explanation is asked in asking a why-question».⁽²²⁾

Therefore, if A asks why Socrates died, A's answer will explain what the question affirms; i.e. that Socrates died, since if A asks why Socrates died, it presupposes that Socrates died, and to explain his death is to explain why he died. The questions, in their obliqua forms, restate the *quasitum*, hence, it

⁽²⁰⁾ P. ACHINSTEIN, *Law and Explanation*, p. 62.

⁽²¹⁾ *Ibid.*, p. 62.

⁽²²⁾ P. TELLER, *op. cit.*, p. 371.

seems that to explain the *quaesitum* is to explain the question. Achinstein⁽²³⁾ has tried to work out his view and to go further on the assumption that the object of explanation is a question. If we call such an object the *quaesitum*, as the scholastics did, we can see at once that most questions are not their own *quaesitum*, unless they are asked about themselves. Hence, the object is not the question itself.

Because of this criticism, we shall try to work out another hypothesis, another question-view of explanation, based on Achinstein's theories, and try to bring about a synthesis between the two contextualist schemas and this new view of explanation as questioning, as we shall now make it explicit.

a. A new question view of explanation

Before going back to the contextualist schema of explanation, I shall give a short account of the object of explanation. That will lead me to speak of the notion of identical questions and emphasis, and of referential opacity of the view I propound.

A statement E explains x by answering or many questions Q_i ($i = 1, \dots, n$). This view of the object explanation is embedded in my criticism of Achinstein's view. E symbolized a direct answer, and x represents an event, a phenomenon, a law, another statement, etc. What is a direct answer? Belnap, a contextualist «avant la lettre», has already answered that question in 1963. «The term direct answer is used for what the questioner would count as completely, but just as completely, answering his question; for what the questioner would take as sufficient, but just sufficient answer, for the kind of response which the questioner *intends* to elicit with his question». ⁽²⁴⁾ This definition implies that an answer is a contextual notion by itself (= *per se*): «It is what *he* (the

⁽²³⁾ In *The Object of Explanation*, in *Explanation*, ed. S. Körner, Yale University Press, 1975.

⁽²⁴⁾ N. BELNAP, JR. «Questions, Answers and Presuppositions» in *Journal of Philosophy*, vol. 63, 1966, p. 20.

may have the same answer though being different. For example,

if A = Socrates died by drinking hemlock,

and q_1 = How did Socrates die ?

q_2 = Why did Socrates die ?

The presuppositions are different, hence, the questions are non-identical:

p_1 = (Socrates was. He died. There is a way in which he died.)

p_2 = (Socrates was. He died. There is a reason why he died.)

p_2 may be false, while p_1 is true, and vice versa. And, if A is a true direct answer to a question, A implies the presupposition of the question; hence this presupposition has to be true.

The second difficulty is due to the problem of emphasis. ⁽²⁸⁾ Two questions, though apparently identical, may be different because they have different true direct answers though they may have identical presuppositions. For example,

q_1 = «Why did *Kissinger* warmly shake hands with Brezhnev ?»

q_2 = «Why did Kissinger *warmly* shake hands with Brezhnev ?»

The questioner who asks q_1 wants an answer to a why-question whose *quaesitum* is the reason why an individual has acted as he did. The questioner who asks q_2 wants an answer to a different why-question whose *quaesitum* is the reason of the way a behaviour has been executed. The answers will be different.

⁽²⁸⁾ P. ACHINSTEIN, «The Object of Explanation.» pp. 14 and following.

b. *The contextualist translation of this other view.*

Rather than to say that «E explains q» is a basic or restructured explanatory sentence which provides a true view of explanation, we would say it is this restructuration: «E explains x by answering Q_j ». Since we hold a contextualist conception of explanation, the restructuration becomes: «A person A, in situation S, cites E to explain x by answering Q_j ». In explanatory sentences of this form, E, x, and Q are referentially opaque. To see that, let us consider an example:

E explains the temperature of a gas at time t by answering, for example, the question «why does this gas have such a temperature at time t?» Hence, E explains why this gas has such a temperature at t. Let us suppose that $E =$ this gas has a mean molecular kinetic energy K at time t. So that, we have these cases:

- 1) A cites 'This gas has K at t' to explain this gas having K by answering the question. 'Why has the gas K at t?'.
- 2) A cites 'This gas has K at t' to explain this gas having such a temperature at t in answering the question 'why has the gas such a temperature at t?'.
- 3) A cites 'This gas has K at t' to explain this gas having such a temperature at t in answering the question 'why has such a gas K at t?'.

The first argument we can propound to show that E, x, and Q are referentially opaque is the *context argument*. A person A in a situation S may well be ignorant that to say E is identical to say E_1 , hence, may be ignorant that to ask Q is to ask Q_1 ($Q = Q_1$), or that x may be redescribed as x_1 .

The second argument we can propound is this. In the case of (1), nothing has been explained, i.e. answered truly. The question is begged. We naturally define question-begging as this: a question q_1 is begged if the true direct answer propounded is logically equivalent to one of its presuppositions. In the case of (1), the question: «Why has a gas such a temperature at t?» is identical to «Why has a gas a mean mole-

cular kinetic energy K at t ?» since presuppositions and the direct answers are identical. But if those questions are identical, then the answer «This gas has K at t' is one of the presuppositions. We have not given the reason(s) of A , B , C , ... in saying A , B , C , ... The same reasoning applies to (3). We would count (2) as a correct answer to the original question, and it implies that we do not substitute «This gas has K at t » for «This gas has a certain temperature at t », though this substitution would preserve the truth-values but not the explanatory value of the explanans. Consequently, questions Q are referentially opaque in our restructuration of explanatory sentences. And if they are opaque, the explanans E has to be opaque.

The fact that questions, in our schema, appear in an opaque context allows us to define circularity as a violation of this non-substituability of the answers. We cannot substitute presuppositions and direct answers of identical questions, and treat them as if they were context-transparent. All questions contain their presuppositions, just like, «Has John stopped beating his wife?», contains the presupposition that John used to beat his wife.

Thus, we can write a question q_1 like this: $Q(P_1)$. If $Q_1 = Q_2$, we know that $P_1 \leftrightarrow P_2$ and $E_1 \leftrightarrow E_2$.

We know that $[Q(P_1) = Q(P_2)] \leftrightarrow [(P_1 \leftrightarrow P_2) \cdot (E_1 \leftrightarrow E_2)]$.

If, as it is the case in (1) above, $E_1 = P_2$, then $P_1 \leftrightarrow E_1$ and $P_2 \leftrightarrow E_2$. Hence, the question is begged. If the questions are identical, the presuppositions are equivalent, and we cannot replace the answer of the second question in the formulation of the first question; it cannot be reformulated in terms of the answer of the second identical one. If questions are referentially opaque, and they are in our restructuration of explanatory sentences, and if they are identical, we cannot substitute presuppositions, nor true direct answers, and not even a proposition x_1 equivalent to x_2 , if it is one of the presuppositions as in (1) above. Equivalent true direct answers E_1 and E_2 may be such that A may well consider E_1 as an answer to his question but not E_2 (Q_1 being identical to Q_2). In certain contexts,

on the other hand, the statement (2) above can count as a sound explanation for someone.

Questions, in our view, are referentially opaque, and, ipso facto, presuppositions and answers are. An individual, placed in a certain context, may well ignore that in answering E to a question Q₁ he also has an answer to another question which is identical to the first question; even if these questions are identical, he may well ignore that, in the context where he is, with his stock of knowledge and information. But, as a matter of fact, even if he does not realize that he is confronted with two identical questions, they are nonetheless identical. In a context where A wants B to understand a problem or a question Q, A wants to link what B knows to what A thinks the correct answer is. The most convincing way, but not the only one, to do it, is to show B that what he knows, answers questions identical to the question that A believes to have the correct answer of. The modified schema of understanding would be this:

A would attempt or render a question, or a problem, Q understandable to those in situation S by citing E, or a number of things of which E is the most central, as providing what A believes is or might be the correct answer to Q, where E would be the answer to an identical question whose answer F is known by those in situation S. The answer E and the known answer F would be logically equivalent. The individuals in S will have learned F and understood in terms of the previously known. ⁽²⁰⁾

As to explanation, the modified schema would be this:

«A would attempt to explain X to those in situation S by answering E to one or several questions Q.»

However, our schema of understanding seems to be too restrictive, in the sense that, A may well establish a link between what he believes to be the correct answer E and the background of these in S, without making E equivalent to something previously known by those individuals in S. The crite-

⁽²⁰⁾ Cf. our article, on «La théorie Contextualiste», pp. 112-112, in *Revue de l'Université de Bruxelles*, 2, 1974. Cf. also M. MEYER *Discovery and Justification in Science*, Ph. D. Thesis, Univ. of Brussels, 1977.

tion we have given is surely the best, because the strongest, to reach the goal of establishing the bridge between the background and the unknown, but it is not the only way to make B understand the question at stake. If B understands the question Q in citing E, B must at least be capable of relating E to his previous knowledge. Thus, we have a minimal criterion of understanding and a maximal one. The loosest tie between the two conceptions, the one he knows and the one at stake in the question asked, is, as it has been shown, ⁽³⁰⁾ analogy. B sees an analogy between the questions he already has an answer to, and the question whose answer E is cited by A. The minimal relation of understanding is analogical, the maximal one is logical equivalence.

We shall not pursue this idea here, nor validate it further by quotations of well-grounded studies. We submit it as a possible bridge between Achinstein's modified schemas of understanding and explanation, and the question view I have propounded on basis of the modification made to Achinstein's contextualism and Achinstein's question view of explanation.

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⁽³⁰⁾ D. SCHON, *Displacement of Concepts*, London, 1963, chapter II. or R.J. BLACKWELL, *Discovery in the Physical Sciences*, Univ. of Notre Dame Press, 1969.