1975

Causation and Memory

David Pears
Oxford University
What causal conditions have to be fulfilled in a case of remembering? The best strategy for answering this question is to concentrate on experience-memory. In a case of experience-memory, the subject makes a correct claim to remember having a certain experience in the past. It is in such cases that the role of causation in memory is revealed most clearly. For an experience-memory claim ties down the beginning of the causal chain that produced it to a single definite event, the actual occurrence of the experience. So if the causal chain in fact began with some other event, which occurred between the experience and the claim, the memory would not be an experience-memory, and the claim would be, to that extent, incorrect.

This can be illustrated with an example adapted from Martin's and Deutscher's article "Remembering." If a child had an experience at the age of 3, and at the age of 4 irrevocably forgot having it and that he had it, and at the age of 5 heard his mother describe it to him in detail, than any subsequent memory of it that he might have could not be an experience-memory. For the causation of the memory-impression within his mind would go back only to his hearing his mother's account of the experience. Even if his memory seemed to him to be an experience-memory, it could only be the memory that he had the experience.

On the face of it this is straightforward. But it conceals a problem, because it is not entirely clear what marks off experience-memory from other types of memory. We may not even have a special form of words reserved for experience-memory claims. No doubt, if I said that I remembered seeing a particular horse win the Derby in 1959, this would be taken as an experience-memory claim. But I might not have meant it in that way. For the phrase "seeing the horse win the Derby" might be a gerundial form of the substantival clause "that I saw the horse win the Derby", just as "I remember his leaving the room" might be another way of saying, "I remember that he left the room."

If there is the same ambiguity in "I remember seeing him leave the room", there is no special form of words reserved for experience-memory claims.

This would not matter very much, because the verb "remember" is nearly always meant to have an especially close connection with the gerund in such sentences as "I remember seeing the horse win the Derby." If there are cases in which such claims are not meant as experience-memory claims, they are certainly rare, and presumably signalled by something in the context. But there is a more serious underlying problem. What distinguishes the case in which I do remember the actual seeing from the case in which I only remember that I saw the horse win?

It is clear that, if I remember the seeing, it must cause my memory-impression
directly, whatever that means. But we cannot convert this proposition. For suppose that I confined myself to making the weaker memory-claim that the horse won the Derby. Suppose too that this fact had been fed into my mind only once, and that was at the race through my actually seeing the horse win, so that the case was not like that of the mother and child. It still does not follow that my memory was really an experience-memory, and that I was, therefore, in a position to make the stronger claim. For the satisfaction of the requirement of direct causation is not a sufficient condition, but only a necessary condition of experience-memory.

Something more is needed, but, though the extra requirement evidently must be concerned with the phenomenal properties of experience-memories, it is not easy to formulate it precisely. It might be thought that there must be relevant images in all cases of experience-memory, and that, when this is added to the requirement of direct causation, the result really is a sufficient condition. But imagery cannot be necessary, because some people do not get images even when their original experience was visual, and we can hardly say that such people never remember seeing things. Perhaps it would be better to make a more general stipulation that in experience-memory, the subject must relive the experience in one way or another. But what counts as reliving it? Certainly it is not enough that I should be able to recall additional details over and above the mere fact that the horse won the race. For my memory that it won might be expandible in this way. Nor is the ability to produce additional details necessary for experience-memory. For it must be possible to have an unexpandible experience-memory, even if it very seldom happens. So perhaps this rather vague concept cannot be characterized any more precisely than this: a subject has an experience-memory if and only if he relives the experience in the most vivid kind of way that is within his general competence and this reliving is directly caused by the experience itself. This allows the appropriately vivid type of rehearsal to vary from person to person. It also allows for the possibility of marginal experience-memory claims, such as, "I can just remember seeing the horse win." This would mean that, though I could relive the experience in the most vivid kind of way that was within my general competence—e.g. in images—my images were very sketchy or indeterminate.

If this is right, the borderline between experience-memory and other kinds of memory will not always be firm and clear. In doubtful cases, the causation may incline us to say that it must be an experience-memory, because it was directly caused by the experience itself, but the lack of vividness of the memory-impression may incline us to the opposite view. There is a similar conflict in a case described by C.J. Radford in "Knowledge by Examples." A schoolboy is asked an historical date, such as the date of the Battle of Hastings, and he gets it right, but he feels no confidence in his answer and does not even claim to remember the date. But his teacher tells him that he does remember it, because he got it right and the information was fed into his mind only the day before. Of course, in this case the issue is not whether a memory is an experience-memory, but whether something is any kind of memory. But there is a similar conflict between the causation and the phenomenal features.

If we use cases of experience-memory in an inquiry into the connection between memory and causation, it may be thought that the narrow focus will lead
to a loss of generality in the results. But this is not really so. For though the task of distinguishing between appropriate and inappropriate causation is less manageable in cases of factual memory, it is essentially the same task. The difficulty comes only from the greater variety of admissible input-events. For example, if a neural surgeon could imprint onto a schoolboy's brain the impression that the Battle of Hastings was fought in 1066, that would be an impression of factual memory, just like the impression that would have been produced by the more usual kind of history lesson. But this only forces us to generalize over different kinds of appropriate input-event, and, when that has been done, the requirement of appropriate causation will take the same form. The stipulation that the causation must be appropriate means, roughly, that there must be continuous storage of a certain kind. I have not yet tried to specify the right kind of storage, but there is no reason to expect any difference between the storage appropriate to experience-memory and the storage appropriate to factual memory. So the results reached in the investigation of experience-memory may be generalized to other kinds of memory, and we can take advantage of the greater manageability of experience-memory without any loss of generality.

The haziness of the borderline between experience-memory and factual memory is a real difficulty. I shall deal with it by keeping as far as possible from the borderline and choosing examples in which the phenomena features are obviously appropriate for experience-memory and asking whether the causation is appropriate too. At least, that will be my primary procedure. In certain cases I shall have to adopt a different, secondary procedure, to be explained in a moment.

First, I should point out that my primary procedure differs from the procedure followed by Martin and Deutscher in their article. What they profess to be investigating is not remembering having an experience but remembering an event. Nevertheless, what they say about remembering an event is very like what I have been saying about remembering having an experience. This is because they always choose examples of events which were in fact experienced by the person who claims to remember them.

But this procedure is misleading because it does not use the method of identifying cases that it purports to be using. It purports to be identifying them as cases of event-memory. But there are cases in which a person can correctly claim to remember an event that occurred in his lifetime, even though he did not witness it. For example, many people remember John Kennedy's assassination in that way. If we wish to exclude such cases, we should stipulate that the claim is to remember witnessing the event, which is stronger than the claim to remember it.

Martin and Deutscher can meet this criticism by pointing out that it is legitimate to broaden the concept of "experiencing" to include more than "witnessing." But though this is a possible line to take, it is not a sufficient defence of their procedure. For there are also cases of remembering events which do not even fall under the broader concept of "experiencing." For example, two schoolboys are running through the date of decisive battles in English history, and one of them says, "I've forgotten the one that comes after the Battle of Hastings"
CAUSATION AND MEMORY

and the other says, “I remember it: it is ...” It follows that the claim to remember an event does not imply any claim to remember experiencing it even in the broader sense.

So wherever possible I shall choose examples in which someone makes an experience-memory claim, because that is how his memory strikes him, and, for the sake of simplicity, I shall interpret “experiencing” as “witnessing.” That will be my primary procedure, and it differs from that of Martin and Deutscher.

However, it will not always be possible to use examples of this type, because there are occasions on which a person would be unlikely to make a sincere experience-memory claim if his memory was inappropriately caused. In such cases I shall follow a secondary procedure which is more like that of Martin and Deutscher. I shall inquire whether the memory in fact meets the causal requirements of experience-memory without assuming that it strikes the subject as an experience-memory or that he makes such a claim.

The most important feature of experience-memory is an obvious one. It comes by a causal route which is not inspectable. All that the subject can do if he wants to check the persistence of the causation is to ask himself whether he still remembers having the experience. People sometimes do this repeatedly when they are afraid of forgetting something. The mechanism which maintains the disposition to make correct claims remains inscrutable.

There is at this point a certain analogy between experience-memory and perception. In both cases the impressions come unheralded because their causation is not inspectable, and yet they are not produced by our own basic actions, as some thoughts are. Hume⁴ and Russell⁵ exaggerated this analogy. There is, perhaps, a closer one between experience-memory and a desire that lasts for a long time. For such a desire is also dispositional, unlike a perception, and the persistence of the causation that maintains it can be checked only by intermittent soundings. The subject has to ask himself whether he still wants what he originally wanted. In fact, it looks as if any reasons that there may be for postulating memory-traces would also be reasons for postulating desire-traces. The main difference would lie in the direction of fit: a memory-trace has to fit the earlier experience, but a desire-trace is not required to fit anything—rather, the future achievement ought to fit it.

Whatever the closest analogy may be, it is clear that the internal causation of experience-memory claims is not inspectable. If we want to find in this field a contrasting case of internal causation that is inspectable, the best example is associational thinking, and it may be that reasoning is another example.

The normal causal route of experience-memory is wholly internal, unlike that of perception, which is partly internal and partly external. But deviations sometimes follow external loops. Most of the cases of deviation discussed by Martin and Deutscher are of this kind. One example (an adaptation of one of theirs) will suffice. A policeman, X, is involved in a car chase. He sees a man in the car that he is pursuing shoot the driver of his own car dead. His memory of seeing the shooting lasts for the thirty seconds that elapse before the crash in which he is concussed and forgets everything that happened in the preceding minute. However, there is a second policeman, Y, who is sitting in the back of the car, and,
though Y fails to see the shooting, he does hear X describing it over the radio while it is going on. Y escapes injury in the crash, and he visits X in the hospital after he has recovered consciousness and tells X’s story back to him. The next day X finds that his memory that the shooting occurred exactly as Y described it turns into something phenomenally indistinguishable from an experience-memory. But Y doubts whether it really is an experience-memory, because he suspects that the causation may have followed the external loop. If so, the case would be like that of the mother and child except that Y knows what X experienced only through X’s contemporary report.

It may be felt that it is very unlikely that X would appropriate Y’s story as an experience-memory of his own. Children do this, it may be said, but not policemen. But adults do sometimes transform hearsay memories into apparent experience-memories, and, in any case, if anyone doubts this, I can adopt my secondary procedure; I can change the example by supposing that after hearing Y’s story, X claims to remember only that the shooting occurred in the way described by Y, basing his claim on hearsay, because he also remembers that Y was his source. Then the argument would be that the causation on this route is inappropriate to experience-memory, so that X’s memory could not have been an experience-memory even if it had had the right phenomenal features and X had forgotten its real source.

We also need an example involving an internal loop. A is travelling in Italy with B and he is learning the language. B tells him the meaning of an uncommon Italian word, and after the holiday, though he remembers the meaning of the word, he cannot remember being told it by B. In fact he has no idea how he learned it, as often happens with a foreign language. However, months later he has what seems to be a memory of being told the meaning of the word by B. But then he reflects that there is a striking similarity between the sound of the word and the sound of B’s name. So even when B assures him that he did not tell him the meaning of the word, he still wonders whether his memory really is an experience-memory. He suspects that the causation may have gone through the sound association, in which case it would not be appropriate to experience-memory. If his suspicion is justified, this will be an example of a deviation following an internal loop.

This case may raise the same doubt as the previous one, but this time it will be more difficult to settle. It is not too difficult to establish that a person who did not have experience E may hear someone else, who did have it, recalling it, and so may acquire an apparent experience-memory which, unlike X’s, is radically mistaken, because he did not have E. In such a case there would be little doubt that the causation went through the other person’s story. But internal loops are more inscrutable. For, though it would be easy to get a case in which A’s apparent experience-memory was radically mistaken, because B never told him the meaning of the word, it would be much less easy to establish that the causation went through the sound association.

But these are cases of radical mistake. If there is no radical mistake, the question about evidence is more difficult. Granted that apparent experience-memories
CAUSATION AND MEMORY

which are not radically mistaken are in general possible, how can anyone discover the causal route and so find out whether a particular memory belongs to this class? Anyone who refused to grant that they are in general possible will have to reformulate the question in line with my secondary procedure, and ask how anyone can find out whether the causal route would or would not have indicated experience-memory, if the memory had had the right phenomenal features.

But the question about evidence is not the only one raised by these examples. There is also the question, how many different hypotheses we can formulate about the causation of the memory in this kind of case, and the question, which of these hypotheses, if established, would lead us to classify the memory as an experience-memory, and which of them would lead us to reject that classification.

Most of what follows will be concerned with the formulation of the various hypotheses and with their impact on the classification of the memory, rather than with relating them to the available evidence.

There are four main hypotheses, which I shall first list and then discuss in detail.

A. The causation of the memory-impression is operative on a single route, which is either the normal one or a deviation.

B. The causation is operative both on the normal route and on a deviation, and on each of the two its operation is both independent of its operation on the other and sufficient to produce the memory-impression without the help of the causation on the other.

C. The causation is operative on both the normal route and on a deviation, but, though its operation on each of the two is independent of its operation on the other, it is not sufficient by itself to produce the memory impression, but only jointly with the causation on the other.

D. The causation is operative both on the normal route and on a deviation, but its operation on each of the two is neither independent of its operation on the other, nor sufficient by itself to produce the memory-impression, but only jointly with the causation on the other.

It will be noticed that there are four distinctions running through these four hypotheses. First, there is the distinction between operative and reserve causation: reserve causation is not operative, but would have been if the causation which was operative had not been. Second, there is the distinction between the two kinds of causal route, normal and deviant. The third distinction concerns the sufficiency of the causation on the two routes: it may be sufficient by itself or only jointly. Fourthly, the operation of the causation on each of the two routes may or may not be independent of its operation on the other. For example, the causation contributed by a sensory cue interacts with the normal causation of memory and the causation contributed by a verbal reminder usually interacts with it. But all this will become clearer in the detailed discussion of the hypotheses.

A. These cases are straightforward. If the operative causation is confined to a deviation, the memory cannot be an experience-memory. If it is confined to the normal route, the memory may be an experience-memory, and its phenomenal features will determine whether it is one.
Here, as in all the cases to be considered under the other hypotheses, the issue is decided by what happened, and not by what would have happened, if things had gone differently. If there had been independent sufficient causation held in reserve on a deviant route, our verdict would have remained unaltered, because it is based on the causation that is actually operative. For example, suppose that X has an experience-memory caused in the normal way, but that, if he had not had it, Y would have given him a phenomenally indistinguishable memory caused in a deviant way. In such a case our verdict, that X’s memory was an experience-memory, would not be upset by our knowledge of the independent, sufficient, reserve causation on the deviant route.

B. The hypothesis is that there is independent sufficient causation operative both on the normal route and on a deviation. For example, everything happens as already described in the case of the two policemen, except that on the day after X hears Y’s story, at the very moment when it is about to produce the apparent experience-memory impression, the normal causation revives and so the memory impression is caused in two different ways simultaneously. This would be like the case of a man killed by two simultaneous bullets in the heart. There would be no straight answer to the question which of the two routes was followed by the causation that produced his memory-impression. It followed both, and the effect is shared without being divided between them. So the verdict must be that it was an experience-memory, whatever else it was.

There is a feature of this kind of case which should be emphasized. Y’s story does not strengthen X’s experience-memory by acting as a reminder. If that had happened, the two lines of causation would have interacted before they produced their shared effect. That would be a different kind of case, falling under hypothesis D, which will be discussed later. In B-type cases the two lines remain entirely independent of one another, without any interaction, all the way to the point at which they produce their final effect, like the two bullets.

This independence of the two causal lines may seem to be an impossibility in a B-type case, because it may appear that interaction between the two causal lines before they produced their final effect is inevitable. For what could possibly stop Y’s story acting as a reminder, strengthening X’s experience-memory? Since the same objection is likely to be made about C-type cases, it may be postponed until hypothesis C has been formulated in detail.

C. The hypothesis is that there is independent causation operative on both routes, but each one is sufficient to produce the memory-impression only jointly with the causation on the other.

This kind of case is difficult to analyze, but it is an important possibility. In the field of perception such cases are less important, because they are unlikely to occur. For their occurrence would require the following improbable coincidence: there would have to be a normal perceptual stimulus below the threshold for producing a sense-impression, and a simultaneous abnormal stimulus, perhaps directly applied to the cortex, also below the threshold, and both stimuli would have to tend to produce the same type of sense-impression, but, of course, each would be only jointly sufficient to produce it. If they did not tend to produce
CAUSATION AND MEMORY

the same type of sense-impression, the result would be a composite, blurred sense-impression. But the coincidence is obviously unlikely in ordinary life. If it were artificially contrived in an experimental situation, the verdict would probably be that the subject half saw the object. This would be a new sense of "half seeing" differing from the current one.

It should be noted that there is another, quite different kind of case in which a sense-impression might be caused in two ways which were jointly but not separately sufficient. An object might be misperceived under the influence of the subject's expectation or someone else's suggestion. But in this kind of case, the causation on the two routes is not independent until the production of the shared effect. It is only when there is independence all the way to the final point that an improbable coincidence is required.

In the field of memory the requisite coincidence is much less improbable. For memory involves storage and a persistent ability to display what is stored. Consequently, the causation which maintains this ability can receive independent supplementation at any moment in the usually prolonged period of its existence. This yields one contrast with perception, because there is only a single brief moment at which a normal perceptual stimulus can receive independent supplementation from an abnormal source.

There is also another, more subtle contrast between memory and perception in this area. When the normal causation of memory receives supplementation by an external loop, the supplementary contribution does not have to be precisely on target. This latitude is clearer in cases of reinforcement than in cases of independent supplementation. Cues and reminders can act as effective reinforcers, reviving the original memories, even if they miss the bull's-eye and only hit the outer ring. But, of course, cues and reminders fall under hypothesis D, because the causation on the two routes is not independent, but interacts before the final memory-impression is produced. They reinforce the normal causation rather than supplementing it. However, the same latitude must exist when there is supplementation of the independent kind required by hypothesis C—when, for example, Y's story does not act as a reminder, but makes an independent contribution to the causation of X's final memory-impression. For this convergence of the two causal lines on a single effect will probably be able to occur when the deviant causation would have produced a somewhat different effect if it had been operating on its own. If cues and reminders can exploit this latitude of aim, independent causal supplementation must be able to exploit it too. But this is a distinctive feature of memory, not shared by perception.

These two contrasts show why the hypothesis of independent joint causation needs to be investigated in the case of memory, but is less important in the case of perception.

However, it is a difficult hypothesis to analyze and an example is needed. The story about the two policemen may be modified once again to illustrate it. We may suppose that the causation appropriate to experience-memory is operating in X, but not sufficiently strongly to produce a memory impression. Y's story, when he hears it, does not act as a reminder reinforcing his experience-memory. Instead, the two causal lines remain independent of one another until the final
point at which they jointly produce his memory impression. This memory impression has the right phenomenal features for an experience-memory. The question is whether we would classify it as one.

Here, as in the previous B-type case, there is the objection that, if X had a latent memory of seeing the shooting, Y's story would inevitably act as a reminder reinforcing it, and so the C-type case would be transformed into a D-type case. The discussion of this objection to the description of the B-type case was postponed. Can it now be answered?

First, there can be no doubt that, if the deviant causation involved a sensory cue rather than an explicit verbal reminder, interaction between the two causal lines would be inevitable. For it is part of the meaning of the phrase 'sensory cue' that such a cue must operate in this way.

But if the deviant causation involves an explicit verbal reminder, the matter is not so simple. We call Y's narrative "a reminder" because he intends it to reinforce X's latent memory, and perhaps elicit further details from him. In order to achieve this result, he does not rely on the latitude described just now, but reproduces X's own words, spoken into the radio at the time. Evidently, there is no improbability in supposing that he fails to reinforce X's latent memory. The improbability begins when we suppose that, in spite of this, he succeeds in producing an apparent experience-memory impression in X. But it is a sufficient explanation of his success to observe, as I did earlier, that adults do sometimes retain the capacity of children to appropriate narratives as apparent experience-memories. However, that is only the beginning of the improbability of the present version of the story. For X's latent experience-memory is now supposed to make at the very last moment a causal contribution which together with Y's narrative is sufficient to produce a memory impression. This adds to the improbability, because what Y is offering is a full description of the shooting, and that is the very thing that X's latent memory is trying to push through into his consciousness, so that it is scarcely credible that the two causal lines will avoid interacting before their final cooperation in producing the memory impression.

Here it would be a help if we could appeal to some criterion of being reminded. Expansion of the story, is, of course, a sufficient condition of being reminded, but it is not necessary. In its absence, the subject would have to rely on a psychological criterion: he knows that he is reminded, because he has the characteristic experience which is something like seeing a light switched on in a half dark room --or, to be more precise, when he hears the narrative, he feels that it fits facts which, he did not quite remember before he heard it, but does now remember partly because of it.

But unfortunately this criterion is unusable in the present case. For even if things happen in the improbable way described, X may still have this characteristic experience of being reminded. For at the last moment, when the memory impression is produced in him, he may feel the fit between it, insofar as it is caused in the normal way for experience-memory, and it, insofar as it is caused in the deviant way. Of course, he will not necessarily know that this is the explanation of his feeling that there is a fit. But it may, nevertheless, be the explanation, and this possibility makes the usual psychological criterion of being re-
CAUSATION AND MEMORY

minded incapable of distinguishing between hypothesis C and hypothesis D.

If the ordinary, psychological criterion of being reminded is unusable, the distinction between hypotheses C and D must be a recondite one. This is the objector's point. Nevertheless, C-type cases are a marginal possibility, lying within the territory of the concept of memory. It is true that they lie in an unmapped part of it, because we have no usable criterion of their occurrence. But we do understand the meaning of hypotheses C. It means that Y's narrative did not reinforce the normal causation of X's memory impression but made an independent supplementary contribution to it.

The same difficulty arises in the other example, which involved an internal deviation. There, too, A would be unable to use the ordinary psychological criterion of being reminded. He doubts whether his memory impression of being told the meaning of the Italian word by B is entirely an experience-memory impression. He suspects that it may have been jointly caused, by the original experience in the normal way and deviantly by the sound association. But it is no use for him to ask himself whether he had any feeling of fit when the memory impression first occurred. For even if the impression was jointly caused in two different ways, he would still have a feeling of fit, just like X in the other example.

There does not seem to be any other psychological criterion available. This is a case in which the concepts of unaided memory and reminding lead us to formulate an hypothesis which goes beyond the available psychological evidence. Neurology is the only possible source of evidence which would discriminate between a case in which the two causal lines do not interact before they produce their final effect and a case in which they interact at some earlier point. For this distinction is concerned with uninspectable causal processes. The fact that we cannot yet tie it down to available evidence in no way discredits it. We certainly understand it, and it is possible that we shall eventually discover neurological criteria which will discriminate between reinforcing a weak memory-trace and compensating for its weakness by adding an independent causal supplement.

Finally, what is the effect of hypothesis C on the classification of the memory impression? In the analogous perceptual case the verdict was that the subject half saw the object. So the verdict in this case must be that it was half an experience-memory. This is in line with the treatment of A-type and B-type cases. For in those two types of case the existence of inappropriate causation, operative or in reserve, did not weaken the case for regarding the memory as an experience-memory, provided that the operative, appropriate causation was sufficient by itself. But this proviso is not met in C-type cases, and so the memory is only half an experience-memory, or perhaps some other fraction would fit the case more precisely.

D. The hypothesis is that the causation of each of the two lines is sufficient to produce the memory impression only jointly with the causation on the other, and the inappropriate causation reinforces the appropriate causation before the final stage is reached. This is how verbal reminders and sensory cues work. The difference between these two kinds of inappropriate cause is that a verbal reminder is a piece of information explicitly offered as an aid to memory, but a sensory cue may only be another partly similar experience which occurs by chance.
The latest version of the incident involving the two policemen will serve as an illustration if one more change is made in it: Y's story reinforces X's latent experience-memory. This removes the improbability noted by the objector.

The general effect of this hypothesis on the classification of the final memory is obvious. If it is produced partly by the normal causation of experience-memory and partly by external reinforcement, then it is only partly an experience-memory. This sounds exactly the same as the verdict on a C-type case, but there is a subtle difference. For in a D-type case the last stage in the causation of the memory-impression is normal. The abnormality occurs at the penultimate stage, where reinforcement is needed. This difference is expressible in the terminology of memory-traces: in a D-type case a weak memory-trace is strengthened, but in a C-type case its causal operation is supplemented by an independent contribution from another cause.

Beneath the general effect of hypothesis D there is a difference which depends on whether the inappropriate causation comes from an explicit verbal reminder or a sensory cue. Either way, there is outside help, and so the subject's ability to make correct experience-memory claims is not a self-sufficient disposition maintained by its own appropriate causation. The difference is that he discovers for himself that something is a sensory cue, and this discovery is an achievement of memory, whereas he does not have to discover for himself that what another person says is a reminder when it is explicitly offered as such. This difference is not connected with the greater completeness of verbal reminders. It is true that they are nearly always more complete than sensory cues, which usually touch the original experience at only one point. Consequently, the subject has less to do after he has understood a verbal reminder than after he has taken a sensory cue. But the difference to which I am drawing attention, concerns his cooperation at an earlier stage, before he understands the verbal reminder or takes the sensory cue. He does not have to discover how to interpret the former, but he does have to discover how to interpret the latter, and this discovery is itself an achievement of memory.

This needs an example to illustrate it. A man sitting at a cafe table sees a woman walk past but does not notice her. For immediately afterwards his companion asks him if he remembers seeing her, and he replies that he does not. So there is as yet no evidence that he did see her. But later he sees another woman, who happens to look like the first one, and this woman's face strikes him as familiar. So he asks himself where he has seen a similar face recently, and this question revives the experience-memory trace, and so elicits an experience-memory of seeing the first woman walk past the cafe table. But it is not wholly an experience-memory, because external help was needed.

However, the man's achievement is more an achievement of experience-memory than it would have been if his companion had reminded him of the first woman's appearance, and the description had revived the original memory-trace. It is true that his memory is not operating unaided when he needs the help of a sensory cue. But he himself notices that the second woman's face is familiar, and that is an achievement of memory. It is a further achievement of memory that he connects the second woman's appearance with something seen on the first occa-
CAUSATION AND MEMORY

sion—a connection which would have been made for him by his companion if it had been a case of verbal reminding.

This step-wise process is characteristic of the operation of sensory cues. Because they operate in this way, they do not undermine the self-sufficiency of the causation of experience-memory as much as verbal reminders undermine it. Of course, the undermining occurs only when the external reinforcement is needed. But it is part of hypothesis D that it is needed.

The analysis of C-type and D-type cases has led to the theory of memory-traces. The next step would be to offer a definition of “a memory-trace”, as Martin and Deutscher do in their article. But nothing that I have said depends on the way in which the next step is taken. I introduced memory-traces simply as links in the normal causation of memory. This concept is indispensable if we are going to draw a distinction between the two ways in which the normal causation of a memory may be helped by deviant causation. For one way is through the strengthening of the normal causal links, and the other way is through the addition of an independent causal supplement. But a normal causal link is a memory-trace. So the distinction cannot be drawn without making any use of the concept of a memory-trace. However, this says nothing about the nature of memory-traces. It characterizes them only by their function.

I have made free use of the concept of “the appropriate causal route for experience-memory”, illustrating it with examples, but never defining it. In fact, it cannot be defined wholly in terms of memory traces, whatever their nature. For, as Martin and Deutscher point out, the sequence of memory-traces leading to an experience-memory impression might contain an artificial stage, which would be a memory-aid in the sense in which we now have hearing-aids. For example, a prosthetic device in the cortex might preserve a memory, or a set of memories, which would otherwise have perished. This raises a difficult question about the limits of the scope of the concept of this type of memory-aid. It would require another paper to deal with this question, and so, more generally, with the task of defining “the appropriate causal route for experience-memory.” The definition would probably be functional, as it is in the case of perception.

3. Loc. cit.
4. Treatise I. i. 3.
5. Analysis of Mind Ch. IX.
6. This case is discussed by J.L. Mackie in “The Cement of the Universe”, p. 44 ff.
7. Loc. cit.
8. Loc. cit.

FOOTNOTES

3. Loc. cit.
4. Treatise I. i. 3.
5. Analysis of Mind Ch. IX.
6. This case is discussed by J.L. Mackie in “The Cement of the Universe”, p. 44 ff.
7. Loc. cit.
8. Loc. cit.

40