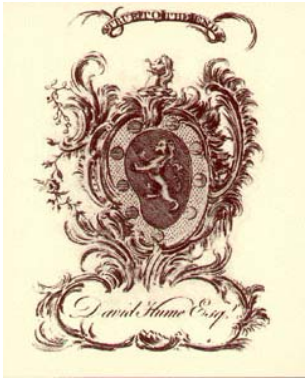

Hume, on the Perception of Causality

David R. Shanks

Hume Studies Volume 11, Issue 1 (April, 1985), 94-108.

HUME ON THE PERCEPTION OF CAUSALITY

Introduction

Few issues in philosophy have generated as much debate and as little agreement as Hume's controversial theory of causality. The theory itself has been notoriously difficult to pin down, and not surprisingly empirical evidence has played a very minor role in the issue of what is meant by 'cause'. This is not, however, due to the fact that empirical tests of the theory are hard to devise, but rather because such tests have usually been undertaken by experimental psychologists addressing slightly different issues and unaware of the philosophical implications of their work.

However, recent signs of agreement on the overall nature of the theory (reviewed in Beauchamp and Rosenberg,[1] chapter 1) allow a profitable integration of the theory with psychological research on the nature and importance of the perception of causal relations in conditioning. The significance of some of these experiments will be discussed later, and it will be argued that the factors Hume cited as being the essential determinants of causality, when complemented by the additional factor of the degree of contingency between the cause and the effect, correspond exactly with the factors known to affect conditioning; and therefore, that the laws of conditioning specify the properties that define causal relationships.

Hume's Theory of Causality

Hume was well aware of the importance of causal connections between events as a source of associations in the mind:

> 'Tis sufficient to observe, that there is no relation, which produces a stronger connexion in the fancy, and makes one idea more readily recall another, than the relation of cause and effect betwixt their objects (T 11).[2]

In other words, if we believe a causal relationship exists between two events, then one of these events, the cause, will readily recall the other, the effect. The problem comes, of course, when we ask how it is that we know that a causal relationship exists. Obviously, a distinction must be made between causation as a physical property and causality as a mental idea. Traditionally, the following definitions have been made: causation is the physical property of one event causing another, such as one ball colliding with and causing the movement of a second ball. This property is part of the realm of mechanics and physics. Causality, on the other hand, describes the attribution by an organism of an effect to a cause. Such a distinction is supported by dictionary definitions.

These two ways of thinking of what is meant by the term 'cause' are explicitly discussed by Hume. On the notion of physical causation, he says:

> We may define a CAUSE to be 'An object precedent and contiguous to another, and where all the objects resembling the former are plac'd in like relations of precedency and contiguity to those objects, that resemble the latter.'

Of the mental idea of a causal relationship, on the other hand, he says:

> A CAUSE is an object precedent and contiguous to another, and so united with it, that the idea of the one determines the mind to form the idea of the other, and the impression of the one to form a more lively idea of the other. (T 170)

Unfortunately, Hume was never less than imprecise in maintaining this dissociation, and often

he plainly confused the two definitions. Hence the academic controversy, between those who, like Kemp Smith, believe that the second definition represents a misguided attempt by Hume to analyse the causal relation on a mental level,[3] and those who see both definitions as essential (e.g. Beauchamp and Rosenberg).[4] But surely the first definition simply represents Hume's view of causality as a philosophical relation, while the second represents his view of it as a psychological fact. And it is as much his intention to explain this fact, that ideas do not simply come into our heads for no apparent reason, but on the contrary are summoned up by preceding thoughts which they are associated, as it is to elucidate the philosophical relation.

The extent of Hume's commitment to a psychological explanation of causal attribution has been recognised by Beauchamp and Rosenberg:[5]

> Hume plainly did develop a theory of causal inference that is intimately connected to the regularity theory.... Hume distinguishes the psychological process of causal inference from causal inference that successfully locates the cause. He further distinguishes both forms of inference from the true cause itself. His theory of inference is based on a psychological account of observation and association, and of course it explains the movement of thought from cause to effect in terms of custom. In certain passages Hume exhibits a belief that causal judgment involves a selective picking out of causes. He treats this process, however, in the way psychologists explain selective attention and discrimination; he evidently does not think it has anything to do with the logical principles regulating proper selection of causes.

Obviously, one would expect a correspondence of subjective causal attributions to actual causal

relations in the real world. But Hume is adamant that we can never know about the extent of such a correspondence. All our beliefs to the contrary are false, and are based on an instinctive faith in causation in the real world. There may very well be a causal relationship in the real world between two events, and this may be mirrored by a causal attribution in the mind (determined by an attribution mechanism), but even though we believe that a causal relationship exists, we can never know it with absolute certainty. Our interpretation of the world is therefore based on belief and not logical necessity.

Hume illustrates this as follows:

> It is not any thing that reason sees in the cause, which makes us infer the effect.... Of which there is this evident proof. The mind can always conceive any effect to follow from any cause, and indeed any event to follow upon another: whatever we conceive is possible, at least in a metaphysical sense: but wherever a demonstration takes place, the contrary is impossible, and implies a contradiction. There is no demonstration, therefore, for any conjunction of cause and effect. (Abstract, T 650-51)

We now turn to the problem of deciding what the factors are that determine whether an association in the mind will be formed or activated between the representations of events in the real world, regardless of whether the latter in fact stand in a causal relationship. Hume reduced these factors to three, namely resemblance, contiguity, and causality. An illustration of the role of resemblance is that a photograph of someone is likely to be associated in the mind of the beholder with the actual person. Contiguity is a factor implying that events close together in time or space are more associable than those far apart; and by causality, Hume implies that if

we believe that there is a causal relationship between events, then there will be a strong association between them in the mind.

Hume says: "'Tis sufficient to observe, that there is no relation, which produces a stronger connexion in the fancy, and makes one idea more readily recall another, than the relation of cause and effect betwixt their objects." (T 11) But here Hume is surely making a circular argument. For how are we to know in the first place that there is a "relation of cause and effect betwixt their objects"? What he surely means is that there is a belief of necessity in the relation between the objects. But this might just be leaping out of the frying pan into the fire, for what can be specified as the condition for necessity? It will be argued that the idea of necessity is provided by the degree of contingency between the objects, contingency being measurable just as resemblance and contiguity are.

Harré and Madden[6] also contend that there is such a thing as natural necessity. They claim (p. 16) that "what we have thus identified is a conceptual relation which is a reflection of a real relation of necessitation between a particular thing endowed with the power to produce an effect in virtue of its nature, in the absence of constraint and when properly stimulated." How does this differ from the "necessity" offered by contingency? Obviously, Harré and Madden's "causal power" is an a priori necessity,[7] while contingency is certainly not. And it is exactly against a priori necessity that Hume so constantly argued, since he could not envisage any solution to the problem of induction. Contingency, on the other hand, is not an a priori relation of necessity, and so escapes Hume's objections.

Criticisms of Hume's Theory

The main objection to Hume's theory is that he goes too far in proposing a complete rejection of the possibility of knowledge about physical relations. Many philosophers, but most notably Kant,[8] have claimed that we cannot derive from experience the assurance of necessity and universality in causal relationships. This is not a matter of contention. But Hume has gone further than this. Not only are we unable to be sure that causal relations are general characteristics of the universe, but we are also unable by observation to assert that a causal relationship exists between a particular pair of events. For Hume, apart from being unable to say that one moving ball must always cause a second stationary ball with which it collides to move, we are in addition unable to say with certainty that a particular observation of a collision involves a causal relationship. For we can surely state, observing a single collision of this sort, that there is a relationship of 'production' involved: the first ball 'produced' the movement of the second ball. The question is then about whether production is related to causation.

To some extent Hume's contention must be true, in the sense that an observation can tell us nothing about the physical notion of causation between events. But there is another side to the coin, and this is why the distinction has been made between causation and causality. The usual notion of causality is concerned with the idea of the 'production' of one event by another. Hume is essentially saying that we can never know that one event has 'produced' another, that we can never with impunity make an attribution of causality, and this is the point of controversy.

This contention is neatly summarised by Michotte, in his book The Perception of Causality:

> It should be remembered that we are concerned here only with the popular idea of causality, or in other words with the 'production' of one event by another. We are in no way concerned with the scientific or philosophical idea....[9]

Michotte presents a series of experiments which refute the notions that we can have no experience of a productive relationship between events, and that "successive events given to us in experience are independent and isolated from each other...."[10]

Michotte's experiments involved presenting projected images which could appear to involve collisions. For example, a stationary object would begin to move just as another moving object touched it, as it would if it were a real collision between objects. By varying such factors as the speed of the images, Michotte discovered those circumstances in which a "causal impression" is formed, or in other words in which the relation of production is perceived. By Hume's analysis, no such circumstances should exist. The significance of such results is explained by Thinés:

> ...the fact that subjects were using terms endowed with a causal meaning to describe such events proved that causal relations existed phenomenally, apart from any knowledge about the laws of mechanics and even contradictory or paradoxical from the point of view of physics.[11]

To sum up the objection caused by Michotte's work, a passage may be quoted which illustrates very lucidly the distinction between the traditional philosophical notion (e.g. Kant) that we can know nothing about causation, and the Humean idea that we can know nothing about production or causality:

> If Hume had been able to carry out experiments such as ours, there is no doubt that he would have been led to revise his views on the psychological origin of the popular idea of causality. He would probably have appealed in his explanation to the 'causal impression' rather than to habit and expectation. This causal impression, however, would have been for him, as for Malebranche, nothing but an illusion of the senses, as is shown by his views with regard to the feeling of effort. Moreover it is probable that his philosophical position would not have been affected in the least.[12]

There is a problem, however, with Michotte's argument. He is claiming that we should replace the Humean view of the origin of causality -- that it depends on custom, habit and expectation -- with 'causal impressions'. But surely there is more to the belief of causality than the mere impression of it derived from single observations of collisions between objects. Customs, habits, and expectations are built up over a long period of time, and surely involve the notion of necessity. And this necessity is derived from observing the contingency between the events, contingency between the degree of temporal correlation between the cause and the effect, or the degree to which the cause increases the probability that the effect will occur. And, of course, contingency is meaningful even with respect to one observation. While one would normally think of contingency as something only to be evaluated after many observations, it is by no means trivial to talk of contingency calculated from just one observation.

Hume himself was well aware that there is often only an imperfect degree of contingency between a cause and an effect, and of the significance of this for perceiving causal relationships (T 130-142). The

importance of finding a psychological explanation for beliefs of necessity in causation has been acknowledged by Mackie.[13] In trying to account for such counterfactual statements as "if in these circumstances X had not occurred, Y would not have occurred either", Mackie becomes entangled in explanations involving the generalisation of propositions from other experiences of causality. The point he misses, however, is that propositions of causality, such as "reckless driving causes injuries" are only derived from many observations of reckless driving, including those which do not involve injury, from which the contingency between reckless driving and injury is determined. In this case, the counterfactual has actually happened, namely that when reckless driving does not occur, injuries tend not to occur. Even in the case of Michotte's causal impressions, statements of causality are based on contingency. Suppose that a subject in Michotte's experiment sees one apparent 'collision' between a moving object and a stationary object. The probability of the stationary object moving in the absence of contact with the moving object is zero, while the probability of it moving when in contact with the moving object is 1.0. Therefore the contingency analysis correctly predicts that an observation of causality will ensue.

In the next section it will be shown why the notion that the causal impression could be "nothing but an illusion of the senses" is remarkably misguided, since it is the basis of all conditioning. One point remains, however, to be explained. Hume specified certain conditions in which ideas would be most readily associated. Now if, as is being claimed, the association of ideas corresponds to the causal relationship between real events, then Hume's conditions of association must in fact be the conditions of

causation. This is indeed a startling notion, that "the laws of conditioning may ultimately specify those conditions which provide the qualities of exposed causality", i.e. "the qualities which define a causal relationship".[14] As will be shown, in circumstances where causal relationships per se are more likely, conditioning is better. Hume may indeed have been specifying the laws of causation, as well as of conditioning.

Conditioning and Causality

The notion that conditioning is the perception of a causal relationship follows quite readily from the above analysis. Campbell has described how this conclusion may be reached. After discussing Michotte's work on the causal impression, Campbell says:

> ...when two events are appropriately coincidental in time, space, and sequence, an unavoidable and indivisible experience of causality occurs. With regard to the older philosophical issues, they [Michotte's experiments] find against Hume and for Kant as to the primitiveness, indivisibility, and immediacy of the experience. However, the conditions under which the experience occurs are those described by Hume for the coincidence we call causality. And the temporal requirements bear a strong superficial identity to those required for conditioning. Now if there were to be a subjective perceptual counterpart to conditioning..., would it not be a perception of causality? On the other hand, if one sought to describe the external behavior of one perceiving a causal sequence in which he himself was involved, would this not look like a conditioned response?[15]

If indeed there is an equivalence between conditioning and the perception of causality, then we

would expect a similarity between the factors known to affect them. It has already been shown that Hume proposed the factors of resemblance, contiguity and causation as potentially affecting the ease with which a causal attribution is made. Do these similarly affect conditioning?

In conditioning experiments the conditioned stimulus (CS) can be considered as the cause and the unconditioned stimulus (US) as the effect. First, Rescorla and Furrow[16] have shown that superior conditioning occurs when similar as opposed to dissimilar stimuli are paired. They found that a visual stimulus was more easily associated with another visual stimulus than with an auditory one, and vice versa. This confirms the importance of the quality of resemblance between stimuli. Secondly, it is well-known that conditioning is dependent on different aspects of stimulus contiguity[17] and spatial contiguity.[18] An illustration of the importance of contiguity in human causality judgement comes from an experiment[19] in which people were asked to assess the extent to which an action (the cause) was effective in producing an outcome (the effect). It was found that judgements of the causal effectiveness of the action depended on the contiguity between the action and the outcome, even though the contingency between the action and the outcome remained unaffected. If the outcome was spatially and temporally close to the action, judgements were greater than when the outcome was spatially distant and temporally separated from the action.

In chapter 6 of their book, Beauchamp and Rosenberg discuss at length the directionality of causal relations, and they attribute to Hume the notion that it is the temporal priority of causes that gives rise to directional asymmetry. They also dismiss

several interpretations of causality which see it as being logically symmetrical or necessarily temporally simultaneous. We might expect, therefore, that backward or simultaneous conditioning might be poor, and this is exactly what has been repeatedly found in animal conditioning experiments.[20] If the CS comes after the US, it fails to elicit a conditioned response.

These factors are not sufficient by themselves, however, to account for some recent experimental findings. Rescorla,[21] for example, discovered that presentations of a US in the absence of a particular CS could affect excitatory conditioning to that CS, and consequently Rescorla proposed that the degree of correlation between the CS and US is the crucial variable in conditioning, not merely contiguity. This is a highly plausible suggestion, because however often two events occur in close temporal proximity, we are only likely to consider them to be causally related if there is a degree of temporal correlation, or contingency, between them. That people are sensitive to the degree of contingency between an action and an outcome has also been shown.[22] People rate an action as more effective in producing an outcome when the actual degree of contingency between the action and the outcome is greater.

This analysis implies that conditioning to a CS will occur if the probability of the US is greater in the presence of the CS than in its absence, and this is consistent with the notion that conditioning depends on the perception of a causal relationship between the CS and US, in which the CS is a member of the set of conditions which provide the actual cause of the CS. As has already been suggested, the third characteristic by which Hume specified causal relationships, namely causation, leads to a circular definition: causality

between two events depends on there being a feature of "causation" between them. However, it is evident that the characteristic that Hume was really trying to specify, that of necessity, is encapsulated by the idea of contingency. The "necessity" of a causal relationship is nothing more than the increase in the likelihood of the effect that the cause entails.

So it seems that indeed the laws of conditioning or association are fundamentally similar to the laws which determine causal relationships, and that in fact conditioning is nothing more or less than the perception of causality. Hume himself said that "in judging of the actions of men we must proceed upon the same maxims, as when we reason concerning external objects" (T 403). And then is it not possible that "the laws of conditioning may ultimately specify those conditions which provide the qualities of exposed causality"? [23]

David R. Shanks
University of Cambridge

1. T.L. Beauchamp & A. Rosenberg, Hume and the Problem of Causation (New York: OUP, 1981).

2. David Hume, A Treatise of Human Nature, ed. L.A. Selby-Bigge; revised edition ed. P.H. Nidditch (Oxford: OUP, 1978).

3. See J.A. Robinson, "Hume's two definitions of "cause". Philosophical Quarterly, 12 (1962), 162-171.

4. Ibid., chapter 1.

5. Ibid., p. 294.

6. R. Harré & E.H. Madden, Causal Powers (Oxford: Blackwell, 1975).

7. This is argued by A. Flew, "Natural necessities and causal powers," Hume Studies, 2 (1976), 86-94.

8. See P.F. Strawson, The Bounds of Sense (London: Methuen, 1966).

9. A. Michotte, The Perception of Causality (London: Methuen, 1963), p. 255, note 1.

10. Ibid., p. 255.

11. G. Thinès, Phenomenology and the Science of Behaviour (London: George Allen and Unwin, 1977), p. 139.

12. Michotte, ibid., p. 256.

13. J.L. Mackie, The Cement of the Universe (Oxford: OUP, 1974).

14. T.J. Testa, "Causal relationships and the acquisition of avoidance responses," Psychological Review, 81 (1974), p. 495.

15. D.T. Campbell, in S. Koch (Ed.), Psychology: A Study of a Science (New York: McGraw-Hill, 1963), p. 122.

16. R.A. Rescorla & D.R. Furrow, "Stimulus similarity as a determinant of Pavlovian conditioning," Journal of Experimental Psychology: Animal Behavior Processes, 3 (1977), 203-215.

17. W.J. Mahoney & J.J.B. Ayers, 'One-trial simultaneous and backward fear conditioning as reflected in conditioned suppression of licking in rats," Animal Learning and Behavior, 4 (1976), 357-362.

18. R.A. Rescorla & C.L. Cunningham, "Spatial contiguity facilitates Pavlovian second-order conditioning," Journal of Experimental Psychology: Animal Behavior Processes, 5 (1979), 152-161. T.J. Testa, "Effects of similarity of location and temporal intensity pattern of conditioned and unconditioned stimuli on the acquisition of conditioned suppression in rats," Journal of

Experimental Psychology: Animal Behavior Processes, 1 (1975), 114-121.

19. A. Dickinson & D.R. Shanks, "Animal conditioning theory and human contingency judgement," forthcoming.

20. e.g. Mahoney & Ayers, ibid.; N.J. Mackintosh, The Psychology of Animal Learning (London: Academic Press, 1974), pp. 57-60.

21. R.A. Rescorla, "Probability of shock in the presence and absence of CS in fear conditioning," Journal of Comparative and Physiological Psychology, 66 (1968), 1-5.

22. A. Dickinson, D.R. Shanks & J.L. Evenden, "Judgement of act-outcome contingency: The role of selective attribution," Quarterly Journal of Experimental Psychology, 36A (1984), 29-50.

23. See note 14.