Causation

Lecture 3

Causation and Regularity

1. Hume's first definition of 'cause'.

- The idea of 'necessary connexion' which is a component of the idea of causation is derived from the 'inward impression' which is generated in us by experience of a constant conjunction between objects of two types – e.g. lightning + thunder.

- So Hume holds that where we take it that there is a causal connection between A's and B's, this is because we have had experience of a constant conjunction (regularity) between A's and B's.

And from this Hume infers that A causes B where

- (i) A is spatially 'contiguous' with B, &
- (ii) A precedes B in time, &
- (iii) there is a constant conjunction of similar A's and B's

  (see Hume's first definition of 'cause' in *Treatise* p. 172)

Whether Hume thinks that there must also be an unknown ('secret') connexion between A and B is disputed. 'Old' Humeans think not; 'New' Humeans think so. We can step aside from that dispute.

- We can also set aside for now the requirements of spatial contiguity (no ‘action at a distance’) and temporal priority (no ‘backwards causation’), in order to focus on the ‘constant conjunction’ (regularity) requirement. Ideally, however, if (i)-(iii) are taken to provide a full account of causation, they should be integrated.

2. The regularity requirements

Hume's position implies that:

- If A causes B, then there is a regular connection between A's and B's – i.e. it is in general true that: if A then B.

Equally: Hume's position suggests that:

- If there is a regular connection between A's and B's – i.e. if it is in general true that: if A then B – then A causes B.

  (though one needs to bear in mind also his requirements of spatial contiguity and temporal priority).

  (for ease of exposition, and following Hume, I'm being a bit vague as to whether 'A' and 'B' are general types or particular tokens)

These implications should be assessed separately.

3. Does causation imply regularity?

- Since A caused B certainly implies that A and B exist, the issue here is whether, where A caused B, there has to be a regular connection between the A's and the B's.

- The obvious problematic case here arises where there is a regular connection, but it is only probabilistic – i.e. A-type events raise the chance of B-type events (e.g. smoking and lung cancer). In cases of this kind there is a causal connection, but no 'constant conjunction'.

- Does this matter?

One might argue that probability is always a mask for ignorance; it just indicates the role of some as yet unidentified further feature whose occurrence interferes with an unqualified 'deterministic' connection – all A but not-X's are B's, where X is the further feature.

But this is not tenable:

- (i) in some areas of science, esp. fundamental physics, it is accepted that the basic phenomena are probabilistic, not deterministic.
- (ii) anyway: even at the macro level, e.g. concerning human disease or gambling machines, there can be definitely probabilistic phenomena. Maybe in these cases there are very complex deterministic processes at work; but there presence does not undermine the probabilistic connections which enter into established causal claims.

- Hence the Humean talk of a ‘constant’ conjunction needs to be modified:

- The obvious suggestion is that where A caused B, we should hold that this is because A’s generally give a high chance to B’s, i.e. the occurrence of an A increases the chance of a B to > .5

- But what where A’s occurrence increased the chance of B’s occurrence – but not enough to give it a chance >.5? (Many medical cases are of this kind – e.g. bad side-effects of a drug).

- Some vagueness here: maybe what’s required is a ‘significant’ increase in the chance of B’s occurrence.

- General moral: probability/chance seems to introduce messy complications into causation.

4. Causation, laws and regularities

- Hume's 'constant conjunction' thesis suggests that what underpins a singular causal claim (A caused B) is a regularity: all A's are B's.

- A regularity of this kind would be a causal law. But once 'laws' are introduced we get a different kind of counterexample to Hume's thesis, arising from cases in which a singular A/B causal claim is underpinned by a law which does not involve a regularity between A's and B's.

- This is central to Russell's critique of 'the notion of cause'. Russell points out that in 'advanced' sciences such as mathematical physics, we deal with laws expressed as differential equations that connect kinds whose values vary continuously (space, time, mass, velocity, etc…). These laws plainly do not state 'constant conjunctions', i.e. actual regularities; for they deal with infinitely many space-time points etc. most of which are unoccupied.

- Further: although these laws are used to explain a particular observed connection – e.g. a particular eclipse of the sun – and the explanation can be couched in causal idioms (the moon's position caused the solar eclipse), it may be that the actual positions involved never recur. So although the theory will provide predictions and explanations of other eclipses, these don't involve the exact repetition of the circumstances involved.

- Thus: it looks as though singular causal claims often draw upon background laws of nature which need not imply that there is a regular conjunction of cause-type and effect-type events. At a common sense level Hume is right: we do get lightning/thunder regularities. But once we get deeper into an explanation of what is going on, we lose the cause/effect regularities while gaining a grasp of the deeper laws that connect the properties exemplified in the situations which are cause and effect.

- Moving to ‘laws’ is in a way a generalisation of Hume’s position, which gets us away from simple ‘conjunctions’ of cause and effect to deeper general connections. Thus it makes it easier to deal with the issue of probability, by taking it that a singular causal claim can be backed by a probabilistic law.

- But it does raise the question of what is distinctive of laws of nature – i.e. whether these are not themselves regularities, albeit more complex than Hume’s cause/effect conjunctions. We will come back to this below.

5. Does regularity imply causation?

- But first we need to consider the converse implication, from regularity to causation. Some such implication is obviously central to Hume's position, since we are supposed to derive our idea of necessary connexion, and thus causation, from experience of constant conjunction. And something of this kind must be right – for our evidence for causal claims, and proposed laws of nature, must be centrally of this kind.

- But there are many complexities here.

(i) ‘Common cause’ cases.

- There is a regular association between the time as indicated on different clocks (at least within the same time zone). Does that imply that there is a causal connection between these different clocks? Clearly not. Instead it indicates that there is a ‘common cause’ of their separate movements – namely that each, separately, has been set to indicate the local time.

- Similarly: consider the succession of night and day: is this a causal connection? surely not – instead these are separate effects of the earth’s daily rotation on its axis (and the relative position of earth and sun).

- A great deal of work goes into epidemiology to try to winnow out mere ‘correlations’, as they are called, from genuine causal connections. Here is an easy case: there is a clear association between ice-cream sales and the incidence of drowning. Does eating ice-cream somehow impair one’s ability to swim? No – for again there is a common cause which obviates any such speculation: when the weather is warm and sunny, ice-cream sales increase, and so does the number of people who go swimming outdoors. It’s just this increase in the number of people swimming which accounts for the increase in the number of drownings.

- Another case: it was discovered that children who develop serious myopia often sleep with the light on in their bedroom, and it was suggested that there is a causal connection here. The suggestion is not unreasonable; but a better explanation is that there is a common cause – the myopia of the parents. Myopic parents often have myopic children (the condition is heritable); and myopic parents often fail to notice that they have not turned off the light in their children's bedroom.

- etc. etc.