John Stuart Mill's (1806–1873) Methods

With his methods of experimental inquiry, it was J. S. Mill's (1806–1873) aim to develop means of induction that would promote a search for causes (Flew, 1984). Mill recognized induction as a process whereby one generalizes from experience but it was his belief, beyond that, that all induction involves a search for causes, and that his methods were intended to support this (Day, 1964). Furthermore, the methods, he thought, would contribute to a definition of "cause." To Mill, causal law meant "uniformity of succession" which, presumably, is consistent with Hume's constant conjunction, and refers to events that are invariable antecedents, i.e., when the antecedent occurs it is always followed by the consequent. Mill went further, however, in proposing that causal laws are proved upon the basis of the *law of universal causation*, the idea that each event has its cause (Newton's *determinism*). This would be bolstered when supported by experimental methods.

The Method of Agreement

According to the *method of agreement*, if two or more examples of a phenomenon only share in a single antecedent condition, that single condition is the cause of the examples of the phenomena (Hung, 1997). By such reasoning, if, in all cases of tree rot, I identify a type of tick to be present, I conclude the tick to have caused the tree rot. The tick, however, may be ubiquitous and found in trees that are not rotting; there could be an unobservable virus. As Hung points out, the method is open to difficulties in interpretation. There may be a relationship that is merely coincidental between the antecedent and the consequent, as was the case in the preceding example. Second, the cause may not have been included in the antecedent conditions, e.g., the miniscule virus. Furthermore, there could be multiple causes, such as the presence of the virus and a certain temperature range. On top of that, the cause could be non-uniform; the same end result may be caused by a number of factors acting separately. With tree rot, the rot may be the same but one tree may rot due to soil that is too damp, another because of woodpeckers, and another because of insect infestation, with our ubiquitous tick still present in every instance. Finally, it is possible that two events may occur in succession, invariably, without a causal relation between them, such as with thunder and lightning, both of which share in a cause but differ in the time their effects take to reach us. We might assume the first experience (seeing lightning) to be the cause of the second experience (hearing thunder). The differences in rates of wave travel produce the temporal differences in receipt of stimulation at the receptors. One has to conclude that the above problems make the generalization questionable.

The Method of Difference

With the *method of difference*, there are cases where the phenomenon under scrutiny is sometimes present and sometimes absent, and in which all other elements, but one, remain constant (over those instances of the "phenomenon-present" and the "phenomenon-absent"). Given those conditions, the element that is present when the other is present, and absent when the other is absent, is causally related to the other. In this case, given that all other aspects within the circumstances being considered have to be the same, we have an example of what, in modern terminology, is called the control of confounding variables.

Joint Method of Agreement and Difference

With the *joint method of agreement and difference*, one gathers a number of instances of positive and negative cases (without everything the same being constant, as with the method of difference above). The multiplication of the number of instances observed is intended to make the method more reliable. The approach expands upon the method of agreement since both positive and negative instances are drawn upon rather than just positive instances. Through the use of this method one concludes that if, due to a process of elimination, the antecedent condition is always present when the consequent is present, but is never present when the consequent is not present, that the antecedent condition is the cause.

Method of Concomitant Variation

With the *method of concomitant variation* one is looking for circumstances where one of the elements, say the antecedent, is varying in magnitude and cases where some other variable varies in a similar manner (Day, 1964). Under such circumstances one determines the first to be causally related to the second if an increase (or decrease) is accompanied by an increase (or a decrease) in the second. For instance, the amount of time that the sun is present during the day is associated with the average temperature. When the sun is briefly present temperature is low and vice versa. (This is what we would now refer to as a positive correlation.)

Method of Residues

With the *method of residues*, one commences with the knowledge that something (A), the antecedent, causes an effect (E), and, furthermore, that the antecedent contains within it an element (A:1) that also has a known effect (E:1). Now, given these conditions, it can be concluded that the first cause (A) minus its component cause (A:1) will equal the first effect (E) less the second, componential, effect (E:1) or (A – A:1 = E – E:1). A person weighing her or himself, for instance, who is rather shy around doctors, can get on a scale fully clothed and then go behind a screen and remove all clothing. The weight of the clothing subtracted from the weight of the clothed person will give the person's weight unclothed. The method, as Hung (1997) pointed out, has its own problems since some causes may not be additive. For instance, water is composed of both hydrogen and oxygen. Both are gases that are flammable but, added together, they cause a dousing of flame; conversely, water douses fire, but, if it has one of its components removed, it will result in unwanted consequences when applied to flame.

Conclusion

According to Hung (1997), the methods developed by Francis Bacon and Mill may have very limited applications. First of all, the conclusions that result from them may often be in error.

Second, they only apply to tidy cases where the requisite conditions are in place. Lastly, they are essentially correlational methods in nature and that confines scientific practice to fortuitous observations and will not yield novel concepts (as true experiments could do). In a nutshell, Mill has falsely confused correlational research with experimental research. Nonetheless, his was a further expansion upon earlier methods in teasing out consistent relations between phenomena. More than that, he was attempting to codify practices that would support the exploration of nature and its lawful regularities.

References

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