Causal Statements and Subjunctive Conditionals

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Hume (1748, Sec. 7) provides two kinds of definitions of causation: (1) "We may define a cause to be an object followed by another, and where all the objects, similar to the first, are followed by objects similar to the second." (2) "Or, in other words, where, if the first object had not been, the second never had existed." Regularity theories of causation is based on (1), whereas counterfactual theories of causation is based on (2). Lewis (1973) is the most well known counterfactual theory. Basically, both regularity theories and Lewis's theory suppose deterministic causations. However, many causal phenomena can be considered to be nondeterministic (probabilistic). Suppes (1970) is one of the most well known probabilistic theories of causation. The common idea of these theories is that a cause raises the probability of its effect. In order to solve the problem of spurious causation, Suppes's theory introduces a partition of the event space. Suppes's idea of using partitions is developed by Skyrms (1980). Skyrms's theory supposes that the partitions should be a maximal specification of causally relevant background factors. However, in order to distinguish genuine from spurious causes, the causally relevant background factors are already known. In this sense Skyrms's theory is circular. Gärdenfors (1988) provides a version of probabilistic theory of causation that does not resort to such circular notions as causally relevant background factors. Gärdenfors's theory materializes Hume's second idea of causation by using a contraction of a probability function. Conditionalization is a method of expansion of a probability function. Lewis (1976) provides another method of expansion called imaging. Imaging is also a method of revision. Lewis's main reason for introducing imaging is to deal with the probabilities of conditionals. Gärdenfors (1988) generalizes imaging. This method is called general imaging. In Gärdenfors (1988)'s theory of causation, which depends on contraction and conditionalization, we cannot relate conditionals to the concept of causation. If we relate conditionals to conditionalization in the way that we equate the probabilities of a conditional with the conditional probabilities of its consequent on its antecedent, we will be faced with Lewis (1976, 1986)'s triviality results.

The aim of this paper is to propose a logic of causation (LC) whose probabilistic semantics (without introducing a possible world semantics) is intended to relate subjunctive conditionals to the concept of causation. Unlike Gärdenfors's theory, this probabilistic semantics depends neither on contraction nor on conditionalization. In order to relate subjunctive conditionals to the concept of causation, we propose a new concept of quasi-contraction, and then resort to quasi-contraction and general imaging.

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