
Comments on Thompson's Review of Causality. New Statistical Methods.

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Short Book Review
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for the
International Statistical Institute
(Director: Prof. Dr. Daniel Berze)

by
Ilija Barukčić.

I am very grateful to Professor Mary E. Thompson for taking the time to study my book Causality, New Statistical Methods, to double-check and triple-check the new methods developed and published in my book and her courage to drop some lines of historical dimensions on such a difficult area of scientific research. Nonetheless, guided by this point of view, I will comment her short book review.

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Background

While the theory of experimental design is well developed, controlled experiments are sometimes difficult or impossible to carry out. At the same time, much of the data in biostatistics, epidemiology, medicine, economics, biology, space physics research and elsewhere etc. is a mix of observational and experimental data. Are these fields of investigation free of cause effect relationships?

At the present time, from a systematic theoretical point of view, the most statistician and researchers in relevant fields are indeed more or less of the opinion, that it is not possible to perform reliable causal inference calculations on observational data.

Titans like Karl Pearson or Bertrand Russell warned us to keep our mathematical and statistical hands off causality and at the end David Hume too. **Hume's regularity theory of causation** has dominated discussion of causality in both statistical analysis and analytic

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philosophy for a long time. According to Hume, causes precede their effects in time. But the so called “regularity theories” of causation have several systematic disadvantages. Firstly. The position "*post hoc, ergo propter hoc*" is known to be a logical fallacy. Secondly. The regularity approach to causation is incompatible with indeterminism. I have proofed that causal direction is not identical with temporal direction, another approach to causation is necessary.

Causes does not only raise the probability of their effects, causes can lower the probability of their effects too. The concept of conditional probability is in this sense at the end not that much useful for solving the problem of causation.

Other approaches to causation (Reichenbach's *Common Cause Principle*, the *Causal Markov Condition*, Counterfactual Approaches etc.) are more or less incompatible with indeterminism. Causation as such must be compatible with the beginning of our world too.

On the other hand, the *co-occurrence of events* is not suitable to solve the problem of causation. Events that occur together must therefore not

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be cause by each other. The co-occurrence of events must be distinguished from the position "*cum hoc, ergo propter hoc*". Firstly. The position "cum hoc, ergo propter hoc" is known to be a **logical fallacy**. It doesn't make sense to use a logical fallacy to solve the problem of causality. Secondly. The co-occurrence of events alone is at the end incompatible with the law of independence. Only **the identity of cause and effect at the same time**, the identity of two that are different, can be the starting point to solve the problem of causation.

Causality occupies a position of centrality in nature and human cognition. There is an enormous literature on causality, spanning philosophy, physics and statistics among others.

Much of the recent mathematical or philosophical writing on causation (Eelles, Hausmann, Pearl, SGS, ...) either addresses to Bayes networks, to the counterfactual approach to causality developed in detail by David Lewis, to Reichenbach's Principle of the Common Cause or to the Causal Markov Condition. Indeed, I have left all this behind me.

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It is right, that my approach to causality is another. My approach to causality is indeed based on **classical logic**, the pure logic, logic proved and known since thousands of years and on the elementary laws of **probability theory** and statistics.

From this starting point I was able to develop a unique mathematical formula of the causal relationship, c , or in terms of statistics, a test statistic, valid for continuous and/or discrete random variables, to develop methods for calculating beta and power of the causal relationship c , the p value etc. At the end, it is possible to perform reliable causal inference calculations on observational data. It is fair to say that Einstein's and Heisenberg's equations can be derived directly from my equations without any problems.

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Conclusions

The peer review was necessary to ensure the quality of the new published methods, the verification process was successful. The results of the peer review and the book review are fantastic. Thus, let us focus particularly on **the words, that are not said** in this Short Book Review.

It is a remarkable fact that Professor Mary E. Thompson in her historical Book Review for the International Statistical Institute, is not arguing any of my claims:

- 1) a unique mathematical formula of a causal relationship c , or in terms of statistics, a test statistic, valid for continuous and/or discrete random variables is developed, mathematically proved and correct,
- 2) methods for calculating beta and power of the causal relationship c , the p value etc. are developed, mathematically proved, correct and can be used in practice,
- 3) It is not argued that the new methods are mathematically proved, correct and ready for use in practice.

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The remark on the misprints is not wrong, the misprints will be reduced drastically in the second Edition of my book.

Ilija Barukčić, Jever, Germany, 27. April, 2006

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