T H E O R I A

Guest editor's presentation

(Presentación del editor)

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In June 2019 the *Fourth Meeting in Philosophy, Probability and Scientific Method* was organized at the Instituto Interuniversitario López Piñero (University of Valencia, Spain). Previous editions were held in Valencia (2006 and 2008), and Santiago de Compostela (2012). Among the participants in those three workshops I should mention: José M. Bernardo, Gustavo Cevolani, Vincenzo Crupi, Igor Douven, Donald Gillies, Carl Hoefer, Deborah Mayo, Ilkka Niiniluoto, Jan-Willem Romeijn, Aris Spanos, Jan Sprenger, and Gregory Wheeler,

The topic for the Fourth Meeting was "Statistical Evidence and Evidence of Mechanisms". The three papers included in this monographic section are based on talks delivered at the meeting.

Why did we choose this topic? The mechanistic approach is gaining importance in philosophy of science in recent years (Glennan and Illari, 2018). Regarding such a venerable topic in philosophy of science as explanation, the causal-mechanistic approach traces back to the eighties —Wesley Salmon was one of its most egregious advocates— and re-emerged with strength at the turning of the century (Machamer, Darden and Craver, 2000). Right now, it is surely the most discussed option in the literature.

However, although the mechanistic standpoint has been mainly discussed in relation to explanation, a related debate developed in parallel concerns the notion of evidence. Statistical evidence is a fundamental source of information for natural and social scientists, and also for policy makers, so that there is a vast array of statistical techniques for getting reliable information about the process, system,.., under scrutiny. Certainly, those procedures are constantly refined and improved, as any other components of scientific methodology, but limitations of statistical evidence are widely known. On account of this, some authors claim that there is a further sort of evidence, namely, evidence about those *mechanisms* involved in the process, whose relevance has been unfairly downplayed. Underestimation is reflected in standardized scientific practice and in criteria for decisions followed by policy-makers and is particularly notorious in medicine/health policies and social sciences/social policies.

A central question in this discussion is what is the role for evidence about mechanisms in detecting/inferring causal relations. It is worth noticing that this question connects the notions of explanation and evidence. Provided that causation is crucial for explanation, addressing that question straightforwardly links evidence (about mechanisms) to explanation. And this is precisely the issue around which the three papers included in this monographic section revolve.

In 'Mechanisms, Good and Bad' Harold Kincaid tries to assess whether mechanisms are necessary, or perhaps, more or less useful, as evidence (i.e.: for confirmation) in favour of causal claims. Furthermore, according to him, the literature on mechanisms is not clear enough about basic questions related to the alleged importance of mechanisms. Departing from a distinction between *horizontal* and *vertical* mechanisms, he argues that neither of both may be considered as essential for evidence about causal effect claims (C is causally related to E). Kincaid uses directed acyclic causal graphs (DAG) -a formal tool popularised by Judea Pearl among philosophers to understand causality- to illustrate problematic situations where assuming the existence of mechanisms may lead to biased causal inferences. Nonetheless, he also acknowledges that mechanisms may be very useful *in some contexts*. His final conclusion is that there are no general methodological rules to determine when mechanisms provide evidence for causal claims. Rather, a case by case analysis is required, encouraging a contextualist perspective on scientific methodology.

It should be reminded here that the EBM (*Evidence-Based Medicine*) approach in medicine insists on making explicit the evidence which grounds causal claims (Howick, 2011). Usually, the sort of evidence favoured by EBM is that provided by clinical studies, especially by RCTs (*randomized controlled trials*). Jon Williamson's paper ('The feasibility and malleability of EBM+') deals with the EBM+ programme, an attempt to qualify the EBM initial programme by including a proper role for evidence of mechanisms in addition to statistical evidence (Parkkinen *et al.*, 2018). Among the criticisms against EBM+ are that, allegedly, it is both a hardly feasible a highly malleable strategy for establishing reliable causal claims. Williamson's paper deals with both objections and concludes, firstly, that the current practice of IARC (International Agency for Research on Cancer) supports the feasibility of EBM+. Concerning malleability —high malleability would be unwelcome since it increases the risk of subjective influences—, Williamson discards formalization as an appropriate strategy. Increasing the quantity and the variety of the evidence is a more promising way to diminish subjectivity. Considering evidence about mechanisms in addition to "association studies" goes in that direction. Furthermore, Williamson points out we have "evidence that makes up for the deficiencies of other evidence", so that some sort of mutual reinforcement is obtained. EBM+ is, then, vindicated given that the reliability of causal claims is increased.

The contribution of Saul Pérez-González and Valeriano Iranzo ('Assessing the role of evidence of mechanisms in causal extrapolation') is focused on a controversial question related to experimental practice, namely, external validity. Let's take for granted that a causal link has been firmly established for the population studied by researchers. Of course, in public policies we are mainly interested, indeed, in that will happen with the target population, that is, the population outside the experimental setting. The question, then, is which is the relevant evidence for increasing the reliability of such extrapolations. Is there any advantage in introducing evidence about the underlying mechanisms in both populations? Pérez-González and Iranzo maintain, firstly, that some common arguments against the reliability of causal claim extrapolations based on statistical evidence do not allow us to infer that there are intrinsic, unavoidable, limitations for them. Secondly, they argue that extrapolations based on evidence about mechanisms are plagued with different and not easier problems (i.e.: masking, mechanisms' absence of regularity in varying conditions). It is not clear then that evidence of mechanisms is able to compensate the weaknesses of statistical evidence, so the former does not seem indispensable. Still, evidence of mechanisms may be very useful for causal extrapolation. In order to assess its relevance, Pérez-González and Iranzo distinguish between a positive (supporting) and a negative (undermining) role for evidence of mechanisms in causal extrapolation. They argue that evidence of mechanisms may be crucial for concluding that the casual extrapolation *is not* reliable —this is its negative role—, while the positive role is much harder to fulfil.

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