Panel Proposal for SPT

Critical perspectives on the role of mathematics in data-science

The critical evaluation of data-science (Floridi & Taddeo 2016) and its place in the so-called data-revolution is primarily focused on the notions of data and code. For the former, this is made very explicit in the tenet of critical data-studies that "data are never just data" (Kitchin 2014) as well as in repudiations of the "myth of raw data" (Gitelman 2013) in media studies and science and technology studies. As for code, this usually comes to the fore when the ethical or epistemic neutrality of design-decisions (often related to the development of autonomous algorithmic data-processes) are questioned, or when we try to clarify the responsibility for such design-decisions (Barocas *et al.* 2013). Even though algorithms and code, and by extension also large parts of the data-processes that characterise the practice of data-science, are mathematical objects, and indeed derive much of their epistemic status and authority from their mathematical foundations (in statistics, but presumably also from the theory of computation), the role and status of mathematics in the practice and public understanding of data-science remains relatively underexplored; especially when integrated in a broader critical assessment of the societal impact of data-science.

The upshot of this panel-discussion is to bring together different perspectives on the epistemic and societal role of mathematics in its relation to data-science and the data-revolution. It is based on the assumption that only a realistic picture of mathematics, as emphasised within the philosophy of mathematical practices, can reliably inform such an inquiry. The latter presupposes a better understanding of the role of applied mathematics in the sciences, an appreciation of the diverse ways in which statistical theory can inform the development of data-processes (Gelman & Hennig 2015), and a critical outlook on the societal status of mathematics. Such a realistic picture of mathematics serves two purposes. It should inform an analysis of what it means to "trust in numbers" (Rieder & Simon 2016) or help us identify clear cases of "mathwashing" (Beneson 2016), but it should just as much clarify the critical role of mathematics and explain how certain epistemic virtues of mathematics can play a decisive role in exposing epistemic failures and poor practices in data-science.

By bringing into focus the fact that the role of mathematics in data-science and in our understanding of data-science has both critical (to expose poor practices, but also by using mathematical proofs as the epistemic standard required to show that certain design-standards are met (Kroll *et al.*)), non-critical (exemplified in references to mechanical objectivity and calculative reason, see Daston (2004) or Christin (2016)) and even anti-critical facets (for instance when mathematics and mathematical literacy become gate-keepers), a more balanced understanding of the implicit and explicit epistemic standards that are at play within data-science comes within reach. This requires us to confront such issues as epistemic trust, the possibility of critique, and the role of secure epistemic foundations, and invites us to question the ambivalent role of mathematics in our understanding of data-science as an epistemic practice, and of data-processes and products as rational outcomes and processes.

Participants

Karen François: Lecturer in Philosophy and Director of the Doctoral School of Humanities at the Vrije Universiteit Brussel. Karen worked on various aspects of the philosophy of mathematical practices, and especially on topics related to mathematics education and statistical literacy. She was also a coordinator of Flanders Training Network for Methodology and Statistics.

Christian Hennig: Lecturer in Statistics at UCL (London), with specific expertise in clustering and classification, data-analysis, and constructive philosophies of statistics and data-analysis. Some of his recent work specifically addresses the uses and misuses of the terms "objective" and "subjective" in statistics and data-science, and draws attention to the many ways in which decisions can be made and motivated in statistical analysys.

Johannes Lenhard: Lecturer in Philosophy and member of the Institute of Interdisciplinary Studies at the University of Bielefeld. He works within the philosophy of science and in science studies. His primary research interest is applied mathematics (including statistics, simulations and data-intensive science) and its social, political and historical development.

Jean Paul Van Bendegem: Professor in Logic and Philosophy of Science and director of the Centre of Logic and Philosophy of Science at the Vrije Universiteit Brussel. His main research is in the foundations of mathematics (esp. constructionism and strict finitism) and the philosophy of mathematical practices. He regularly contributes to debates that touch on the status of mathematics in science, society and technology.

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