Science Meets the Human Condition – Values and Uncertainties in Science

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Abstract

This feature reports on the first meeting of the Milano Logic and Philosophy of Science Network, held at Politecnico di Milano (12 March 2025). It focuses on the contributions investigating the roles of values and uncertainty in contemporary scientific practice. The five contributions presented by the authors are summarized, spanning climate science, medicine, measurement theory, and scientific classification.

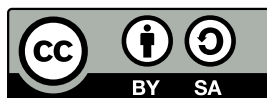**How to Cite**
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We are living in complex and uncertain times. We experience this most of the time, across the globe. Our concerns and emotions are deeply affected by these conditions, but also serve as resources that help us endure. Complexity and uncertainty also pervade the realm of scientific research. Alongside limitations in providing certainty and control, scientists are progressively recognising the standpoint-relativity and value-ladenness of their tasks and practices. In light of this, it seems inevitable that uncertainty and values would become central themes in the philosophy of science. Nowadays, scientific practices are examined through the lens of both individual and collective values. The hope is that, by acknowledging science's entanglement with uncertainty and values, we might better navigate the forms of uncertainty we face from various perspectives, allowing us to move toward wiser evidence-based decisions.

During the first meeting of the *Milano Logic and Philosophy of Science Network*, several scholars presented aspects of their philosophical research dealing with values and uncertainties. Their work spanned fields as diverse as climate science, civil engineering, medicine, and economics. In this feature article, we briefly review and reflect on five of these presentations, which illustrate how philosophical inquiry can enrich science in uncertain times.

Malvina Ongaro (Politecnico di Milano) addressed how decisions are made under conditions of uncertainty. Her re-

search focuses on contexts of natural risks, but her talk extended to risks in medicine, climate change, and AI. Ongaro distinguished different types of uncertainty: aleatoric (related to the randomness of the world), epistemic (related to our representations of the world), and normative (related to our values). She outlined two main approaches to treating uncertainties: models, which seek to quantify and predict outcomes, and storylines, which explore plausible narratives without relying on probabilistic forecasting. For decision-making, she discussed cost-benefit analysis and multi-criteria analysis, each with its strengths and limitations. She finally called for more responsible and inclusive decision-making, one that accounts for the plurality of needs, values, and forms of knowledge across disciplines. Fairness, particularly in terms of recognition and participation, emerged as a key ethical dimension of managing uncertainty.

Davide Serpico and Francesco Guala (Università di Milano) introduced their project on normative kinds. Their central thesis is that classification schemes in science are never entirely neutral, but are rather influenced by the values of those who construct and apply them. Thus, what counts as a 'natural kind' in science typically depends on whose interests are being served. These categories are not merely descriptive, but also carry normative force: They can evoke positive or negative connotations and thereby influence how individuals perceive the world and behave, as well as how institutions

respond. As part of their project, Serpico and Guala are investigating several case studies, particularly in the medical domain, such as diagnostic categories related to addiction and eating disorders, as well as social categories like money, casts, and human races.

Mara Floris (Università Vita-Salute San Raffaele) presented ongoing research at the intersection of philosophy and medical practice, with a focus on epistemic injustice: a form of harm that occurs when individuals are wronged in their capacity as knowers. In clinical contexts, such injustices often affect patients, particularly women, who may be disbelieved, dismissed, or excluded from knowledge production. Floris and her collaborators are developing three interconnected projects to address these issues. The first project investigates obstetric violence, focusing on how information can be distorted or withheld during childbirth, often through over-medicalisation. The second project examines the diagnostic delay in endometriosis, attributing it partly to cognitive biases in clinical reasoning and systemic underestimation of women's suffering. Finally, a broader initiative identifies and classifies instances of epistemic injustice in doctor–patient interactions, to foster more equitable, trust-based clinical relationships.

Alessandro Giordani (Università Cattolica di Milano) explored the topic of measurement in science. Far from being a simple, objective act, measurement is influenced by uncertainty, which does not simply mean technical flaws but also

inherent limitations in our knowledge. Giordani emphasised that every measurement results from a particular standpoint, meaning our perspectives and interests shape the outcome. Hence, there is no 'true' measurement, but only measurements relative to specific conditions and assumptions. The talk also explored how values may infiltrate the measurement process, from deciding what to measure and how, to interpreting the results. Understanding these interwoven roles of uncertainty, standpoint, and values allows for more critical engagement with data and a deeper appreciation of the human element in scientific research.

Hernán Bobadilla and Francesco Nappo (Politecnico di Milano) explored the epistemic and ethical dimensions of climate research. Bobadilla examined a methodological controversy surrounding the storyline approach, a recent method in the attribution of extreme climate events. Bobadilla argued that this approach leads to a genuine scientific understanding of climate phenomena, although qualitatively distinct from traditional probabilistic approaches. He suggested that philosophers of science are well-positioned to clarify emerging controversies. Nappo focused on Integrated Assessment Models (IAMs), which aim to generate long-term climate policy scenarios by combining data and assumptions from economics, environmental science, and engineering. He discussed the epistemic status of IAM-based scenarios and examined how convergence across them should be interpreted. Nappo also addressed the ethical di-

mensions of IAMs, raising important questions about where in the modelling process value judgments occur, who should be responsible for managing them, and how ethical oversight can be improved.

The collective upshot of these presentations carries both descriptive and normative implications. On the one hand, philosophical research on various branches of science and engineering highlights how deeply entangled scientific research is with societal concerns and ethical norms. On the other hand, social sciences and philosophical perspectives do not undermine the possibility of achieving objective scientific knowledge. Rather, the presentations collectively emphasise how recognising and critically examining the interplay between science, ethics, and society is essential for fostering a more responsible, inclusive, and reliable scientific research, one that can legitimately offer guidance in a complex and uncertain world.

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