Frontiers in Philosophy and History of Science and Technology

Winter Semester 2025 | Research Colloquium

The Chair of Philosophy and History of Science and Technology is pleased to welcome colleagues to our seminar series for the Winter Semester 2025, which will take place on Tuesdays from 15:30 to 17:15 (CET) at **1. Floor in Augustenstrasse 40, Room F1.10/11.**

14 OCTOBER
Online Workshop: Philosophy of Science in Practice

21 OCTOBER
Dr. Aysel Görkan | EPSA Fellow, Turkey
Nathanael Sheehan | TUM/ Exeter University

28 OCTOBER
Luis Lopez I LMU

04 NOVEMBER
Emma Cavazzoni | TUM

11 NOVEMBER
David Colaço | LMU

18 NOVEMBER
Hugh Williamson | TUM/ Exeter University

25 NOVEMBER
Maria Volkova | Exeter University

02 DECEMBER
Sven Nyholm | LMU

09 DECEMBER
Silvia Milano | TUM

16 DECEMBER
Paolo Leone | Nova SBE-Lisbon

13 JANUARY
Rena Alcalay | TUM

20 JANUARY
Michael Klenk | University of Delft

27 JANUARY
Hybrid Workshop on Democracy and Expertise

03 FEBRUARY
Joyce Koranteng-Acquah | TUM

OCTOBER 2025 – FEBRUARY 2026
Tuesdays 15:30-17:15 (CET)
Venue: 1.Floor – Augustenstrasse 40

If you plan to attend, please let oksana.bondar@tum.de know so she can ensure access to the building. For further information and to sign up for these seminars, please email desantila.hysa@tum.de

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21 OCTOBER Aysel Görkan | EPSA Fellow, Turkey

Science–Society Interaction and the Problem of Levels of Selection

In this study, I aim to clarify the relationship between certain misconceptions about evolution and their reflection in society. Through a theoretical and epistemological analysis, I examine the dynamic interplay between science and society. I focus particularly on reductionist approaches in biology, such as typological thinking and gene-centrism. These approaches not only shape scientific debates on the levels of selection but also influence how evolutionary concepts are understood and utilized in broader social contexts. In particular, I argue that gene-centrism and reductionism generate significant epistemological challenges: these approaches reinforce the deterministic perspective that grants causal primacy to genes. Such approaches contribute to both the emergence of limitations in scientific practice and the oversimplification of the evolutionary role of other levels of organization. By addressing these issues, I aim to shed light on the epistemological problems that arise in clarifying and understanding scientific concepts related to evolutionary theory.

21 OCTOBER Nathanael Sheehan | TUM/ Exeter University

Methodologies: Towards a Situated Metascience

This chapter sets out the methodological commitments of the thesis by positioning them in relation to, and in critique of, contemporary metascience. Current approaches to metascience typically cluster around three domains: open science, the science of science, and methodological activism. I begin with a critical review of this landscape, highlighting in particular the tendency of metascience to neglect insights from the history, philosophy, and sociology of science (HPS). In response, I develop an alternative research design, which I call situated metascience. This design reorients methodological attention toward openness as situated practice, scientific activism as a form of care, and HPS as a critical methodological resource. Building on this research design, I then specify the topics, methods, and values that ground the present thesis. The chapter concludes by showing how situated metascience is operationalized through three interlinked methods drawn from philosophy of science in practice: case studies that situate inquiry in concrete research contexts; concept cartography as a tool for mapping philosophical and infrastructural commitments; and reflexive analysis of the research process itself.

28 OCTOBER Luis Lopez | LMU

Making Translational (Mis)alignment Auditable

I propose a formal framework for assessing translational alignment in biomedicine. This framework takes as its conceptual starting point Lara Keuck's notion of scope validity, defined as the matching between the target as operationalized in experimental settings and in application contexts. The problem I address is how to make those operationalizations—and their matching—explicit, open to scrutiny, and amenable to computation. I do so by representing each practice with formally constrained diagrammatic specifications of types, functional relations, and declared equivalences, and by relating them through a common-ground schema that records alignment maps for measurements and target-defining features. Measurement claims are captured in a model-based manner (after Tal), detailing what is measured, how it is produced, and the calibration and uncertainty involved. This turns comparability into an explicit, auditable mapping rather than a tacit analogy, supports simple quantitative indicators of matching, and does so without erasing local context.

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04 NOVEMBER Emma Cavazzoni | TUM

Bugs and Pears: Data Models Discriminating among Differences beyond Statistics

This presentation examines the reasoning behind selecting biological parameters and mathematical variables for data models, as well as the considerations and dynamics shaping their construction. Challenging traditional accounts that interpret data models solely in statistical terms, we argue that data models in biology cannot be separated from what Suppes (1962) calls ceteris partibus conditions; and that such conditions include not only experimental settings for data collection and analysis but also computational constraints of large-scale AI systems. We ground our reflections on two case studies from the agricultural project Haly.Id: pear classification via tissue differentiation and insect monitoring through drones. In the first part of the presentation, we advance four related claims: 1) biological data models involve processes of differentiation and identification; 2) these processes are interdependent, though researchers' roles differ; 3) each phase produces a distinct model contributing to the final one; 4) model development is constrained by biological and technical factors. In the second part, we show how reliance on complex and partly black-boxed technologies like those common in the age of genAI may facilitate some modelling tasks but strongly limit researchers' ability to adapt models to their specific goals.

11 NOVEMBER David Colaço | LMU

The Generative Conceptual Conflict in Science

The past decade has seen new philosophical explorations of scientific concepts, the building blocks of scientific theorization, with accounts from Feest, Arabatzis, and Haueis. While most philosophers accept that concepts can proliferate and change, what remains unaddressed is how we account for conceptual conflict. This occurs when there is disagreement over the intension and extension of a concept, resulting in inconsistent conceptualizations of the same ostensible targets of investigation. In this talk, I account for conceptual conflict, focusing on cases in cognitive science. I address how this conflict can be generative, informing new conceptual and empirical advances. My account rests on the posit that concepts can be treated as conjectures. They are hypotheses that pick out phenomena in their extensional spaces, where these phenomena serve as data against which we test these hypotheses. This transforms conceptual conflict into a form of rival hypothesis testing.

18 NOVEMBER Hugh Williamson | TUM

The Field of Indicators: Quantitative Genetic Repertoires in Animal and Plant Breeding

Quantitative genetics is a statistical approach to genetics, distinct from classical Mendelian and molecular genetics, that has shaped and been shaped by attempts to intervene in the biology of agricultural plants and animals at the population level throughout the twentieth and twenty-first centuries. This seminar explores the 'repertoires' (Ankeny and Leonelli 2016) of materials, skills and practices that comprise quantitative genetics in plant and animal breeding, focusing in particular on practices of producing and using statistical indicators in breeding programmes (namely heritability, breeding values, and genetic gain). I will analyse three critical issues that arise from the use of quantitative genetic indicators in breeding and agriculture: 1. Contestations over expertise, between data-driven approaches and skilled judgement; 2. Indicators as tools of biopower, especially over animals; and 3. The ambiguous epistemic and political role of environmental factors in quantitative genetics. I will also show how the movement of particular repertoires back and forth between animal breeding and plant breeding has brought these different issues into prominence.

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25 NOVEMBER Maria Volkova | Exeter University

Making up marriage: officials and AI checking the genuineness of the relationship

This paper presents findings from an ethnographic study of how the UK state seeks to detect 'sham' (fraudulent) marriages through immigration control. It advances two central findings. First, states are often assumed to govern through clear-cut categories that define who people are and how they should act. But in the case of 'sham' marriage detection, the categories used by the Home Office are anything but clear. Precisely because couples cannot know what counts as a 'genuine relationship', they go to great lengths to present themselves in ways that pre-empt possible doubts. Many turn to online communities, where they collectively develop shared norms and informal conventions about how to appear as a 'real' couple in the eyes of the state. In this way, ambiguous classifications shape couples' self-presentation. Second, although automation and AI are often expected to reduce human judgment, my findings suggest the opposite. In a context of opaque infrastructures and vague criteria, these technologies can intensify reliance on intuition. Frontline officials reported feeling more confident in flagging couples based on 'gut feeling', assuming that any error would be corrected by an objective system, unaware that the system itself draws on their own discretionary inputs.

02 DECEMBER Sven Nyholm | LMU

The Ethics (and History) of Defining Artificial Intelligence

I will be discussing whether it matters – and if so, why it matters – how we define artificial intelligence. Like other controversial concepts with a history, like freedom or equality, the concept of artificial intelligence is an evolving concept, and new definitions of this idea are suggested on a fairly regular basis. Moreover, according to some authors, how we should define artificial intelligence is not just a purely descriptive question of conceptual analysis or semantics – instead, there are ethical reasons for favoring certain definitions over others. To approach this topic in at least a somewhat systematic way, I will start with an incomplete history of attempts to define artificial intelligence. I will then ask whether we should choose one definition or whether we should take an "inclusive" approach that incorporates elements from several of the suggested definitions we will consider. I will argue that we should adopt what I will call a "broadly inclusive" definition of artificial intelligence, since, among other reasons, this helps to explain why the notion of artificial intelligence is not only philosophically interesting, but also a topic that raises many different kinds of ethical questions.

16 DECEMBER Paolo Leone | NOVA SBE, Lisbon

Decentralizing science: Market and commons pathways

The organization of science is being reconfigured by the emergence of initiatives that decentralize the governance of scientific knowledge production, evaluation, and dissemination. These initiatives respond to growing concerns about the centralization of authority in publishers and journals, which can impede the efficient production of scientific knowledge by limiting the disclosure and reuse of data and research materials, create imbalances in evaluation by relying heavily on the labor of uncompensated reviewers, and constrain innovation in scholarly dissemination by preserving outdated publication formats. Drawing on qualitative methods, including in-depth observations, interviews, and document analysis, this paper investigates two such initiatives—ResearchHub and Evidence—to examine how they enact decentralization and with what implications. The analysis shows that these initiatives developed distinct governance mechanisms, which underpin different governance forms. ResearchHub introduced a "market-based" governance system in which reviewers are compensated with research coins that can be exchanged for currency or used to request preprint reviews, pose specialized questions, or crowdfund research proposals. This token-based model aligns effort with reward, addressing exploitative dynamics in traditional evaluation systems. In contrast, Evidence fostered a "commons-based" governance system built around an open research ecosystem that supports in-depth engagement with scientific work, allowing scientists to reuse data and materials, interrogate figures, and reproduce analyses before and irrespective of journal publication. By comparing these cases, the paper theorizes alternative governance systems for decentralized science, clarifying the trade-offs between market-based and commons-based approaches.

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13 JANUARY Rena Alcalay | TUM

Sin of the Tree of Knowledge

Many believe that the single most significant development over the past 500 years, in terms of cultural influence, technological innovation, and social transformation, has been the emergence of modern science. The advent of modern science is equally unparalleled in terms of philosophical, metaphysical, and religious significance. For many, science has come to represent the dawning of a new era, the ascent of humanity out of an age of blind dogmatism and into the clear daylight of procedural rationality and empiricism. In fact, the ascent of humanity to procedural rationality and empiricism was first described in the story of Genesis. In that story, knowledge and sin were intimately connected; particularly, the shift from pure intellectual truth (emet/sheker, “true/false”; a priori) to empirical knowledge (convention; a posteriori). This is captured when, in front of the tree of knowledge, Adam and Chava (Eve) are enticed by the serpent to eat the forbidden fruit. This is often told as the first sin of man. Shaped by the Christian doctrine, eating forbidden fruit from the tree of knowledge was a rebellion against God, and the punishment for this was that all the descendants of Adam and Eve were infected with the stain of transgression. Consequently, humans are lost in a state of sin.

But this is not the only understanding of that story. And, importantly, this is not the only conceptual explanation of the relationship between sin and knowledge. Talmudic sages synonymize good and evil with the instantiation of perfect knowledge into the physical realm. Before eating the forbidden fruit, it is said that humanity originally acted according to truth and falsehood—sharing God’s perfect, a priori knowledge. After eating fruit from the Tree of Knowledge, humanity now possessed empirical knowledge with subjective, moral categories of good and evil. These subjective moral categories formed into two inclinations: yetzer hatov (יִצְרָה טוֹבָה; the good inclination) and yetzer hara (יֵצֶר הָרָע; the evil inclination) (Talmud, Berakhot 61a). What can we make of this interpretation of the story in Genesis 2:7? Often interpreted as the original sin of humanity, or else as a story about human limitations or even sexual desire, when, in fact, the logic of the words gestures to another interpretation: that at the root of empirical knowledge there exists both creativity and harm.

I argue that epistemic harm is constitutive of empirical knowledge, and that, once this is recognized, the role of epistemic harm in our social-epistemic practices can be better understood. With Genesis in the background, I first present the Parable of Inclination to establish that both yetzer hatov and yetzer hara are required for knowledge, growth, and moral development. I then argue that yetzer hara is both the force animating discovery and the source of exclusion and hermeneutical inequality. Drawing on four nested semantic categories, I taxonomize different forms of epistemic harm and show that they arise from hermeneutical gaps and reasoning failures inherent in bounded cognition driven by yetzer hara. Because yetzer hara animates intellectual striving while simultaneously giving rise to exclusion and hermeneutical inequality, epistemic harms are not simply opposed to flourishing or reducible to wrongdoing; they are constitutive of the very conditions under which knowledge is produced.

27 JANUARY Richard Williams | TUM

Hybrid Workshop on Democracy and Expertise

The Feasibility Power of Experts

In the philosophy of science, the values in science debate largely explores how the value judgments of experts may influence politics in unacceptable ways. In contrast, I will foreground the underexplored “feasibility-power” of experts. In politics, experts often make feasibility judgments about what is possible and what is necessary. In practice, methodological choices rather than moral choices often shape the feasibility judgments of experts. So, I will argue that methodological pluralism is a critical check on the fallible feasibility judgments of experts. However, I will argue that no particular individual or institution must practice methodological pluralism. In practice, individuals inside institutions may need consensus on methodological questions. On a much bigger scale, I will argue that the research ecosystem as a whole should cultivate methodological pluralism. In practice, different institutions should seek contestation on methodological questions as a critical check on each other.