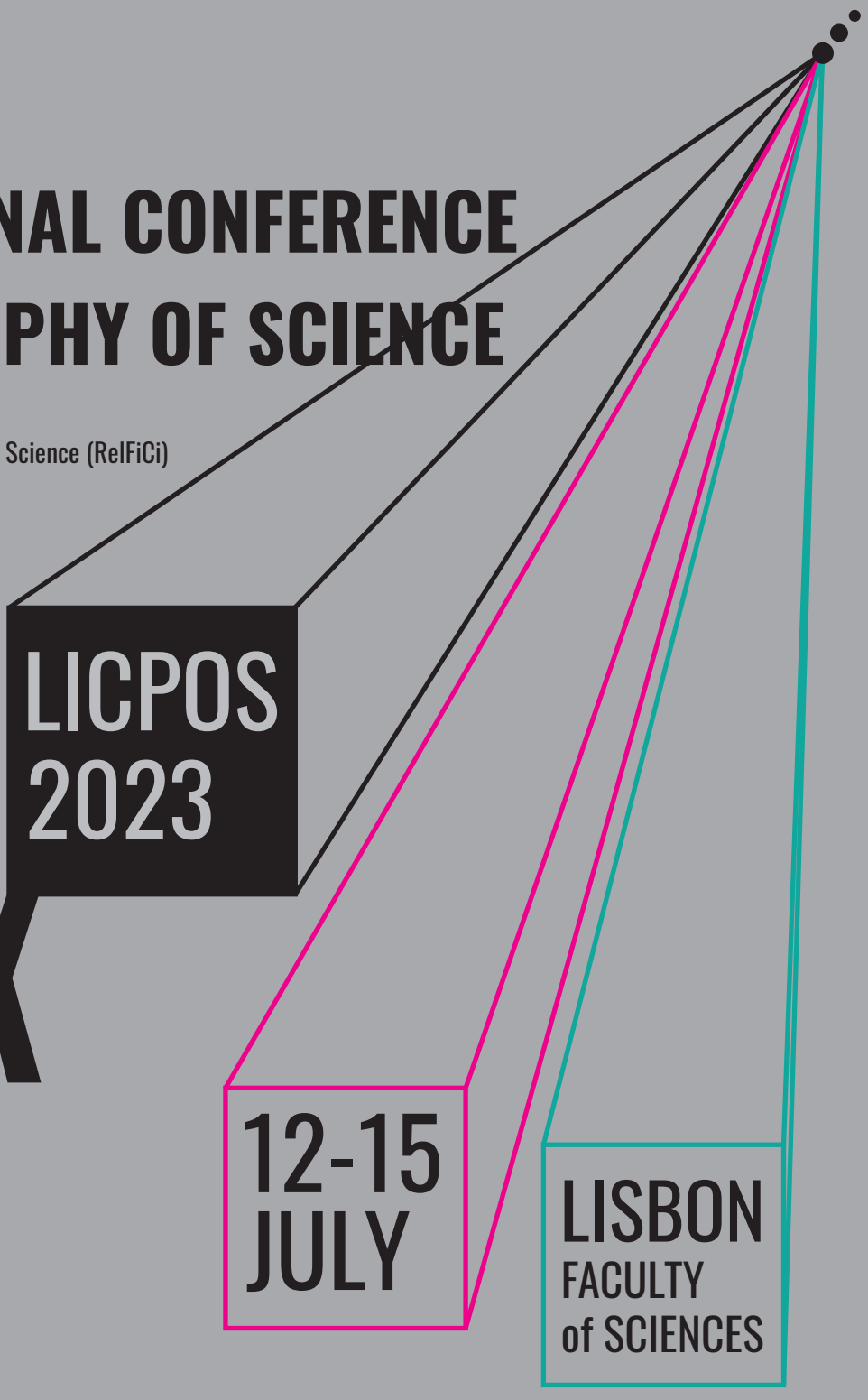
# 4th LISBON INTERNATIONAL CONFERENCE ON PHILOSOPHY OF SCIENCE

Hosting the 2nd meeting
of the Iberian Network of Philosophy of Science (RelFiCi)




# BOOK OF ABSTRACTS

**4th Lisbon International Conference on Philosophy of Science - LICPOS 2023**
Satellite event: 2nd Meeting of the Iberian Network of Philosophy of Science (ReIFiCi)

12-15 July 2023
Faculty of Sciences of the University of Lisbon

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Design of site, poster and booklet
Silvia Di Marco

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# WELCOME ADDRESS LICPOS 2023

In the context of the celebration of its 20th anniversary, the Centre for Philosophy of Sciences of the University of Lisbon (CFCUL) organizes the 4th Lisbon International Conference on Philosophy of Science (LICPOS 2023), from the 12th  to the 15th July 2023, at the Faculty of Sciences of the University of Lisbon (Ciências ULisboa).

The Lisbon International Conferences on Philosophy of Science (LICPOS) are periodic conferences directed to a wide audience with interests in the philosophy of science broadly conceived. Reflecting the main areas of research of CFCUL the conference explores mostly subjects related to:

Epistemology and Methodology;
General Philosophy of Science;
Philosophy of Logic and Mathematics;
Philosophy of Physics;
Philosophy of the Life Sciences;
Philosophy of Artificial Intelligence and Computation;
Philosophy of Cognitive Sciences;
Philosophy of Technology;
Philosophy of the Human Sciences, Ethics, and Politics;
Science and Art.

However, scholars working on any topic of interest in philosophy of science are invited to be part of the conference.

As a satellite event, on July 15, LICPOS 2023 hosts the 2nd Meeting of the Iberian Network of Philosophy of Science (ReIFiCi).

We are delighted to receive you at LICPOS 2023 and we hope you will enjoy the conference and the city of Lisbon.

João L. Cordovil
On behalf of the Organising and Scientific Committees

# KEYNOTE SPEAKERS

## GABRIELLE GRAMELSBERGER

RWTH Aachen University

Gabriele Gramelsberger holds the Chair for Theory of Science and Technology. Together with Prof. Dr. Stefan Böschen (Chair for Technology and Society) she is responsible for the Master's program in Governance of Technology and Innovation. In 2018 she founded the CSS Lab, supported by the NRW Digital Fellowship 2017. Her aim is to develop a conceptual framework for Philosophy of Computational Sciences as well as an open science infrastructure for Computational Science Studies. She is a member of the RWTH Human Technology Center and serves as Vice Dean for Research of the Faculty of Arts and Humanities at the RWTH Aachen University. In 2019 she became a regular member of the North Rhine-Westphalian Academy of Science, Humanities and the Arts. In 2021 she became founding director of the Kate Hamburger Kolleg "Cultures of Research" – an International Center for Advanced Studies in Philosophy, Sociology, and History of Science and Technology at RWTH Aachen University. She received her PhD in philosophy from the Freie Universität Berlin in 2002, where she taught from 2004 to 2014. In 2015 she became Privatdozentin at the TU Darmstadt, where she taught from 2014 to 2016. She was guest researcher at the Max Planck Institute for Meteorology in Hamburg (2007) and research fellow at the DFG "Media Cultures of Computer Simulation" Institute for Advanced Study at Leuphana University Lüneburg (2014 and 2015 to 2016). In 2016 she became Chair for Philosophy of Digital Media at the University Witten/Herdecke, and in 2017 Chair for Theory of Science and Technology at RWTH Aachen University.

Keynote address: *Philosophy of Computational Sciences*

## JAMES TAPPENDEN

University of Michigan

James Tappenden has published on paradoxes, negation, vagueness, analytic truth, Frege's philosophy of mathematics and logic, and mathematical explanation. His current

research principally addresses two areas: nineteenth century German philosophy, particularly the mathematician/philosopher/logician Gottlob Frege, and historically informed philosophy of mathematics, with special attention to shared themes in Bernhard Riemann's complex analysis/algebraic geometry and the mathematical foundations developed by Frege and Richard Dedekind. The historical research supports an investigation into the metaphysics and epistemology of mathematical concepts, with special emphasis on the concept of "fruitfulness". Papers that are representative of the current research include: "The Riemannian Background to Frege's Philosophy" in The *Architecture of Modern Mathematics*, J. Ferreirós & J. J. Gray eds. (Oxford University Press), "Mathematical Concepts and Definitions" and "Mathematical Concepts: Fruitfulness and Naturalness" in *The Philosophy of Mathematical Practice*, P. Mancosu ed. (Oxford University Press), "A Primer on Ernst Abbe for Frege Readers" *Canadian Journal of Philosophy* Supplementary Volume, "Infinitesimals, Magnitudes and Definition in Frege" *Essays on Frege's Basic Laws of Arithmetic,* Marcus Rossberg and Philip Ebert eds. Oxford University Press" and "History of Mathematics Illuminates Philosophy of Mathematics: Riemann, Weierstrass and Mathematical Understanding" Forthcoming in *The Richness of the History and Philosophy of Mathematics,* Jose Ferrieròs, Karine Chemla et. al. (Springer) James previously taught at the University of Pittsburgh, and has held visiting positions at Berkeley, Harvard, Oslo and the University of Paris VII (Diderot). In 2006-2007 he was a fellow at the Michigan Institute for the Humanities.

Keynote address: *The German Romantic Context for Frege's Early Writings*

## JOHN SYMONS

The University of Kansas

John Symons is Professor of Philosophy and Affiliate Professor of Computer Science at The University of Kansas and is Founding Director of the Center for Cyber-Social Dynamics. His research areas include philosophy of technology and general philosophy of science. He is author of 11 books or edited volumes and over 60 articles and book chapters. John is committed to interdisciplinary cooperation in research and teaching and his research has appeared in computer science, mathematics, and applied economics journals in addition to philosophy journals. He was past editor-in-chief of *Synthese* (2002-11), the leading journal in epistemology and philosophy of science and has served as editorial board member of numerous interdisciplinary journals and journals of philosophy. He currently serves as executive editor of *Philosophy and Technology* and is now editor-in-chief of *Global Philosophy*. John is a regular participant in Complexity Science programs and groups internationally and has served as visiting faculty at Peking University and The University of Lisbon. He is a member of the Institut International de Philosophie (IIP) and is an associate member of the Institut d'histoire et de philosophie des science et des techniques (IHPST), Paris 1. In 2022 he was elected a member of the International Academy for Philosophy of Science (AIPS). John has experience as Department Chair in two universities including a stint as Chair of the Department of Economics at KU. He has successfully led efforts to secure large extramural research funding from NSF, the Templeton Foundation, and the Department of Defense. His new Center for Cyber Social Dynamics at The University of Kansas is home for the interdisciplinary and cross-cultural

study of the relationship between internet and data-driven technologies and society, politics, and culture. We aim to understand and evaluate the ways in which our lives are shaped by the ubiquitous and pervasive influence of computing technologies. This understanding will allow our communities to mindfully and ethically shape technologies so as to promote human flourishing.

Keynote address: *Machine Learning and Scientific Inquiry*

## MARIA JIMENEZ BUEDO

UNED Madrid

María Jiménez Buedo is Assistant Professor in the Department of Lógica, Historia y Filosofía de la Ciencia of the UNED in Madrid. She has a PhD in Political and Social Sciences from the European University Institute (EUI) and an MA in Philosophy of Social Sciences from the London School of Economics. She has worked in the fields of Political Economy, Scientific Policy and Philosophy of Social Sciences, with emphasis on methodological questions.

Keynote address: *Experimental Validity in the Social Sciences: challenges, practices, and conceptual tools*

## PATRICIA PALACIOS

University of Salzburg

Patricia Palacios is Associate Professor in philosophy of science at the University of Salzburg and an external member of the Munich Center for Mathematical Philosophy. She is also Associate Editor of *Foundations of Physics*, an international journal devoted to the conceptual bases and fundamental theories of modern physics. She is a founding Trustee and current Equity, Diversity and Inclusion Officer of the Philosophy of Physics Society, which maintains the open access journal *Philosophy of Physics*. Her areas of specialization are general philosophy of science, philosophy of complexity sciences and philosophy of physics. Her research in general philosophy of science focuses on scientific explanation, reduction and emergence, and the role of idealizations in science. In philosophy of physics, she works primarily on the foundations of statistical mechanics and philosophical problems raised by phase transitions. She also works on the application of physics methods to economics and biology and on the role of analogies and idealizations in model building in economics as well as in other sciences. Apart from this, she is interested in complex sciences approaches to biology, and in the use of analogue experiments and simulations in science, especially in the context of black holes and biomedical research.

Keynote address: *Reduction and the Autonomy of the Special Sciences*

**SAMIR OKASHA**
University of Bristol

Samir Okasha has broad philosophical interests, though most of his research falls into two main areas: (i) philosophy of biology / evolutionary theory; and (ii) epistemology /philosophy of science. Within philosophy of biology, he is especially interested in foundational and conceptual questions surrounding evolutionary theory. For many years, his research focused on the 'levels of selection' question in evolutionary biology, and the related issue of individual versus group conflicts of interest. This culminated in the book *Evolution and the Levels of Selection* (OUP 2006), which was awarded the 2009 Lakatos Prize for an outstanding contribution to philosophy of science. From 2011 to 2016 he was Principal Investigator on an ERC research project entitled “Darwinism and the Theory of Rational Choice”. This culminated in a book, *Agents and Goals in Evolution*, published by OUP in 2018. He is currently the PI on another project entitled “Representing Evolution”, funded by an ERC Advanced Grant.

Keynote address: *Evolution and Natural Selection: the tautology problem re-visited*

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Is modelling a source of evidence? (Valeriano Iranzo)

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# SUBMITTED PAPERS

**Abhishek Kashyap**
Indian Institute of Technology Guwahati

### A dilemma concerning consensus in science

An overwhelming reliance on expert consensus is a fact of contemporary social existence. The rationale for this reliance, presumably, is that expert consensus is based on, and hence indicates scientific knowledge, where knowledge is standardly understood as being based on facts (factivity). It becomes important then to delineate conditions under which expert consensus reliably indicates scientific knowledge. Philosophical investigations into the topic have highlighted the necessity of both evidential and institutional factors in this regard. Of the evidential factors, elimination of veritic luck is seen as an important requirement for true beliefs to count as knowledge. This presentation focuses on the necessary evidential criteria for knowledge-indicating consensus and argues that, at least in some domain of scientific inquiry, expert consensus cannot reliably indicate scientific knowledge. I will offer a taxonomic classification of scientific inquiry based on the nature of theorising and the quality of evidence. Although it has been suggested in the literature that consilience of evidence eliminates luck, I will identify cases where mere consilience will not suffice. I will then employ the relevant alternatives approach to argue that epistemic luck cannot be eliminated without violating the requirement of factivity. We are thus left with a dilemma – either we deny that expert consensus is a reliable indicator of scientific knowledge, or we understand scientific knowledge as a non-factive epistemic achievement.

**Adam Chin**
University of California, Irvine

### Philosophy of the Non-Basic Sciences: Thinking with the 85%

General philosophical accounts of science have come increasingly under fire as overly physics-centric. Since at least the 90s (e.g. Galison and Stump 1996), work has queried what might happen to our theories of science if we took biology or even paleontology as

our starting points instead (see e.g. Creager et al. ed. 2007 and Currie 2018). Given that far more actual scientists work in these fields, the critique is well founded. But even these new bases, I argue, are not sufficient. If we would really like our accounts of science to align with the actual practice of science, then philosophers need to think outside the labs and ivory towers.

According to The US Bureau of Labor Statistics, in 2021 almost 1,274,000 individuals in the US alone were classified as "scientists", with "Life, Physical, and Social Science Occupations". Of those, only about 194,180 participate in industries related to "Scientific Research and Development Services". The other roughly 85% of US scientists do non-basic, non-research-oriented work. They make chemical assays, measure water quality, sequence genomes, save condors, design lotions, and figure out where to build bridges. What would happen if we took the applied, non-basic sciences as the exemplars for our general philosophy of science? No more Theory T, no more DN Models, no more Duhem-Quine; but a lot more practice, protein, and production down on the concrete.

In this talk, I explore why we might want a philosophy of science which starts with the non-basic, non-research-oriented science and how we might do it. One big payoff: our accounts of science will actually match reality. Another: when philosophy of science matches real-world science, it will be more useful in real-world contexts—like religion-science dialogues, vaccine controversies and policy decisions.

**Alberto Colombo** (1); **Liberty Severs** (1); **Víctor Vila Ramírez** (1,2), **Giulia Chiosini Hambsch** (1,3); **Ana Tajadura-Jiménez** (4,5); **Alejandro Galvez-Pol** (5,6); **Lydia Fettweis Neto** (1); **Anna Ciaunica** (1,5)

(1) FCUL, University of Lisbon; (2) University of Granada; (3) University of Osnabrueck; (4) University Carlos III Madrid; (5) UCL; (6)University of the Balearic Islands

**Exploring the multisensory modulation of the self in depersonalization**

We take our experiences of the self and presence for granted in daily life. However, within depersonalisation and derealisation disorder(s) such experiences are radically different: Individuals with depersonalization (DP) report the pervasive feeling of detachment from the world, both within and outside of the self (Sierra & Berrios 1997; Ciaunica et al, 2021; Ciaunica et al, 2022; Gallagher, 2000; Perkins, 2021). This talk will present ongoing studies that explore the multisensory modulation of self and presence in depersonalisation, taking as inspiration the 'magic shoes' paradigm originally developed by Tajadura-Jimenez and colleagues (Tajadura-Jimenez et al, 2015). We extend this auditory sensory feedback approach to examine bodily movement (Study 1) and action observation (Study 2) in depersonalisation experiences, and explore the potential implications of this work for research at the intersection of self-experience, philosophical beliefs, and therapeutic outcomes in future studies.

We hypothesise: 1) that high DP will correlate with greater pre-task variance between actual and perceived body representation, 2) distinct post-task changes to dimensions of the bodily self following auditory feedback modulations (e.g. during high/low frequency spectra, but not control) across both groups, and 3) measurable group differences at the behavioural (i.e. gait mechanics) and physiological (i.e. cardiodynamics) level, including altered phase coupling of cardiac and gait responses during self-produced bodily movement in high DP. This work will therefore further our understanding – at both the conceptual and empirical level – of the complex features of depersonalisation experiences, unveiling fundamental features of self-consciousness in our daily lives.

Sierra M, Berrios GE (2000). The Cambridge Depersonalization Scale: a new instrument for the measurement of depersonalization. Psychiatry Res. 2000 Mar 6;93(2):153-64.
Ciaunica A, Seth A, Limanowski J, Hesp C, Friston KJ (2022). I overthink-Therefore I am not: An active inference account of altered sense of self and agency in depersonalisation disorder. Conscious Cogn.

Gallagher, S. (2000). Philosophical conceptions of the self: implications for cognitive science. Trends Cogn Sci.
Perkins J (2021). Life on autopilot: A guide to living with depersonalisation disorder. Jessica Kingsley Publishers; London & Philadelphia
Tajadura-Jiménez, A., Basia, M., Deroy, O., Fairhurst, M., Marquardt, N., Bianchi-Berthouze, N. (2015). As light as your footsteps: altering walking sounds to change perceived body weight, emotional state and gait. In Proceedings of the 33rd annual ACM conference on human factors in computing systems.

**Alejandro Gracia Di Rienzo**
University of Santiago de Compostela

**Noneist Mathematical Structuralism**

Noneism is the claim that some objects don't exist and that quantification over them is intelligible. Major proponents of noneism (Routley, Zalta and Priest) have a straightforward answer to the question about the nature of numbers and other mathematical entities: they are non-existent objects. After presenting some problems for this view, I will explore an alternative noneist philosophy of number which combines the insights of noneist quantification with eliminative structuralism. The basic idea of eliminative structuralism is to interpret arithmetical theorems not as making claims about a fixed domain of abstract objects ("the numbers"), but as saying what holds for any function that behaves like a "successor function" over some objects. Many authors have pointed out that this form of structuralism is threatened by vacuity: if not enough objects exist, the eliminativist paraphrase renders all arithmetical sentences vacuously true. There are well-known solutions to this problem (e. g. set-theoretical platonism, or Hellman's modal structuralism), but they all accept a basic assumption behind the objection: that quantification is always ontologically loaded. This is precisely what noneists deny, so they have an easier way out of the vacuity problem if they want to pursue structuralism. I will discuss how this basic insight can be developed within the noneists theories of Zalta and Priest and compare the resulting view with the usual modal structuralist reconstruction of arithmetic.

Hellman, G. (1989). Mathematics Without Numbers. Oxford, Oxford University Press.
Hellman, G., Shapiro, S. (2019). Mathematical Structuralism. Cambridge, Cambridge University Press.
Linnebo, Ø., Florio, S. (2021). The Many and the One. Oxford, Oxford University Press.
Priest, G. (2015). Towards Non-Being. Oxford, Oxford University Press.
Routley, R. (2003). "The Importance of Nonexistent Objects and of Intensionality in Mathematics", Philosophia Mathematica, 3:11, pp. 20-52.
Zalta, E. (1983). Abstract Objects. Dordrecht, D. Reidel.

**Alejandro Rosas**
National University of Colombia

## Moral principles and moral disagreement

Research with sacrificial moral dilemmas (kill one to save many) provides an experimental window into how two plausibly fundamental moral principles – namely the utilitarian "Promote the greater good" and the deontological "Protect individual rights" – interact and potentially lead to radical moral disagreement.
These principles do not always conflict, but when they do, research shows that participants disagree in their judgments; some approve the sacrifice of one life (a rights-infringement) to save more, while others uphold the protection of individual rights. The mainstream view (Greene & collaborators) interprets the disagreement as a function of whether participants are able or not to rationally inhibit ancestral, prepotent, emotional impulses, typically activated when the sacrifice is "close up and personal", rather than impersonal. This allows them to fend off disagreement by endorsing the normative superiority of the utilitarian, more rational, solution.
However, data from several published studies reveal that different personal scenarios can evoke a wide range of percentages of approval, from 25% to 75%. This wide range across different personal items cannot be explained by variance in the ability to control aversive emotions, because it is observed within the same samples. Rather, the items suggest differences in the severity of the rights-violation (victim innocent or not, or doomed to die anyway), even though it is personal in all scenarios. This suggests that participants confront dilemmas primarily by estimating a balance of moral costs vs. moral benefits. The varying moral cost of sacrificing one person is objective, but it is met with individual variation in the relative force of the moral sensitivities (utilitarian vs. deontological). If it is unlikely to place this subjective factor under a normative rule, e.g., by establishing the superiority of one particular balance between the conflicting sensitivities, then the resulting disagreement is probably radical.

Greene, J. D., Morelli, S. A., Lowenberg, K., Nystrom, L. E., & Cohen, J. D. (2008). Cognitive load selectively interferes with utilitarian moral judgment. Cognition, 107, 1144–1154.
Greene, J.D.,Nystrom, L. E., Engell, A.D.,Darley, J. M., & Cohen, J.D. (2004). The neural bases of cognitive conflict and control in moral judgment. Neuron, 44, 389–400
Greene, J. D., Sommerville, R. B., Nystrom, L. E., Darley, J. M., & Cohen, J. D. (2001). An fMRI investigation of emotional engagement in moral judgment. Science, 293, 2105–2108.
Nelkin, D. K.,McKenzie, C. R.M., Rickless, S. C., & Ryazanov, A. A. (in press). Trolley problems reimagined: Sensitivity to ratio, risk, and comparisons. In: F. Aguiar, H. Viciana, & A. Gaitan (Eds.), Experiments in moral and political philosophy, Routledge (forthcoming).
Rosas, A., Bermúdez, J. P., & Aguilar-Pardo, D. (2019). Decision conflict drives reaction times and utilitarian responses in sacrificial dilemmas. Judgment and Decision Making, 14(5), 555–564.
Rosas, A., & Aguilar-Pardo, D. (2020). Extreme time-pressure reveals utilitarian intuitions in sacrificial dilemmas, Thinking and Reasoning, 26(4): 534-551.
Rosas, A., Hannikainen, I., Lam, J., & Aguiar, F. (2023). Individual attitudes towards moral costs and benefits drive responses to moral dilemmas. European Journal of Social Psychology, 1–13.Advanced Online Publication. https://doi.org/10.1002/ejsp.2935

**Alessandra Cenci**
Aalborg University

### The philosophy and epistemology of the “Citizen Data Science” stance: mapping a new field

How "black box" problems and losses of autonomy, privacy, power and control engendered by AI systems and algorithmic decisions can be addressed by increasing human agency and the actual exercise of democracy in the digital era?
Here, I defend a participative approach to the generation of AI and predictive algorithms – a Citizen DATA Science stance (CDS) – that entails combining a philosophically sophisticated view with practicable solutions to actively engage diverse stakeholders (expert/scientists, non-expert/non-scientists) at all stages of the design process (conceptual, empirical and, technical phases). This view demands interdisciplinarity (philosophy, social science, techno-anthropology, data science) and is original since AI and algorithms are barely produced by involving end users, potential recipients or the public.
Two shortages at an applied science level of existing research on “explainable”, “trustworthy” and “human-centred” AI concerning actual a) citizens’ participation and b) multidisciplinary teamwork required to attain - simultaneously - epistemic and ethical-social goals (technical efficiency, explicability/transparency, legitimacy, accountability, fairness, public trust, democracy) are addressed. These aspects (a-b) are neglected by mainstream approaches to ethical-social AI; such as the “AI for social good/AI4SG”, including the emergent fields of “AI ethics by design” and Value-Sensitive Design applied to AI, since all adopt substantive, expert-led and, top-down approaches to the good and value. These issues remain also unexplored in data science, so-called “human-compatible” AI (concerned with “human control”) and later studies on “fair” algorithms.
The original CDS construal devised, its underlying tenets (ethical proceduralism; inter-/cross-disciplinarity, citizen science; objective social knowledge production; AI ethics by design; empirical determination of value/public value) will bridge the gap between theory and practice and can contribute to the spread of democratic science practices in the digital era inspired by the values of co-development, cooperation, transparency, accountability, trust and liberal democracy.

**In the present paper, I will devise further the original philosophical foundations for the CDS stance, initially drawn in these studies, viz. the axiology and social epistemology underlying this view (which major insights are expected at an applied science level).

**Alessandro Demichelis**
IMT School for Advanced Studies, Lucca

### How to avoid precision medicine hesitancy

Precision medicine, sometimes referred to as personalized medicine, is a medical approach that aims to tailor medical practices, drug development, and clinical interventions on the specificity of each individual genome. It promises to revolutionise the way diseases are treated and is surrounded by considerable hype. However, it has been met with criticism as well. Some authors target their critiques at the ethical limitations in terms of resources allocation, opportunities, and ethical fairness. Others focus more on the

worrying aspects entailed by the growth of medical power over human life.
This paper discusses two aspects of this approach that are often neglected, but that are in dire need of consideration. The first concerns the terminological and conceptual confusion between personalized medicine, precision medicine, and genomic medicine, and the effect of this confusion on public perception. How much "personal" is personalized medicine? How much is tailored toward the individual as a whole, encompassing his/her clinical history and personal details, and how much is the result of the recent breakthroughs in handling big amounts of data?
The second regards the status of precision medicine as a "revolution" or a "change in paradigm". On this latter point, we claim that, far from representing a paradigm shift, precision medicine is better understood as another step in a reformulation of disease taxonomies in stricter etiological terms. Our discussion provides a clarification of the nature, goals, and limitations of precision medicine, that is instrumental to avoid misunderstanding and, consequently, erosion of public trust toward a potentially beneficial medical practice. We already saw how such a situation can develop, for example with the phenomenon of vaccine hesitancy. The critical points surrounding precision medicine of today are strikingly similar to those concerning vaccine hesitancy of yesterday. We should strive to understand and address those potential problems before they present themselves, or incur the risk of facing yet again an unnecessarily entrenched antagonism.

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**Alexander Belak**
University of Zurich

### What Is Grasping?

There has been, since the beginning of the century, a revival of interest in the nature of understanding among both epistemologists and philosophers of science. Arguably, one of understanding's principal features is grasping how isolated pieces of information within a common domain hang together. But what is grasping? Most prominent answers appeal to grasping as providing certain reasoning abilities in regard to what is understood. Depending on the author, proposals on how to characterize these abilities vary.

Importantly, however, each proposal invokes a particular object of understanding. That being said, understanding typically admits multiple objects across various domains, each of which might impose different requirements on the reasoning abilities grasping provides. Consequently, just focusing on isolated objects or domains runs the risk of yielding only a piecemeal analysis of grasping that lacks the kind of traction a more systematic account would offer. So construed, progress on a comprehensive analysis of grasping requires deeper insight into the common thread between understanding's many objects–i.e., into the object of grasping.
In this talk, I present and defend a revisionary account of grasping as a way of intellectually engaging with its object. I proceed in three steps. First, I identify the common object of grasping as structures, and establish a category-theoretical approach to make the structures in questions more intelligible. I then determine what it takes to intellectually engage with grasping's object, thereby providing an account of the reasoning abilities grasping provides. Finally, I draw on the results of my previous worksteps to characterize grasping's very nature, answering the question of what grasping is.

**Alexandros Constantinou**
University of Glasgow

**Emergence and Downward Causation**

The concept of Emergence was aimed at dealing with the problems such as Mental Causation. An expanded version of Emergence, one applied to a much larger variety of phenomena, can be used to relate the Special Sciences with the more fundamental Physical Sciences. This bridging of gaps, however, has been put on the backburner as Emergence has consistently come under scrutiny with well-placed concerns about its internal consistency. In this talk I seek to clarify a general view of Emergence, that is what are the assumptions that an Emergentist must make and how those relate to the concept of Emergence itself. I draw from Kim’s seminal work on Emergence to formulate the concept and its surrounding commitments, arguing that Emergentists are ultimately non-reductive physicalists. I then develop the twin concepts of complexity and novelty to explain the intrinsic features of Emergence. This laying out of Emergence allows for the worries of internal inconsistency to arise in the form of Kim’s exclusion and Downward causation worries. The Novelty condition, understood as new and distinct causal powers, comes under threat from the causal closure of the physical. As physicalists, emergentists are forced to endorse the idea that all physical events have prior physical causes. From this commitment we can derive Kim’s Exclusion and Downward Causation arguments against Emergence, forcing emergentists to either abandon novelty or embrace epiphenomenalism, both of which are detrimental. Once this dilemma is in view, I lay out an approach to move beyond it, by embracing the Novel causal powers of Emergents as physical phenomena, thereby included within the causal closure of the Physical. The upshot is that we can reap the benefits of the relation without giving up on the conceptual innovations of Emergence.

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**Andrei Mărăşoiu**
University of Bucharest

**Representation and design in network models of category deficits**

I tackle the debate in the metaphysics of mind which separates those who think concepts and semantic memory are amodal (independent of their sensorimotor origins; call them “rationalists”) from concept empiricists, who think concepts and semantic memory are formed by crossmodal integration of sensory sources that concepts are not independent of. I argue that attention to neural-network modeling in category deficits undermines the debate between rationalists and empiricists about concepts. Patients exhibit category deficits when they lose mastery of some concepts but not of others, e.g. their performance with animate objects is intact but not so for inanimate, or the other way around.
Modeling category deficits with neural networks proceeds at many explanatory levels at once: behavioral, clinical, computational, and cognitive-psychological. Network plasticity and rewiring given local damage, as well as the interaction between different networks, have been invoked to support conflicting large-scale models of human semantic memory, either an “amodal hub” view I assimilate to a rationalist view, or a focus on crossmodal sensory integration which I assimilate to an empiricist view.
I argue that both rationalism and empiricism about human semantic memory are equally ill-supported. Using Farah and McClelland’s classical 1991 study, I argue that, in building networks to model the impaired semantic performance patients exhibit, we lack a principled way to distinguish (i) realist representationalist assumptions about the nature of human memory of concepts; from (ii) design assumptions built into the neural networks. These assumptions are aimed at the simplicity, fluent functioning, computational tractability and ease of integrating clinical data into simplified network models. Such an epistemologically rich and context-sensitive environment, I argue, undermines any sweeping large-scale metaphysical claims concerning the nature of the human memory of concepts, such as rationalism v. empiricism.

**Aurore Franco**
IHPST, University of Paris 1 Panthéon Sorbonne

### The Endosymbiotic Theory and the Modern Synthesis

The endosymbiotic theory, presented by Lynn Margulis for the first time in her article "On the Origin of Mitosing Cells" in the Journal of Theoretical Biology in 1967, has been rejected by about fifty scientific journals. These numerous rejections already foreshadowed the controversies that were to surround the theory, which was criticised, rejected, or minimised even after its experimental evidence had been established.
The vigorous scientific opposition between the neo-Darwinians and Margulis points to a scientific controversy that seems to go beyond the simple theoretical framework. This brings us to the question I shall address. The modern synthesis theoretically could integrate the endosymbiotic theory which was nonetheless received with such a virulent reaction. I argue this reaction is motivated due to the paradigmatic shifts necessarily implied by the endosymbiotic theory.
In order to answer this question, and to identify the extent of its inadmissibility for neo-Darwinists, it is necessary to consider an epistemology of the endosymbiotic theory, that is to say, a study of the constitution of this knowledge as valid, in terms of validity and value. To do so, I have tried to answer three questions: gnoseological – what is the nature of this theory and the phenomenon it studies ? Methodological – what are the conditions of its production, Margulis' epistemic frameworks and her social and cognitive posture as a researcher, as well as those of the neo-Darwinians ? Finally, ethical – why has there been so much resistance, what are the scientific, ideological and seemingly political stakes behind this theory that this resistance reveals?

**Benjamin Toth**
CFCUL, University of Lisbon

### The narrative structure of scientific writing

There is much interest currently among historians, philosophers, and cultural theorists in a cluster of related topics in science studies, including: fictionalism, narrative, make-believe, and models (see references below). A common feature of these topics is that scientific descriptions are treated as a hybrid of narrative and non-narrative writing: one part objectivity and realism, one part imaginary investments (anti-realism, subjectivity, rhetoric, and fictives).
This paper makes the case for a different approach. Rather than see narrative as outcrops within the text, I will argue that scientific writing is narrative throughout. This does not mean that science writing is like storytelling or fiction. It is however subject to the same rules of formation as other types of narrative.
To make the case I will introduce a methodology for analysing narrative first developed by the critic Roland Barthes in the late 1960s, but which hasn't been used to analyse scientific writing. Barthes showed that a short fictional text could be broken into fragments, each of which contain one or more of five narrative codes. When orchestrated with the text in an act of reading, they form the story for the reader. I will show in this paper that the narrative codes are similarly present in scientific texts. They play the same role, and are present throughout the scientific text.
A number of questions arise if scientific writing does not contain narrative but is narrative.

What, if any, are the relations between scientific texts and fiction? How can the mathematical equations, tables and other figures be treated as narrative? How do scientific narratives differ - as they surely do - from other narratives, including fiction? What is the relationship between narrative and scientific models? The final section of the paper examines these questions and suggests possible answers.

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**Bojana Grujicic**
Max Planck School of Cognition; Humboldt University of Berlin; UCL

**Representational similarity analysis underdetermines deep neural networks as mechanistic explanations of object recognition**

Recent findings in visual neuroscience suggest that deep convolutional neural networks (DCNNs) trained in an object recognition task enable predicting neural response properties in the ventral stream (Khaligh-Razavi & Kriegeskorte, 2014). Given this predictive success, do DCNNs also provide an explanation of object recognition? This issue has been recently picked up in the philosophical discourse (Cao & Yamins, 2021a, 2021b; Buckner, 2018), with several arguments offered for the claim that DCNNs are mechanistic explanations of object recognition (Cao & Yamins, 2021a, 2021b; Buckner, 2018).
I focus on one frequently used method to compare workings of DCNNs and the brain - representational similarity analysis (RSA) - which forms the backdrop against which DCNNs have been ascribed mechanistic explanatory status. RSA compares the degree of similarity between representational geometries of DCNNs and the brain in the object recognition task (Khaligh-Razavi & Kriegeskorte, 2014).
I ask whether RSA enables an abstract mechanistic mapping between DCNNs and the ventral stream representational mechanism (Bechtel, 2007) responsible for object recognition. I outline an account of mechanism sketches based on Craver & Kaplan (2020), and argue that RSA does not corroborate DCNNs as mechanism sketches. What plagues the applications of RSA is the variety of similarity measures used as a part of that framework. Focusing on correlation and Euclidean distance I show that they pick out different properties of stimuli-elicited patterns in order to quantify representational geometries. I show that this further entails contradictory implications about the vehicles of representations according to two accounts of representational mechanisms one may want to map via RSA – one on the level of individual neurons comprising neural populations (Cao & Yamins, 2021a), and another on the level of neural manifolds (Buckner, 2018). I proceed to argue that there is a problem of relevance of these measures for the explanandum capacity of object recognition.

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**Carla Feliciano**
CFCUL, University of Lisbon; National Institute of Health Dr. Ricardo Jorge, Lisbon

**Underdetermination of theories by evidence. Deconstructing the problem in contemporary biomedical sciences**

Underdetermination of theories by evidence' is one traditional approach in antithesis to scientific realism. The rationale of the so-called 'underdetermination of theories by evidence' is that at any moment, evidence will always be insufficient to support, entirely, one scientific theory. For any scientific theory, it is possible to find a rival theory that explains empirical evidence equally well. In this paper, I argue that the concept of underdetermination is not applicable in the context of contemporary biomedical sciences (including human immunology). The definition of observable and unobservable should be adapted to technological advances. For example, it is problematic to classify, contemporarily, an antibody as unobservable. Accepting underdetermination without making use of available (and proven reliable) scientific techniques and previous knowledge, is unthinkable. Contemporary biomedical sciences do not allow themselves to be limited by apparent obstacles such as the 'underdetermination of theories by evidence'. When contemporary biomedical sciences are faced with an impasse, such as apparent rival theories, scientists seek new evidence until solving the underdetermination. In this paper, I provide an example from immunology that undermines the concept of underdetermination in immunology.

**Charlotte Erika Zito**
University of Geneva

**Loop Quantum Gravity and primitivism about laws of nature**

The aim of this talk is to evaluate the teneability of a primitivist metaphysics about laws in the context of Loop Quantum Gravity (LQG). This project is motivated by the fact that both metaphysical theories and physics aim at unravelling the deepest structure of the universe, and thus must be constantly confronted to one another, and by the kind of ontology displayed by theories of quantum gravity, which is fundamentally

non-spatiotemporal (see for instance Huggett and Wüthrich, forthcoming). This last feature contrasts strikingly with one of the main presuppositions of primitivism about laws (at least in Maudlin's version), namely that the passing of time is comprised among the primitives of the fundamental ontology (see Lam and Wüthrich, 2021).
My talk starts out from these premises and brings the debate one step further. I will indeed evaluate the fate of primitivism about laws within LQG by taking into consideration not only Maudlin's version of primitivism (Maudlin, 2007), but also a more recent account of the theory, namely minimal primitivism (Cheng and Goldstein, 2022). Since minimal primitivism does not postulate a fundamental direction along with time passes in its ontology, I will argue that this version of primitivism is more apt in the context of LQG, in which it is not straightforward to interpret its fundamental structures in a spatiotemporal manner. Indeed, laws of minimal primitivism act by "constraining physical possibilities" (Chen and Goldstein, 2022, p. 21) which need not to be located in spacetime, which therefore might be given up entirely. Furthermore, by considering the role of probability amplitudes in LQG (Rovelli and Vidotto, 2015) I will argue that contrary to Maudlin's primitivism, minimal primitivism is able to account for stochastic laws as constraints. This constitutes further motivation for accepting minimal primitivism in the context of LQG.

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**Cristina Barés Gómez & Matthieu Fontaine**
University of Seville

**Methodological inference in anatomical research: the bloodletting**

In this paper, we analyse the case of The Bloodletting Letter of 1539 by Vesalius. He started a new aspect of medical research by introducing the anatomical studies, even before his main work The Fabric. In fact, the main question is whether the method of anatomy could corroborate speculation. How can we decide of the correctness of a hypothesis? Neither deduction nor induction is sufficient to account for medical reasoning, above all if we deal with hypotheses. We suggest that medical reasoning involves a third kind of reasoning, namely abduction, by means of which hypotheses are introduced. Hypotheses constitute the basis for the physician's action. However, it is only when it will have been exposed to observation, the anatomical practice of dissection in this case, with sufficient regularity, that the initial hypotheses will be (defeasibly) confirmed. Hypotheses, planning of trials and confrontation with facts can be connected within the Gabbay and Woods model (2005), in which abduction is considered as an ignorance-preserving inference. In some sense, we revive the Peircean triad involving abduction, deduction, and induction in scientific research, which must always begin by the introduction of hypotheses that recommend a course of action. In this regard, we argue that the GW model of abduction is particularly well-suited to account for the role of hypotheses in medical research

practice, but also in medical inquiry.
First, we begin with an account of medical reasoning within the GW model of abduction, and its application to the case of The Bloodletting Letter. Then, we apply the Select and Test model medical reasoning advocated by Magnani (1992). This leads to take part in an actual debate in the philosophy of medicine between “mechanistic” and “probabilistic” perspectives. Following theses advocated by Russo and Williamson (2007), it is acknowledged that both perspectives are necessary to establish causality in medicine. Our proposal is that these perspectives would be better understood in inferential terms: whereas mechanisms result from abduction, probabilities and statistics result from empirical trials and induction.

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**Daniel N. Camesella & María de Paz**
University of Seville

**Émilie du Châtelet and the absolute space**

Émilie du Châtelet’s conceptions of space and time have been discussed in recent years. Here we will try to examine what is the status of the law of inertia according to the conception that absolute space is a useful fiction, as she states in her work Institutions de Physique. To do this, we will focus on other key figures in the history of science such as Newton and Leibniz. These two authors were important to Châtelet when it came to shaping his thinking in relation to space-time. Unlike Newton, Châtelet did not commit herself to the physicality of absolute space, but she seems to be following Leibniz regarding the ideality of this entity. The main problem is that the absolute validity of the law of inertia seems to be dependent on the existence of an absolute space, according to the Newtonian program. Thus, if space is only a “useful fiction”, the epistemic status of the law of inertia becomes problematic. Furthermore, in her work it is not also clear what kind of space she is defending since we can find on some occasions two types of spaces in one of the chapters, dedicated to the treatment of the space, of the Institutions. It could be interesting to discuss the status of these spaces and see on which of them we could apply the law of inertia and how. Is there a physical and a fictional space, or, in fact, we can talk about two spaces but just one of them is real, in the sense of we can find bodies in it? We would like to analyse this problem in the context of du Châtelet’s work, where she claims to be establishing a Newtonian physics with a metaphysical foundation based on Leibnizian or Wolffian thought.

**Daniele Molinini**
University of Bologna

### Mapping-based accounts of applicability and converse applications

The philosophical problem that stems from the successful application of mathematics in the empirical sciences has recently attracted growing interest within philosophers of mathematics and philosophers of science. Nevertheless, little attention has been devoted to the converse applicability issue of how considerations coming from the empirical sciences find successful application in mathematics (such converse issue is acknowledged in Levi 2009, Skow 2015, Ginammi 2018 and Molinini 2021, 2022). In this talk I address the latter issue and I discuss it in connection with the inferential conception of application, originally proposed by Otávio Bueno and Mark Colyvan (Bueno and Colyvan 2011).
Although there have been many attempts to implement, extend, or even criticize the inferential conception of application proposed by Bueno and Colyvan (see, e.g., Rizza 2013, Bueno and French 2018, Soto and Bueno 2018), such 'mapping view' of applied mathematics is still the most influential strategy adopted by philosophers to address the philosophical problem stemming from the successful application of mathematics in the empirical sciences. But does it work for cases of converse applications (i.e., cases in which the successful applicability involved is that which goes from the empirical sciences to mathematics)? In this talk, focusing on some case studies, I argue that the mapping view of applied mathematics does not have the resources to handle the converse applicability issue. I point to the difficulties that the inferential conception has in this context and, finally, I sketch a view of application that bypasses two major difficulties faced by the inferential conception and that opens fresh research paths that are yet to be explored.

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**Davide Romano**
LanCog, Centre of Philosophy, University of Lisbon

**On the alleged extra-structures of quantum mechanics**

I argue that a particle ontology naturally emerges from the basic dynamical equations of non-relativistic quantum mechanics, when the quantum continuity equation is realistically interpreted. This was recognized by J.J. Sakurai in his famous textbook "Modern Quantum Mechanics", and then dismissed on the basis of the Heisenberg position–momentum uncertainty principle. In this paper, I show that the reasons of this rejection are based on a misunderstanding of the physical import of the uncertainty principle. As a consequence, a particle ontology can be derived from the quantum formalism without the need of additional ad hoc assumptions, and therefore it cannot be regarded as "extra-structure".

**Dominic Ryder**
London School of Economics and Political Science (LSE)

**Directed Temporal Asymmetry from Scale Invariant Dynamics: Is the Problem of Time's Arrow Solved?**

The scale invariant model of Newtonian gravity by Barbour, Koslowski, and Mercati (2014, 2013, 2015) purports to solve the problem of the arrow of time, but has received minimal philosophical analysis. This omission is amended in the present work, in which I describe how the model manages to derive asymmetric behaviour from symmetric physics. The Janus point structure of the proposed solution holds significant preliminary promise for deriving asymmetry from symmetry, and improves substantially on the canonical entropy-based approaches to time. However, the proposal does not recover sufficient supervenience relationships between various other arrows of time to regard the problem as being solved, and this failure undermines the research programme more generally. This work highlights the deep connection between our understanding of the physical world, and the relative progressiveness of research programmes. Therefore, I offer a line of research for the programme, in which statistical mechanics is defined within the BKM model. This synthesis of statistical mechanics and the BKM model could potentially recover our experience of time and thus be a significant advance toward a satisfactory solution.

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**Donal Khosrowi & Finola Finn**
Leibniz University Hannover

**Can AI produce synthetic evidence?**

The recent proliferation of generative artificial intelligence systems (GAI) raises a host of novel philosophical questions about AI in science. We focus on the role of GAI in the historical sciences, including history, archaeology and anthropology. Here, researchers are already using AI for various purposes, e.g. to reconstruct partially destroyed manuscripts, and a new wave of GAI systems like StableDiffusion hints at the possibility of more dramatic restorative inferences. For instance, suppose researchers trained a GAI model on extensive labeled image, text and scan data on artefacts recovered from a certain region. Consider now a case where researchers prompt such a system to provide a rendition of how a newly discovered, but partially destroyed artefact would have looked like if it had remained intact, or how it may have looked like when it was made and used. Can we sometimes consider such outputs to be epistemically on par with finding concrete, material evidence speaking to the same query? A first blush response is to say no: GAI outputs may be understood as hypotheses or speculations, and there might be good reasons to pursue these hypotheses, but they are not evidence in and of themselves. Contra this view, we argue that under suitable conditions, e.g. concerning the nature, amount and variety of training data, the fidelity of theory that informed the labeling of these data, and constraints on learning processes, GAI outputs can indeed carry enough (derivative) justification to count as synthetic evidence, which can sometimes be epistemically on par with traditional, material evidence. We show how our thesis connects with prior arguments in the epistemology of computer simulation and modeling, and explore the wider ramifications it has for the epistemology of AI-based science.

**Elena Dragalina-Chernaya**
National Research University Higher School of Economics, Moscow

**Abstract logics as formal ontologies as classifications**

This paper addresses a classical question: If logic has no ontology, in what sense is it a formal ontology? I'll focus on a concept of an abstract (model-theoretical) logic, i.e., a pair (L, ⊨L), where L is a class of sentences and ⊨L is a satisfaction relation between structures and L-sentences. Abstract logic satisfies the Isomorphism Property: If U⊨L$\phi$ and B≅U, then B⊨L$\phi$ (Ebbinghaus 1985, p. 27-28). The maxim "There is no logic without inference" problematizes the use of the term "logic" in abstract model theory. This paper offers an interpretation of abstract logics as formal ontologies as well as higher-level classifications.
According to Edmund Husserl, logic as formal ontology concerns structures of an objective area of categorical objects. These higher-level objects hypostasize region-independent forms of objects. I suggest considering isomorphism types as model-theoretic analogues of categorical objects of Husserl's formal ontology. Thus, abstract logics as formal ontologies do not distinguish between specific individuals in the domain but deal with individuals of higher order, i.e., isomorphism types. Moreover, we may consider an abstract logic as a classification A = <tok (A), typ (A), ⊨A>, where tok (A) is a set of tokens, i.e., isomorphism types, typ (A) is a set of types, i.e., sentences of the language, and ⊨ A is a binary relation between them (we may read a ⊨A $\alpha$ as a is of type $\alpha$ in A) (sf. a classical definition of classification in Barwise, Seligman 1997, p. 28). Therefore,

isomorphism types as abstract tokens may be classified by means of their types, i.e., sentences of the language. Relations of satisfaction between the sets of isomorphic structures and the sets of sentences do exactly this job of a higher-level classification.
To sum up, following Gil Sagi's conception of form as a type of meaning which is more coarse-grained than extension, i.e., form D(t) = form D'(t') if and only if there is a bijection f: D →D' such that f (ext D(t)) = ext D'(t')) (Sagi 2021), I suggest considering abstract logics as higher-level classifications of forms.

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**Francisco Carrapiço**
CFCUL, University of Lisbon

**Travelling Beyond Neodarwinism. Contribution to a Symbiogenic Theory of Evolution**

Life is evolution, a dynamic continuum that has remained unbroken since its emergence. Traditionally, biological evolution is considered as a gradual process that consists essentially of natural selection, conducted through minimal phenotypic variations that are the result of genetic mutations and recombination to form new species. It is likewise a dynamic process that develops and responds not in the sense of perfection and progress, but in the sense of adapting to new conditions. However, evolution is not just the result of mutations and genetic recombination combined with natural selection. It involves other processes, namely symbiotic associations between different organisms to form consortia, a new structural life dimension and a symbiont-induced speciation, which have been secondary or even underestimated by the Neodarwinist approach. Symbiogenesis was introduced in 1909 by the Russian biologist Constantin Mereschkowsky and was defined as "the origin of organisms by the combination or association of two or more beings that enter into symbiosis". It is an evolutionary mechanism that enables a coherent conceptual rupture in relation to evolutionary ideas of the past, but that simultaneously builds a new evolutionary approach to life on our planet. Symbiosis is therefore the vehicle through which the acquisition of new genomes and new metabolic and organismal capacities occurs, enabling the evolutionary construction of organisms. Given that symbiosis and synergies are fundamental patterns in nature, the presence of organisms living symbiotically and communicating with each other corresponds to the structural basis of evolutive success, as well as to a new level of hierarchical complexity organization in the web of life. Thus, the development of a Symbiogenic Theory of Evolution can contribute towards a new epistemological approach to the symbiotic phenomenon in evolution and towards new perspectives that allow for a better understanding of the web of life on Earth and beyond.

**Frank Zenker**
Nankai University, Tianjin

### Cohen's convention and the body of knowledge in behavioral science

In the context of discovery-oriented hypothesis testing research, many behavioral scientists today accept a convention according to which the general relative seriousness of the antecedently accepted false positive error rate $\alpha = 0.05$ is matched by a false negative error rate of $\beta = 0.20$. Proposed by Jacob Cohen, this convention implies that the probability that a statistically significant true observed effect (aka a genuine discovery) cannot be independently replicated is four times larger than the probability that a statistically significant observed effect is a mistaken discovery. Moreover, Cohen's convention ignores contexts of hypothesis testing where the more serious of both errors is the β-error. Cohen's convention, we argue, has proved harmful to the development of a progressive science of human behavior, making its wide acceptance crucial to explaining the replication crisis in behavioral science. While the "right" error rates for some context should be informed by epistemic and practical considerations, epistemic considerations alone suggest that a genuine contribution to the body of scientific knowledge presupposes $\alpha = \beta << 0.05$.

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**Frederico Carvalho**
FCSH-NOVA, Lisbon

### Evolution, Cooperation, and Moral Value

In this talk we will argue that recent attempts to reduce moral value to cooperation are flawed as a metanormative theory. Oliver Scott Curry has developed significant work in explaining the evolutionary and cooperative basis of the moral rules we commonly believe in (Curry, 2016). Caring for your family, helping your group, returning favours, being brave, deferring to your superiors, dividing disputed resources, respecting private property, are all cooperative behaviours that are fitness-enhancing and also seem to be majorly accepted by different societies around the globe (Curry, 2019). From these seven cooperative directives we can derive the nuclear rules of morality (Curry, 2022), which nonetheless might lead to more complex moral values if combined, e.g., values like 'diplomacy' are based on ideas of helping your group and dividing disputed resources

(Curry, 2021). While we believe that Curry has shown that we may be genetically disposed to regularly act based on cooperative feelings, the theory of Morality-as-Cooperation (MAC) does not fully ground moral value. We can only argue that we may derive objective moral principles from cooperative rules if we can demonstrate that adaptive value is morally relevant. While Curry has defined morality as a social technique to better promote cooperation and avoid social conflict, by not making a case for the moral value of fitness he fails to ground moral value in cooperation. Furthermore, moral value seems to go beyond the value of survival and reproduction (cf. Singer, 1980; Foot, 2001; Collier and Stingl, 2019). In conclusion, I will argue that, while Curry's work is of empirical importance, it lacks a proper metaethical structure. Only if we argue that adaptive value is always morally relevant in defining moral good (which seems to be an implausible account), can we also affirm that there is normative power in MAC.

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**Gal Yehezkel**
Sapir Academic College, Israel

**Why the one-asymmetry approach cannot explain the arrow of time**

It is commonly believed that a scientific explanation has been found for the asymmetry of the second law of thermodynamics. This explanation consists, beyond the fundamental laws of nature, of nothing but a postulate about statistical mechanics coupled with a hypothesis about a boundary condition of the universe, commonly termed the "past hypothesis."
The thermodynamic time asymmetry is important for explaining a variety of different phenomena, and some have attempted to rely on this approach to explain other asymmetries in time (see, for example, Albert (2000); Carroll (2010); Dowe (1992); Grünbaum (1973); Loewer (2012)). Although there are criticisms of this approach, these usually focus on the past hypothesis (see, for example, Price, 2004; Winsberg, 2004; Earman, 2006; Gryb, 2021). Nevertheless, this strategy for explaining the second law of thermodynamics is so accepted that it is described as a dogma in the philosophy of science (Earman, 2006, p. 399).
In this paper, I claim that the one-asymmetry approach is in principle unable to account for any asymmetry in time. My argument relies on the fact that the statistical postulate,

which lies at the heart of this account, seems to imply that the entropy of a closed system should increase not only in the future, but also in the past – a problem usually referred to as the "reversibility paradox." However, the past hypothesis, which was introduced as a means for saving the statistical postulate from being undermined by experience, can only solve the reversibility paradox at the price of making this postulate vacuous. Instead of explaining the second law of thermodynamics, the one-asymmetry approach is found to be a simple statement of brute fact – that the entropy of the universe is increasing over time.

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**Giacomo Zanotti; Daniele Chiffi & Viola Schiaffonati**
Polytechnic University of Milan

### AI and risk: a philosophical analysis

A great deal of attention has recently been devoted to AI-related risks, with the European proposal for the AI Act explicitly adopting a risk-based approach. However, discussions on AI-related risk have so far largely ignored the philosophical and scientific literature on risk, and they rarely build upon a proper conceptualization of this notion. This paper aims to fill this gap. First, we discuss the main characterizations of risk, focusing on the one that is typically employed in the policy literature on risk mitigation and conceives of risk in its different dimensions of hazard, exposure, and vulnerability. Then, we apply this three-dimensional analysis to risks stemming from the use of AI systems, providing a ground for AI-related risk analysis. We proceed by showing that, when it comes to AI systems, different kinds of risk are involved. In addition to loss of lives and material damage, the use (and misuse) of AI systems can involve social risks – most notably, AI systems can incorporate forms of bias and exacerbate discrimination. We conclude by arguing that ex-ante characterizations of AI-related risks, such as the one at the basis of the proposal for the AI Act, show severe limitations, for technological development in AI is extremely rapid and the deployment of AI systems often generates contexts of uncertainty. Our fine-grained conceptual analysis enables a better characterization of AI-related risk and thereby more effective mitigation policies.

**Gil Santos**
CFCUL, University of Lisbon

**Downward Causation in Social Neuroscience**

In this talk, I will argue for a relational account of downward causation (DC) in terms of both its transformational and conditioning effects. Specifically, I shall contend that DC can avoid the main problems traditionally attributed to it, provided that we are able to reconceptualize the notion of whole and that form of causality in a purely relational way. In the second part of the talk, I will show how social neuroscience has been thinking in terms of DC, particularly when studying the impact that 'socioeconomic status' has on the brain and cognitive development of children.

**Gonçalo Martins**
CFCUL, University of Lisbon

**Analysing Niche Construction in a termites' colony according to a processual perspective**

The need of an alternative version to the substantialist perspective that has permeated the Life Sciences should be considered. Process philosophy can be the alternative, providing a conceptually different worldview, grounded in the idea of process, instead of autonomous, essentialist, and well-defined substances. Accordingly, and assuming an epistemic strand of process philosophy, based on the idea that the notion of process provides the most appropriate conceptual instrument for understanding the world, ecological interdependencies can provide a strong empirical motivation for a "process turn" in the life sciences.
The observed interdependence in the living world requires that living entities should be studied as relational entities, being influenced by the environment and able to modify it. The Niche Construction Theory, in recognizing the capacity of organisms to modify their own niches, through their metabolism, activities and behaviours, has provided good theoretical and empirical results in the explanation of ecological phenomena and of some evolutionary phenomena. Departing from the working hypothesis of a processual philosophy in ecology, through the Niche Construction Theory, it should be explored the possibility of integrating ecology and evolutionary biology, thus advocating that the living world is better understood as an entanglement of ecological and evolutionary processes, such as Niche Construction and Natural Selection.
An example concerning the extended physiology of colonies of mound-building termites can illustrate the Niche Construction Theory in a processual perspective. The regulation of the mound's atmosphere, through the termites' ecosystem engineering, exemplifies the continuous construction of a dynamic adaptive structure, which challenges some assumptions of substantialist philosophy. Instead of being characterized by the discrete individuality, separateness and passivity of the termites, the continuous homeostatic effort of the termites should be understood, in an epistemic processual stance, by the persistence of their activity, which requires prioritizing wholeness, dynamicity and interactive relatedness.

**Guido Tana**
ArgLab-NOVA, Lisbon

**Dogmatism, Knowledge, and Factivity**

Knowledge breeds dogmatism. This appears to be the paradoxical consequence of knowledge entailing truth. It implies that if S genuinely knows p, then S is entitled to reject a priori any counterevidence against p as misleading. However, such a stance appears irrational because unrestrictedly dogmatic. It appears intuitively impossible to dismiss beforehand all future counterevidence to our knowledge-claims.
This presentation analyses and assesses some proposed solutions of the dogmatist paradox and presents a possible, albeit revisionary, way out. Specifically, whether it really is irrational to be dogmatic in the way described above, and whether it is possible to utter genuine knowledge-claims while allowing for knowledge defeasibility. It is argued that both approaches fail to solve the paradox.
The former delivers a picture of knowledge ill-suited for human beings. In order to argue for this, cases from the history of science are examined to show that even in cases where it would have seemed reasonable to be dogmatic, the best course of action remained to reject dogmatism.
The defeasibility strategy is then shown to fail in not being able to explain the impermissibility of endorsing a dogmatic stance once knowledge is obtained, except by appeal to arbitrary sotto voce clauses. Finally, the attempt of fallibilist accounts of knowledge to detach knowledge from certainty are shown to fail on similar grounds. Fallibilism cannot satisfactorily deal with concessive knowledge attributions. Cases from science and ordinary language use show how concessive knowledge attributions defeats knowledge-claims.
The analysis understands the paradox as a dilemma: either we can explain how dogmatism is rationally avoided while endorsing our knowledge-claim or revise the factivity condition. In the conclusion of the talk some possibilities concerning this latter route are investigated. Taking inspiration from contemporary accounts of scientific knowledge, a pragmatist take on the factivity condition is suggested.

**Hernán Bobadilla**
Polytechnic University of Milan

**Interpretation in Model Explanations: A Case Study in Explaining Seismic Phenomena**

Interpretation plays a central role in using scientific models for explaining phenomena: Meaning must be bestowed upon a vehicle in terms of what it is and what it stands for in order to be used for model explanations. However, it remains unclear how capacious and complex interpretation in models can be, particularly when conducted by the same group of scientists in the context of one explanatory enterprise. This paper sheds light upon this question by means of examining modelling and explanatory practices in the contexts of the Olami-Feder-Christensen (OFC) model of earthquakes. This case study shows that various interpretations can be intricately intertwined in the overall meaning of a model used for model explanation.
My analysis focuses on two interpretative tasks, namely conceptualization and denotation. I submit that the conceptualization of the OFC vehicle is threefold: as a cellular automaton, as an imagined two-dimensional spring-block system, and as a computer

simulation. I also submit that the denotative function of the OFC vehicle comprehends three distinct targets, namely seismic faults, Burridge-Knopoff's original spring-block model of earthquakes and nonconservative self-organized critical systems in general. At different passages in their papers, OFC emphasise one or another conceptualization and denotative function in their model, mediated by recognized internal mappings.
My analysis of the OFC case leads to a manifold picture of interpretation, according to which scientific models are construed as networks of interconnected meanings. The pondered integration of these various interpretations, guided by locally attended explanatory commitments, leads to model explanations with layers of content, both in their explanantia and explananda. The various conceptualizations provide content for the explanantia. And the various denotations provide different content for the explananda. At different moments, one or another content can be highlighted, but they are interrelated through internal mappings.

**Janko Nešić**
Institute of Social Sciences, Belgrade

**Attuning the World: Ambient Smart Environments for Autistic Fields of Affordances**

Autism spectrum disorder is a condition characterised by social and non-social core deficits in social interaction and communication, repetitive patterns of behaviour, and hyper- or hyporeactivity to sensory input. Affordance-based Skilled Intentionality (Rietveld, Denys, & van Westen, 2018) that combines enactive and ecological views of cognition with the Free Energy Principle and Predictive Processing was proposed as the framework from which to view autism (Nešić, 2023) integrally. Skilled Intentionality distinguishes between a landscape of affordances (sociomaterial possibilities for a species) and a field of affordances (inviting possibilities for an individual in a situation). Bodily normativity refers to "the organism's evaluative capacity" (Toro et al., 2020) that guides the organism's behaviour in attuning to the environment. The ecological-enactive approach shows that autistic differences in bodily normativity and their field of affordances stem from aberrant precision estimation (Constant, Bervoets, et al., 2018; Nešić, 2023). Autistics over-rely on the precision afforded by the environment - a stable ecological niche they build. It is argued that autistics have a narrow field, with shallow temporal depth and great intensity and affective salience of the affordances that do come up in the field. In my talk, I will build on the ecological-enactive account of autism to suggest that one therapeutic way to shape the autistic field of affordances and help alleviate ecological problems (environmental volatility with which they cannot cope) is through the use of Ambient Smart Environments (ASEs, interior environments permeated with smart technology). The understanding of ASEs as a meta-affordance that intervenes on the user's field of affordance under the Skilled Intentionality and Active Inference was put forward by White and Miller (2023). Taking the cue from autistic lived experience while supporting the niche construction style autistics resort to themselves, ASEs could help them minimise uncertainty and avoid some suboptimal behavioural patterns.

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**Jer Steeger**(*) **& Ray Pedersen**(**)
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### Complementarity as epistemic infringement

We argue that Bohr's philosophy of complementarity has historically operated as a vehicle for epistemic infringement. Leydon-Hardy (2021) defines epistemic infringement as the systematic contravention of the interpersonal social and epistemic norms that an agent takes to constrain their relationship to the infringer in a manner that may encroach upon their epistemic agency. The infringer often appeals to the very norm they are violating to justify their actions, steering their victim into radical self-doubt.
Roughly put, complementarity requires rejecting any visualizable description of quantum objects. In a different history, this rejection might have aligned with a norm that Duhem took to govern the practice of physics: the introduction of novel, symbolic meanings for terms like "place" and "speed" with the ultimate aim of increasing the precision of our commonsense descriptions. In our history, however, Bohr's complementarity served as a tool to undermine the commonsense understandings of laypersons and specialists alike. We can never know the full extent to which Bohr intended to use complementarity in this way. We argue, however, that regardless of Bohr's intent, the mechanisms of infringement served to increase his social and political capital while suppressing the uptake of epistemic goods from contributors outside of Copenhagen.
We focus on two historical case studies. First, we offer a reading of Heisenberg's Physics and Beyond that suggests Heisenberg took complementarity to function as a tool of infringement in his relationship with Bohr. Second, we examine Wheeler's trip to Copenhagen to advertise Everett's work.

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**João Pinheiro**
University of Bristol; CFCUL, University of Lisbon

### Holocultural Moral Psychology Supports the Mind-Dependence of Moral Normativity

In this talk we will argue that the properties that may ultimately characterize moral

normativity are mind-dependent. These purported properties include "inherent-authority", "universality", alongside any others appealed to in descriptions of moral normativity as "queer" [sensu Mackie 1977; cf. Olson 2014] and as necessary or sufficient properties of moral normativity [vide Stich 2018 and Gert & Gert 2020]. We will argue that these are mind-dependent in the sense that they are presented to us in virtue of our deeming a norm to be moral. The evidence for the metanormative thesis comes from holocultural moral psychology studies revealing individual and group differences in the determination of the scope of the moral domain [e.g., Sachdeva et al. 2011, Wright et al. 2013, Sinnot-Armstrong & Wheatley 2014, Buchtel et al. 2015, and Levine et al. 2022]. That is, there is widespread disagreement as to what norms, judgements, or behaviours count as moral in contrast to non-moral (e.g., conventional, prudential, social, religious, aesthetic, inter alia). Nevertheless, there are still noticeable trends within cultural groups, hinting at a probable cultural etiological explanation for the differential development of the moral domain. Based on this evidence, we will argue that the best explanation for the fact that different people may agree with a norm but nevertheless disagree as to whether that norm is moral is that moral normativity is presented to us as a function of still ill-understood sociocultural conditions affecting the development of domain-general and social-domain-specific normative cognition and conation. The robust realist alternative according to which moral normativity is a quality of moral norms themselves or of some hypothetical normative facts will be shown to fare awkwardly against this evidence.

**João L Cordovil**
CFCUL, University of Lisbon

**Towards an Emergentist Interpretation of Quantum Mechanics**

In the literature we can find several ways of formulating the measurement problem of Quantum Mechanics (QM). For instance, according to Ladyman and Ross (2007: 180-181), following Maudlin (1995:7), the measurement problem can be presented as a trilemma:
1. All measurements have unique outcomes
2. The quantum mechanical description of reality is complete
3. The only time evolution for quantum systems is in accordance with the Schrödinger equation.
The problem is that QM often attributes to quantum objects superpositions with respect to the properties that we can measure. We do not seem to observe the superposition of macroscopic objects like measurement devices contradicting (1), and so we have a problem if we continue to assume that the particle and the apparatus really don't have definitive states in accordance with (2), and that the time evolution is always in accordance with (3). (2007, p. 180-181)
Another way of putting the measurement problem is: "If quantum theory is meant to be (in principle) a universal theory, it should be applicable, in principle, to all physical systems, including systems as large and complicated as our experimental apparatus". (Myrvold, 2018) However, this leads to the following:
"a state in which the reading variable and the system variable are entangled with each other. The eigenstate-eigenvalue link, applied to a state like this, does not yield a definite result for the instrument reading."
So, despite the diversity of formulations (and solutions) of the measurement problem, it is standard to assume that QM is a universal theory and, therefore that, classical properties are metaphysically reducible (or identical) to quantum properties.

Nevertheless, do we need to accept this assumption?
This paper aims to i) analyse the micro-reductionist assumption of the universality of QM and its consequences in formulating the measurement problem of QM; ii) explore the possibility of an emergentist account of classical-quantum relationship, its feasibility and advantage.

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**Johan Soderberg & Evelina Johansson Wilén**
University of Goteborg

### (E)quality in research: Sex and gender perspectives as indicators of research quality

In 2016, the Swedish government mandated that public research councils integrate sex and gender perspectives (SGP) in the evaluation of the scientific quality of project proposals. Prior to this, interventions to promote gender equality in science focused on the approval rates of proposals by applicants of the underrepresented sex. The 2016 research bill sought to fix gender imbalances in the content of the research itself. Critics of the bill warned against the threat to academic freedom and the quality of research, while proponents welcomed a belated correction of systematic biases in knowledge production. In the presentation we examine those diverging claims, drawing on an analysis of the successful grant proposals submitted to two of Sweden's largest research councils during 2018-2021. The reframing of a political-ethical value, i.e., gender equality, to function as an indicator of research quality, invites a renewed reflection on the fact-value distinction. Our empirical findings suggest that the fear that academia would succumb to the hegemony of "gender theory", as expressed by critics of the research bill, was exaggerated. Nor is there much evidence in support of the proponents' claim that the bill would promote scientific innovation and novelty of research methods. The integration of SGP does not imply any significant challenge of science "as usual". Understanding grant proposals as a genre text, we argue that the way in which SGP is framed in the applications gives clues to the aspects of feminist epistemology that are taken to be palatable in the scientific community at large. We argue that applicants exploit the multiplicity of feminist schools and the ambiguities in the policy discourse in order to comply with the new rules while preserving their autonomy to select topics and methods of investigation.

**Johannes Mierau**
Witten/Herdecke University

### Bourbaki's Legacy in the Structuralism of Physics

Nicolas Bourbaki was once the epitome of structuralism. But his impact faded away about the time he published his formal specification of 'structure'. Since then more convenient approaches have completely superseded the Bourbakian techniques for reconstructing

mathematical structures. The aim of my contribution is to explain why the structuralists of physical theories still adhere to the Bourbakian concepts in spite of the existence of supposedly more promising alternatives. I identify two major incentives: 1) the attraction of the Bourbaki programme as outlined in the popular writings of Bourbaki and Dieudonné, and 2) the belief that Bourbakian structures are the most appropriate choice for the needs of physical theories, even though they may not be for mathematics.
A prominent figure of the first group was Patrick Suppes who aimed at writing "a kind of Bourbaki of physics showing how set-theoretical methods can be used to organize all parts of theoretical physics and bring to all branches of theoretical physics a uniform language and conceptual approach" (Suppes, 1969, p. 191). These ideas turn out to be misguided: The formal elaboration of Bourbaki's concept of structure could not accomplish any of these programmatic aims (Corry 2004).
The second motive applies exclusively to the structuralism of physics. I will argue that it constitutes a sound justification to stick to this seemingly outmoded approach. Structures in theories of physics are generally more complex than fundamental mathematical structures. They are built on multiple base sets, and involve higher order relations, which can be constructed with ease using Bourbaki's echolon schemes. Furthermore, the intricate relations between physical theories cannot be described adequately in terms of logical implications or functors between categories. A foundation on set theory permits to rigorously define limit and asymptotic relationships that are crucial for current debates in philosophy of physics.

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**José Ferreirós**
University of Seville

**A conceptualist take on structuralism**

This paper defends a conceptualistic version of structuralism as the most convincing way of elaborating a philosophical understanding of structuralism. The tradition of “conceptual mathematics” in the period 1850 to 1940 (Riemann, Dedekind, Hilbert, E. Noether) led to a structuralist methodology in pure mathematics. But there is a tension between the ‘presuppositionless’ approach of those authors, and the platonism of some recent philosophical versions of structuralism. I argue that one can resolve this tension, admitting ‘logical objects’ understood in minimalist terms, interpreted from a semiotic point of view, and introducing the basic tenets of conceptual structuralism. The paper is devoted to an open discussion of the assumptions behind conceptual structuralism, including arguments to show that the objectivity of mathematics can be explained from the adopted standpoint – without denying that advanced mathematics builds on hypothetical assumptions (Riemann, Peirce, Hilbert).

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**José Ramalho Croca**
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**Complex Relational Physics Nonlinear Quantum Physics and Eurhythmic Physics**

Traditional science, namely physics, explicitly assumes a mereological linear posture and even more important that absolute knowledge is, at least in principle, possible. This absolute knowledge in physics is traduced by the so-called laws of Nature, that absolutely rule physical phenomena. With the advent of quantum physics things start changing, even if orthodox quantum mechanics still assumes that some of its claims are absolute, such as for instance, Heisenberg indetermination relations.
Nonlinear relational quantum physics, initiated by Louis de Broglie and eurythmic physics, assume from the very start that physical phenomena are very complex and consequently, what we do have are mere representations, more or less adequate and nothing more. In such conditions, a statement that is adequate at a certain scale of description of Nature, at other scales, may prove to be inadequate. Furthermore, it is also assumed that there are no true absolute facts. The so-called facts are only meaningful in a given conceptual universe. To take in consideration this situation, a nonlinear complex relational science, in which the concept of interaction plays a most important role, has been developed. In such a global framework, interaction is the basic process experienced by a physical system of inducing modification in other systems and consequently of being modified to a more or less significant degree. Furthermore, it is assumed that absolute concepts, such as for instance, determinism and indeterminism are only mere ideal extreme dialectical notions. Any happening does occur somewhere in between them. A happening, a fact, only reaches its meaning in a given inter-relational conceptual universe.

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**José Alejandro Fernández Cuesta**
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**The Logical Structure of Physics: implicit limits of the structuralist proposal and explicit challenges from quantum-logical developments**

This communication will analyze the formal presuppositions implicitly assumed in the classical structuralist proposals of Sneed (1971), Balzer et al. (1987), Stegmüller (1979) and Moulines (1996). First of all, a number of problematic assumptions will be made explicit

(choice of concrete conjunctive axiomatics, equivalence between intensive and extensive predicates or commitments to a project of relevance) but, above all, attention will be paid to the assumed methodological circularism.
After enumerating these limits and possible self-contained problems in the classical structuralist programs, I will proceed to pose a different challenge based on recent developments in the study of quantum logics and their philosophy. The lattice structures (Birkhoff and von Neumann (1936), Svozil (1998)) and the latest highly promising developments (especially the families of consistent histories of Griffiths (2002, 2013, 2019) and quantum logical gates, Chiara et al. (2018)) place a serious limits on the structuralist formalization and analysis methodology making the burden of proof now fall on the structuralist philosopher of science.

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**José Antonio Pérez Escobar**
École Normale Supérieure, Paris

**A normative role of mathematical models in measurement**

Biological phenomena display variability and historicity and are inherently "messy". To improve the reproducibility of experiments and develop a quantitative, rigorous biology biologists resort to numerous measurement strategies to control the messiness of biology. Measurement is key for quantification and involves a sort of order making. Although biology can be ordered in different ways that influence model building, the aim is to build models that represent real, empirical structures.
However, in their efforts to measure and mathematize messiness, scientists may also inadvertently use mathematical models in a way that culminates in epistemic circularity. Mathematical models can be used as rules on how to perform measurement instead of mere outputs of measurement and representing empirical structures. For example, they may be source of quantitative expectations on empirical phenomena, and a failure of the latter to adjust to the model may lead to questioning the measurement procedure. The

same mathematical model can be used in a way or another depending on contextual nuances.
I present a case study on the brain's "compass", a brain system which encodes the facing direction of mammals. It is comprised of "head-direction" cells, each of which encodes a given angular direction in its electrophysiological activity. The early measuring of this cells is performed according to a compass analogy and yielded a mathematical model, inspired by the compass analogy too. However, subsequent measurement is influenced by the mathematical model itself, which places quantitative expectations on the cells' activity. If the two do not match, the model can be revised, but also some cells may be excluded from analyses ("monster barring") and others are measured in ways so that the model is fulfilled (mathematical model as rules of description instead of descriptions). I discuss what kind of contextual nuances in the scientific practice prompts each use of the mathematics.

**Joshua Ben Itamar**
Independent scholar

**Berkeley's Criterion Of A Mechanist View and His Attack on The Mechanist View**

One of the main criteria for describing the argument between mechanistic and anti mechanists in the 17th and 18th century is the mathematization criterion. According to this criterion the mechanist view demands mathematization of the scientific explanation. Not only that science should use mathematics, according to the mechanist view, but the basic concepts of science should be mathematical. This criterion does not fit the criterion which is implied from Berkeley's writings. According to the criterion of a mechanist view as implied from Berkeley's writings, a mechanist view is one that explains all natural phenomena, assuming material causes only. In this argument Berkeley is defined as an anti mechanist
Berkeley claims that the material world is a collection of sensual ideas that are perceived by us. These ideas exist in our mind. He also claims that the ideas are passive. An idea is merely a sign for another idea, and not the cause of the formation of another idea. Berkeley claims that the term "Force", which scientists use to designate the cause of motion, does not represent a real quality but a mathematical fiction. This view is called " Scientific Instrumentalism". Science does not deal with material causes according to Berkeley's view. The universal mind (God) is the real cause of natural phenomena, "planting" the regular ideas referred to as '' nature''. Still minds and God should be dealt with in metaphysics. A scientific explanation is, according to Berkeley, a reduction of phenomena to laws of nature. Although Berkeley executes a full mathematization of the term "Force", he did not argue that the mathematization criterion is the criterion of a mechanistic view.

**Juan Hermoso Durán**
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**How (not) to be a faux materialist. Sense and reference in scientific reduction**

The notion of faux materialism was introduced by Strawson (2019) as part of his argument that both philosophical behaviorism and functionalism are in fact forms of eliminativism.

Among those accused of faux materialism is David Lewis, "[…] simply one of the most distinguished of the many false materialists who claim that […] the mind-body (mind-brain) identity theory is true in some version, but who also believe that […] to believe in the existence of consciousness is to deny the identity of mental phenomena and physical or bodily phenomena" (Strawson, 2019: 25). Thus, Lewis would be denying implicitly what he defends explicitly, "[..] that mental states are contingently identical to physical –in particular, neural– states" (Lewis, 1995: 219) –as would, each in their own distinctive way, all philosophical behaviorists, mind-brain identity theorists and functionalists. Lewis, then, if Strawson is right, does not believe that mental states are brain states: he denies the existence of mental states.
Strawson's argument, I will argue, rests on a rather demanding construal of reduction: while Lewis makes the distinction between reduction and elimination turn on semantic decisions concerning a spectrum of coincidence between folk concepts and scientific concepts, Strawson seems to require that the scientific account of any given phenomenon –or at least of conscious experiences, which might be a special case in this regard– maintains each and every one of the properties that we attribute to the phenomenon in our commonsense intuitions; unless this is so, there would be no reduction, but elimination –in Strawson's terms, "Denial". The purpose of this work is to assess the prospects for both ways of understanding reduction (and elimination) from the standpoint of van Riel's (2010, 2013, 2014) arguments that the reduction relation involves not only phenomena but also concepts –alternatively, not only Fregean references but also senses.

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**Klaus Gärtner**
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**The Science of Consciousness in the Era of AI – Can we expect something new?**

Most of the time we cherish consciously experiencing the world. Eating ice cream, seeing a beautiful sunset or listening to the sea are only a few examples of our rich phenomenology that makes life worth living. However, when it comes to explaining this so-called phenomenal consciousness, we often feel deeply puzzled. Phenomenal consciousness has resisted its integration into the natural order of scientific research. The fact that phenomenal properties are considered to be intrinsic and qualitative has caused many to believe that the Hard Problem of Consciousness (Chalmers 1995) reveals the impossibility of this endeavor. However, with Artificial Intelligence (AI) research thriving, the question is can we expect something new?
My answer, here, is 'yes, we can expect something new', but it is different from what one would anticipate. I will explore the idea that our ever-deepening interaction with AI may

require us to rethink the traditional framework in which we consider consciousness; and this has consequences. Usually, we look at consciousness through the lens of the Mind-Body Problem (Descartes 1991, 1998), i.e. by trying to reply to the question how consciousness and the body interact. In the time of AI, however, it may be time to revise the frame of reference and consider the so-called Mind-Technology Problem (Clowes, Gärtner and Hipólito, 2021). The Mind-Technology Problem claims that we need to re-conceptualize the nature of the mind and its relationship to technological artifacts by asking ourselves how the mind is transformed, extended and enabled by smart technologies. For consciousness this means that the problem about how to naturalize phenomenal properties may be pushed back and questions about the limits of consciousness become more salient. I will exemplify this idea by discussing the implications.

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**Laurie Letertre**
Warsaw University of Technology

**Temporal nonlocality from indefinite causal orders**

Previous works explored the possibility of a genuinely temporal counterpart to Bell nonlocality, one that would refer to the presence of non-classical correlations between timelike-separated events. This paper argues that famous existing proposals do not properly target an adequate notion of nonlocality along the temporal dimension. It is proposed to focus instead on a more recent definition of temporal nonlocality provided by [Adlam, E. (2018). "Spooky action at a temporal distance." Entropy 20(1), p.41]. This paper explores to what extent causal nonseparability is a necessary ingredient to Adlam's temporal nonlocality, and can therefore be used to test that principle. It is explained how indefinite causal orders allow testing standard Bell nonlocality, noncausality of processes, and Adlam's temporal nonlocality, which allows clarifying the relation between these notions. Finally, contrary to what has been claimed in the literature, it is argued that, while the presence of temporal delocalisation of quantum systems is frame-dependent, a model-independent detection of temporal nonlocality can still be obtained.

**Liberty Severs** (1)**; Jesper Rørvig** (1)**; Tania Couto** (2)**; Ana Paiva** (3)**; Raquel Oliveira** (4)**; Miguel Faria** (3)**; Filipa Correia** (ITI LARSys)**; Anna Ciaunica** (1,5)
(1) FCUL, University of Lisbon; (2) Hong Kong Polytechnic, Faculty of Humanities; (3) IST, University of Lisbon; (4) ISCTE-IUL; (5) UCL

**Embodied Joint Agency and Human-Robot Interactions**

Artificial Intelligence-based technologies such as robots are developing at an unprecedented speed in our societies, considerably impacting human lives. In order to better understand this impact, we need to investigate the effect of interacting with these technologies on human mental and social lives. This project will focus on the relationship between the sense of embodied selfhood and social joint agency in human-human versus human-humanoid robot interactions. In doing so, behavioral, physiological, self-reports and neural data will be collected during a joint task performed in dyads of either two humans or a human and a humanoid robot. The results will further our understanding of how humans are affected mentally and socially by interacting with artificial agents.

**Louis-Étienne Villeneuve**
University of Cambridge

**Colligations in the historiography of science**

In this presentation, I will show how we could get new inputs on historical writing in the history of science by introducing into our philosophical lexicon the notion of "colligation". As historians of science constantly rely on colligatory concepts (i.e. concepts that bring together different historical entities under a general idea, such as "scientific revolution", "scientific tradition", "research programme", "contemporary science", "paradigm shift", etc.), the theorization of the meaning and justification of these concepts is actually beneficial both for the analysis of the historical explanation and understanding of past sciences. The introduction of the notion of colligation into the lexicon of philosophers of the history of science could benefit from many insights that can be found in general philosophy of historiography (Walsh 1974, Cebik 1969, Ankersmit 1983, McCullagh 2000, Kuukkanen 2015, Roth 2020). Three ideas inspired by these works, namely non-standardization, hyper-coherentism and agregativity, will be at the heart of this paper. Based on these ideas, some outlines of a general programme of analysis of historical writing will be presented.

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**Lucie Boël**
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### Developing an epistemological framework to study the role of ignorance in scientific research

The awareness of the qualitative and quantitative importance of ignorance in scientific research led to the emergence of various approaches to ignorance, which can be gathered under the general expression ignorance studies. Although these studies enlighten us on the socio-political causes and effects of ignorance, they pay little attention to the concept or the phenomena itself: its properties and conditions, its dynamics, and how scientists take it into account. I focus on the epistemic dimension of ignorance, and on the way it shapes scientific research. In order to apprehend its role in scientific inquiry, I argue we need a conceptual analysis of ignorance as well as a framework that will help us study ignorance-related phenomena in research activities (the latter is conditioned on the former). The development of this framework is essential to deepen our understanding of the dynamics of scientific inquiry. I draw my analysis of ignorance from the general literature on the subject and from recent literature in analytic epistemology. First, I present the main characteristics of Le Morvan's Standard View of ignorance – where ignorance is the absence or lack of knowledge – and why the implications of his model are counterintuitive. The model must rely on our intuitions about ignorance to serve as a tool in the study of scientific cases of ignorance. Then I suggest some ways to revise this conception so it aligns with this aim, such as the shift from logical to pragmatic arguments, and the addition of new principles based on intuition to evacuate the model's counterintuitive implications. Finally, I give an overview of the properties of ignorance, and of the model's applicability to an empirical case of scientific ignorance.

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### Genuine Understanding or Mere Rationalizations? Approximations and Idealizations in Science and XAI

The use of deep neural networks (DNNs) in high-stakes contexts has been criticized for

their opacity. Explainable AI (XAI) aims to address this by explaining DNNs' decisions for fair and trustworthy deployment. Local post hoc XAI methods, such as LIME, SHAP, and saliency maps, however, have been argued to offer mere rationalizations instead of genuine understanding (Rudin, 2019), leading to the "rationalization objection." Fleisher (2022) counters this objection by equating post-hoc XAI models with idealized scientific models (ISMs), which can provide genuine understanding despite misrepresenting their targets. Fleisher's account is based on (1) a reframing of the discussions about transparency, interpretability, and explainability in XAI in terms of understanding, and (2) some relevant features, centered around idealization, that are (potentially) shared by ISMs and post-hoc XAI models (i.e., simplification, flagging, and focus on specific causal patterns). In this contribution, I argue that Fleisher's optimism is based on a flawed analysis, and I present an alternative account grounded in key differences between approximations and idealizations, both in science and XAI. I conclude that, while the ISMs chosen by Fleisher as examples offer a genuine understanding of their targets, current local post-hoc XAI models do not, supporting the validity of the rationalization objection (which I properly formulate). As a result, it is advised to avoid post-hoc XAI methods, or use them with caution, in high-stakes settings, especially when inherently interpretable models exist. Although a comprehensive framework for determining when post-hoc XAI models can be said to provide a genuine understanding of DNNs' decisions is unavailable, this contribution provides essential clarifications for developing one.

**Marco Gomboso**(*) **& Daniel Heredia**(*)(**)
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**Determinism in current physics. Is it possible?**

We discuss the possibilities of determinism in natural processes, taking under consideration both quantum and classical physics. We present this firstly by questioning the supposed nature of quantum physics as non-deterministic, following the proposal of Penrose (1991): the collapse of the wavefunction as a particular measurement which seems to indicate certain contingency does not actually give the full picture of the reality of the former. Moreover, (in addition to what Penrose suggests) we consider this collapse as part of a bigger deterministic picture. Secondly, we analyse the distinction between this microphysical scenario and our macrophysical experience, in the light of determinism as well. We suggest that this experience can be understood as a particular "measurement" similar to what happens in quantum mechanics. For instance, the image of a person with certain identity features is a highlight or particularization of all the possibilities the identity of this person experienced, experiences and will experience through time. The "collapse" is thus linked to individuation, not less real, but incomplete of reality.
By linking the domain of quantum physics in a deterministic fashion to our macrophysical world, we aim to show that a non-contingent character of reality is possible when accepting measurements or particular instances of things as forms of comprehension given by the physical world (thus not just mere subjective interventions), for the complete picture (closer to the wavefunction) cannot give distinctive information (understanding this as differentiation of elements, such as particles in the microphysical domain and a certain colour in the macrophysical one). This allows for a possible reform in physics as we understand it nowadays.

**Margarida Hermida**
University of Bristol

### Alien trees

Unlike chemistry or physics, which feature universal natural kinds defined by intrinsic properties (e.g., electrons, chemical elements), biology has taxa – phylogenetic groups of organisms that share a common ancestor and evolutionary history. These groups are spatio-temporally restricted and defined by extrinsic or relational properties. This is equally true of species and higher taxa; thus there could be no alien plants, animals, or bacteria, any more than there could be alien tigers.
However, there are also universal – i.e., spatio-temporally unrestricted – natural kinds in biology, defined by intrinsic and functional properties. For instance, the kind 'photosynthetic organism' involves structural properties (membranes, molecules that absorb light) and functional properties (e.g., the capacity to carry out photosynthetic reactions). Independent evolution of photosynthesis in extra-terrestrial environments is to be expected wherever carbon-based life occurs and sufficient light is available. Atmospheric oxygen and photosynthetic pigments constitute promising exoplanet biosignatures, indicating that this natural kind is already used in astrobiology.
Something similar may be said of the natural kind 'tree' – land-based photosynthetic organisms supported by a rigid trunk. On Earth, nine lineages of land plants have independently converged on the tree morphology, and we should expect that, where land-based photosynthetic organisms face competition for access to light, trees will evolve. So, although, strictly speaking, there cannot be alien plants (because 'plant' refers to a phylogenetic group), there may be alien trees.
Should astrobiology eventually be successful in identifying instances of extra-terrestrial life, biological classification would be twofold: a phylogenetic classification of each independently originated tree of life; and a universal classification of organisms, based on properties such as energy acquisition and ecological role. Such a universal classification would encompass organisms with different origins, evolutionary histories, and biochemical composition, and would be appropriate for a truly universal biology.

**Mariana RP Alves**
Cartas com Ciência and CIDTFF, University of Aveiro

### Becoming Oscillation: Contemporary dance and developmental biology meet through philosophy exchange

Art and science (or art-science) initiatives are becoming ever more prevalent, more popularly through the pairing of artists with scientists in a way to translate scientific and technological progress into a story that is comprehensible to the public. These can be considered "unidirectional dialogues", where artists are service providers and art-science used solely as a means to an end. Another possibility is to focus on interdisciplinary exchange, providing the art and science communities with a platform to share questions and perspectives on life in what could be labeled as a "bidirectional dialogue", that can also be shared with the public. Interdisciplinary dialogue is in itself a celebration of diversity. It presents interesting approaches for social inclusion (1). Creating opportunities for this dialogue to exist provides a counterweight to an incredibly polarized world (2) by promoting creativity and freedom to doubt, two core values shared between artists and

scientists. Sharing this dialogue with the public can inspire others and ourselves to break walls from the ivory towers we build in our own communities. This shared learning and interaction can offer unique perspectives to artists, scientists, institutions and the public.It is essential, however, to understand the implications of this dialogue between artists and scientists, on them and on society. In this communication, I will share the experience of how an interdisciplinary dialogue between Dance Theatre Heidelberg and the European Molecular Biology Laboratory (Germany) was born out of sheer serendipity and a shared passion for philosophy. Discussing how circumstances are found to build true bridges between art and science research-minded people who are pursuing similar questions from different angles, and promoting interdisciplinary endeavors could contribute to a society where the public is increasingly engaged and aware that fundamental scientific research and art together can enrich a plural but cohesive world view.

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**Marilynn Johnson**
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### A Journey to Lascaux: On the Role of Intention, Aesthetics, Emotion, and Ethics in Interpreting Prehistory

What does it mean to have access to prehistoric art? To what extend are the aims of archaeological science impeded by aesthetic attention to beauty? Drawing on a personal encounter with Lascaux cave as well as cognitive science research about aesthetic perception, I discuss the limits and possibilities of interpreting prehistoric art in the modern day. In doing so I consider the roles of intention, aesthetics, phenomenology, and emotion in archaeological interpretation—considering work by philosophers as well as archaeologists. I further present and defend a distinction between meaning and significance in interpretation that can help pull apart two interpretive questions that are often run together. Ultimately, I argue that the ethical issues must take center stage in these debates. For, the historical focus in archaeology on the most beautiful objects has often meant that the stories of the laborers whose work went into the production of these objects go untold. Again, in ethical debates the distinction between meaning and significance in archaeological interpretation proves vital.

**Marta Esteves**
Munich Center for Mathematical Philosophy

### A second-order Theory of structures for Group Theory: an argument for non-eliminative structuralism

In line with the aims of non-eliminative structuralism in the philosophy of mathematics, in this paper we present a second-order axiomatization of groups as sui-generis structures. This approach is inspired by Stewart Shapiro's (1991) defense of second-order logic as the

logic of (sui-generis) structures, and by Leitgeb's (2020) second-order axiomatization of graph theory, which also presents unlabeled graphs as this type of structures. Continuing this line of research, we show how the main theorems and definitions of group theory can be understood as statements about groups as sui-generis structures, and how this supports the argument in favor of non-eliminative structuralism. We also present general results regarding how fundamental mathematical notions, such as those of a free object, a product, or a quotient, can be understood by means of a general second-order theory of structures.

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**Martina Valković**
Leibniz University Hannover; Radboud University Nijmegen

**Cultural evolutionary theories and their limitations**

The last decades have seen a rise in the application of concepts and methods from biological evolutionary theory to human cultures and societies in an attempt to explain their change and complexity. In these cultural evolutionary theories, culture is conceptualised as information mainly stored in individual humans. Culture is broken down in distinct cultural traits which are transmitted from one individual to another and vary in respect to their "fitness". Cultural change is then the resulting change in the frequency of cultural traits.
In this talk, I offer some arguments against this type of view by using Mesoudi (2011) as a case study. Even though the criticism focuses on one theory, the arguments also apply to other theories that espouse similar ontological and methodological assumptions, to the extent that they do. I claim that Mesoudi's ontological assumptions about cultures and societies are dubious, and that his methodological assumptions, which follow directly from his ontological ones, are inadequate when it comes to addressing cultural and social phenomena. Since cultural evolutionary theories espouse a particularly strong version of methodological individualism, they are oblivious to the consequences of the fact that human societies are not just aggregates of individuals, but rather structured wholes. While social groups may be constituted by people, this does not mean that people determine all the facts about groups or that the social world completely depends on individuals. Social structures could themselves be causes, and not completely reducible to individual actions. A simplistic view of societies as little more than aggregates of individuals also leads to overlooking the importance of power inequalities in social and cultural change, making this a significant blind spot. A consequence is that this approach to the study of human culture is, at the very least, incomplete and applicable only to limited cases.

**Mattia Petrolo**(*); **Daniele Chiffi**(**); **Viola Schiaffonati**(**); **Giacomo Zanotti**(**)
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**Two Dogmas of Trustworthy AI**

A lot of attention has recently been devoted to the notion of Trustworthy AI (TAI). Our aim here is twofold. First, we survey the philosophical debate on TAI and contend that the prevailing views on trust and AI fail to account for some crucial aspects of the design and use of AI systems. Secondly, we put forward an original proposal that avoids these shortcomings. The current debate on TAI largely boils down to the dichotomy between two alternatives, neither of which is completely satisfying. Purely epistemic accounts of trust, which take trust to be a matter of rational choice and probability estimation, allow one to make sense of the notion of TAI but fail to distinguish TAI from merely reliable AI - a distinction that is usually deemed essential. Motivational accounts of trust, instead, focus on the motivations and moral obligations of the trustee and clearly distinguish trustworthiness from reliability. However, given that AI systems hardly possess motivations and moral obligations, the notion of TAI turns out to be a categorical error. In both cases, the notion of TAI somehow reduces to that of reliable AI. We argue that this outcome is undesirable. AI systems are not ethically neutral: the notion of TAI should allow us to go beyond mere reliability and consider critical ethical dimensions involved in the design and use of AI systems. In our view, the current philosophical debate builds upon two dogmas, namely that (i) trust in AI should be modeled on interpersonal trust and (ii) the attribution of trustworthiness to AI systems should be understood literally. By dropping both dogmas, we provide an alternative framework that insists on the importance of a notion of TAI that captures the epistemic and non-epistemic dimensions of the design and use of AI systems.

**Michalis Christou**
Johannes Kepler University

**Non-transitive identity in the quantum realm: Many worlds, one identity relation**

According to the Many Worlds Interpretation (MWI), a world-system initially in a superposition of two states, after measurement results in two worlds where each state obtains respectively: world A splits into world B and C. The issue here is that the transitivity of identity fails because A=B, A=C, but B≠C. Two approaches are studied. Wallace's (2012) worlds as four-dimensional entities stretched over time, so that the relationship is not one of identity but of one temporal parthood, I think results in odd worm-like unintuitive entities. In the second approach, I consider Bader (2021) which rejects that identity is a one-to-many relation. For him the initial world is identical to only one of the two resulted worlds and this as a brute fact, that carries no further explanation. But I find this to be insufficient because its explanation is asymmetrical.
My account of world identity is paraconsistent and, in sense, more intuitive: following measurement, if world C was annihilated right after, it would be the case that world A just is world B (and vice versa). This follows the normal progression of identity and preservation.
I follow Priest's (2010) logical framework which defines identity as the material biconditional: w=w1 is defined as $\forall P(Pw \equiv Pw1)$. This logic has values t (true only), f (false only) and b (both true and false) and the material biconditional is not transitive, so identity

is not as well. To see this, consider A that is b, B that is t, and C that is f. In this case we have A≡B, A≡C but ¬(B≡C). Also, in this setting, logical explosion does not follow from the failure of transitivity. Giving up the transitivity of identity is hard to accept, but paraconsistent identity further provides explanation for natural cases of fission and vagueness.

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**Nadja Meisterhans**
Karlshochschule International University

### From Paranoia to Utopia? Psychoanalytical-philosophical reflections on performative-surrealist crisis-solving in times of multiple crises

The aim of the presentation is to outline in a perspective of a queer-feminist inspired critical theory in what sense psychoanalysis can be understood as political philosophy that can inform about the structural origins of societal regressions that can even take a mass psychotic form. The presentation addresses the question, whether the past corona crisis management has reinforced authoritarian desires and created a fertile soil for the belief in conspiracy. How can the belief in conspiracies be understood psychoanalytically and socio-theoretically and what role do populism and ideology play in this? A central thesis of the presentation is that the crisis of (neoliberal) (post-)democracy, which has been intensively discussed for some years, can also be interpreted as a crisis of critique. This is followed by the thesis that this crisis has a root in a diffuse societal discomfort in neoliberal culture, which at the same time forms a breeding ground for mass psychotic modes of reaction. Despite these seemingly pessimistic interpretations, the last part of the presentation will show, from a dialectical perspective and with reference to Salvador Dali's paranoid-critical method, under which conditions collective paranoia can be sublimated into a dystopian wake-up call that stimulates social reflection. Following Ernst Bloch, it will be also discussed whether civil society based scandalizations and performative protests that negate the status Quo are motivated by latent, i. e. not yet conscious, utopian desires that can be imaginatively transformed into manifest concrete utopias based on artistic forms of action and protest. The presentation thus draws on contemporary utopia-theoretical debates in (queer) feminist contexts and asks whether ideological interpellations can be subverted by dystopian narratives and artistic performance practices inspired by Dali's critical paranoid method.

**Nino Guallart**
University of Seville

### Dialogical games with modal logic with probability

In this work, we will follow Shahid Rahman's modal dialogues and we will propose a variation of them for probability operators, both in its objective (stochastic) and its subjective interpretation (doxastic), and for generalisations of the latter such as

Dempster-Shafer theory. Probability modal logic is a non-normal, monotonic logic, but a special one in the sense that it defines a probability distribution, so certain rules in order to follow the axioms of probability have to be considered. To achieve this, the talk will be divided into two parts: Firstly, we will introduce the system itself, defining a series of new rules for dealing with probability metrics, and also introducing a generalisation of contexts in dialogical games that we will call "hypercontexts". The second part of the talk will be the logical and philosophical justification of the creation and use of these hypercontexts, in particular for subjective logic and its variations (mainly Dempster-Shafer and subjective logic). We will defend that the use of hypercontexts instead of contexts allows defining imprecise probabilistic beliefs, and thus permit us to play modal dialogues in which agents state probabilistic beliefs with a certain degree of uncertainty. To close the talk, we will show the link between this dynamical approach to probabilistic modal logic and a more traditional model-based semantics, in which the use hypercontexts has a similar relationship with neighborhood semantics as contexts to Kripke semantics. Although having different approaches, in this case the dynamical and the model-based semantics have to agree in a fundamental issue, probability is deeply connected to classical logic, and this has to be reflected in all its possible logical interpretation of probabilistic formulas.

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**Nuno Miranda e Silva**
University of Evora

**The absence of epistemic peerhood in Education Sciences: notes on methodological impacts**

Epistemic peerhood reflects concerns about the impact that errors can have on humanity. Underlying it is the questioning of what happens when people with similar levels of training, understanding, and access to data come to different conclusions (Frances, 2010; Gelfert, 2011; Kelly, 2005), which holds the suggestion of error or at least incomplete theory construction.
However, what concerns emerge in scenarios where agents who are not epistemic peers nevertheless make similar conclusions? Or different conclusions? Is there, in any of these situations, error or suspected error? Will the situations require any rapprochement, compromise, or consensus?
This questioning is relevant in Education Sciences, because this essay suggests, that this scientific area is not subject to epistemic peerhood, since its agents do not assume similar values, interests and knowledge and they act from different contexts It proposes to analyze the consequences of epistemic peerhood absence on educational research, which is relevant because Education Sciences must question about what knowledge is and how it can be achieved. It approaches the constructs of education and Education Sciences under the lens of Complexity Theory (Silva, 2019, 2020), draws on epistemological perspectives that welcome the diversity and power of agents (Feyerabend, 1991, 2010; Harding, 1992, 2004, 2015; Longino, 1990), and mobilizes very preliminary data from an ongoing study on the epistemology of the Education Sciences, to suggest that the

absence of epistemic peerhood has methodological consequences leading to (a) dispensation of mimicry of scientific methods, (b) insufficiency of modest positions (attitudes of revisiting knowledge must be added), (c) the need for the uncovering of non-linear elements, (d) the impossibility of epistemic superiority at the outset, (e) praxical rather than epistemic peerhood, and (f) intersubjective assertiveness - and these become characteristics of the epistemic status of the Education Sciences.

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**Oliver Todt; José Luis Luján & Noemi Sanz**
University of the Balearic Islands

**Scientific Methodologies in Regulatory Science: is there an Optimum Choice?**

In this contribution we analyze the question if there is such a thing as a "best scientific methodology" in regulatory science. Regulatory science is the use of scientific methods and data for supporting decision making in the regulation of science and technology. The latter includes, for instance, the regulation of chemical substances, genetically modified foods, pharmaceuticals and health claims on foods.
On the basis of case studies of several regulatory processes, we argue that there does not exist any single best scientific method for generating decision-relevant data. In fact, we show that in regulatory science the most suitable methodologies often differ from what is considered "best practice" in academic science. What goes by the most adequate scientific method can and will –justifiably and rationally– vary according to context and use.
Our analysis shows that in regulatory science epistemic factors do not necessarily play the principal role in the selection of methods. Rather, often it is the non-epistemic objectives of a particular regulatory process which determine what counts as the most appropriate scientific method. And these non-epistemic objectives, in turn, may in certain cases be influenced by the needs and preferences of the relevant stakeholders (like, for instance, consumers or industry).
We conclude that –in spite of the influence of non-epistemic factors– methodological choices in regulatory science can generally be understood as rational choices. In addition, engagement of the regulators with the stakeholders is one possible strategy that might allow to minimize possible conflicts between regulators' methodological choices and stakeholders' non-epistemic objectives.

**Olivier Ouzilou**
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### Conspiracy Theory of Society and Structural Explanation

Popper (1972) characterizes what he calls the "conspiracy theory of society" (CTS) as a flawed method of explaining the existence of (a) alleged collective entities and (b) macrosociological realities (economic crises, wars, etc.). Generally speaking, adopting CTS consists in thinking that, in order to explain a social phenomenon, it is sufficient to identify the social agents with an interest in its occurrence and to infer the intentionalist explanation that seems to follow from this identification. According to Popper, understanding the inadequacy of CTS allows one to grasp the true purpose of social science and thus the relevance of methodological individualism (MI): CST indeed underestimates the complexity of social causality by focusing on teleological causality at the expense of analyzing the macro-aggregate consequences of individual actions.
I focus on (b) by asking: should the criticism of CTS necessarily be made from the postulates of IM? A different critique of CTS has, in fact, been outlined (Shalom, Albert, 2002; Cassam, 2019, 87): according to this so-called "structural" approach, the failure of CTS comes from its inability to understand institutional or systemic factors. I wish to deepen and defend this idea by showing that:
1/ the methodological failure of CTS comes from its inability to place itself at the appropriate level, i.e. non-individualistic, of explanation of a large number of social phenomena. A criticism of CTS from the point of view of methodological holism, and more precisely of "causal explanatory holism" (List, Spiekermann, 2013), is therefore possible.
2/ This approach is not only relevant but epistemically superior to the individualist criticism
3/ the holistic approach is a better antidote to CTS: it thematizes what is sometimes at the origin of conspiracy theories, namely the need to make sense of opaque modes of domination (Grewal, 2016), and can make false beliefs in conspiracies intelligible.

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**Pablo Caballero**
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### Hybrid Logic for the Analysis of Conceptions of Physical Time

Our paper addresses certain issues about the relationship between philosophy of science and formal logic (as a tool for conceptual analysis). We consider the extent to which formal

logic allows for a qualitative understanding (i.e., without the use of quantitative means) of the fundamental characteristics of different conceptions of physical time. Hybrid temporal logic [1] is used to axiomatically represent two central conceptions of time in the history of natural science, namely those of Newtonian physics (system N) and the theory of special relativity (system R). We thus follow Carnap's proposal in [2] to apply topological (non-metric) methods to the analysis of space–time. On the one hand, system N formalises the properties of Newtonian absolute time described in the well-known Scholium to the Definitions of the Principia [4], as well as the notion of time involved in Galilean transformations for inertial frames. On the other hand, system R formalises relativistic time by considering the concept of lightcone (central to relativistic space–time) as introduced by H. Minkowski in [3]. R is obtained as a modification of N by defining the properties of the accessibility relation in such a way that temporal relations lack an absolute significance. Finally, after introducing N and R together with their detailed physical justification, the properties of their corresponding models are examined, and different theorems are proved (we only mention one of special philosophical significance, namely, the construction of a model that satisfies both Newtonian and relativistic axiomatic systems).

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**Paride Del Grosso**
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### Causal Issues in Policymaking

According to Evidence-Based Policy (EBP), policymakers should develop policies on the basis of the available evidence. However, EBP does not shed light on one of the major policymakers' concerns, i.e. policy effectiveness: it is not clear what type of evidence is needed to find out whether a policy (P) will produce the intended outcome (O).
I will discuss this issue by arguing that policy effectiveness is a causational question: asking whether P will produce O is asking whether P will cause O. By considering The Russo-Williamson Thesis (Russo and Williamson 2007), I will claim that, to establish causation between P and O, two types of evidence are needed, namely probabilistic evidence of a dependency between P and O and evidence of a mechanism.
However, while the former can be gathered, for instance, from the results of randomised controlled trials, which are generally considered the best evidence to establish correlation (Shan and Williamson 2021, 6); the latter is more problematic to find. First (i), because it is not clear what a mechanism is. Second (but related to (i)) (ii), because it is not clear how to establish a mechanism between P and O.
I will provide a solution to issues (i) and (ii). Regarding (i), much of the literature concerning mechanisms is in the domain of biology, whereas it is poor in the domain of policymaking (Ibid.). By using the definitions present in biology, I will propose a notion of mechanism that is workable in the domain of policymaking. Regarding (ii), I will claim

that a causal mechanism can be established by identifying one or multiple causal pathways (i.e. a complex web of causal relations) between P and O, and by providing a solid causal narrative describing these causal pathways.

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**Paulo Castro**
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**A Wave-memory interpretation for Quantum Mechanics - An attempt to unify pilot-wave theory with standard QM formalism**

In 1927 two views about quantum phenomena were proposed. One was Bohr's complementarity view, founded on Heisenberg's uncertainty relations, leading to the Copenhagen interpretation and to Hilbert space formalism. The other was de Broglie's double solution hypothesis, implying the existence of a Pilot-wave effect along the corpuscle's trajectory. Bohr's view would prevail given the implications of the Heisenberg relations, state superposition and the existence of non-locality, seeming to disprove the pilot-wave approach. On the other hand, the Copenhagen Interpretation still carries a heavy metaphysical load on the epistemological limits of human knowledge, while giving no explicit relation between indeterministic and deterministic behaviors in Nature. Over the last years the Hydrodynamic Quantum Analogs (HQA) field has been developing [1]. A droplet can be put to bounce on an oil bath, creating a quasi-monochromatic wave field that guides the droplet along a non-classical trajectory [2]. Although several quantum cases have been experimentally modeled by their analogs, HQA cannot provide an empirical picture of the quantum world. However, it does indicate a conceptual framework favoring a realism-based approach, while keeping the standard formalism of quantum mechanics. Another striking feature in HQA is that the field encodes information about the droplet's path [3], thus being a memory carrier structure. In my talk I wish to extend this idea to quantum phenomena. Adopting de Broglie's realism, I will propose that a quantum wave acts as a nomological memory for the corpuscle behavior, encoding the probability density of all its positions and momentum within the wave. I will further suggest that a complete description of quantum phenomena involves both a pilot-wave dynamics for the particle and a standard QM formalism for the information [4]. I will assess two objections to this, coming from the uncertainty relations and the non-locality, providing a possible answer to each.

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**Pedro Farinha Gomes**
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**Between philosophy of art, social and human sciences and the history and philosophy of science: aesthetic empiricism and contextualism, internalism and externalism, and the social, economic and political importance of artistic work**

The theoretical work carried out in epistemology of art aims to determine the most appropriate way to interpret a work of art, that is, to determine what kind of knowledge we must bring to it so that an appropriate interpretation will occur.
In theories of aesthetic empiricism, it is argued that the contact with its empirical properties is sufficient. In theories of aesthetic contextualism, it is argued that this is not enough. Contextual elements are necessary.
It is within the scope of aesthetic contextualism that the social and human sciences can be summoned in the interpretative process of works of art, such as the social history of art and the sociology of art.
I will defend that formalist theories of art are those that come closest to pure empiricism, considering that in a formalist approach, within the scope of the work on formal properties, is where the autonomy of art can be more strongly defended. I will make a contrast with historical and sociological approaches to art that, radicalizing the importance of considering the social context of artists, result in a sociologism, annulling the portion of artistic autonomy that should be attributed to artists and artistic creation. However, I will argue that the convening of these disciplines, within the scope of their critical dimension and, therefore, of liberating intervention and emancipation, makes it possible to convene ideological elements that can lead viewers to the knowledge of the conditions of domination in which their lives occur.
Establishing an analogy with the internalist and externalist theories of the history and philosophy of science, I will also argue that either appealing to an empiricist perspective or to a contextualist one, should both be thought of as a way of defending artistic creation as an existential stronghold.

**Petar Nurkić**
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**Water, Water Everywhere! A Skeptical Chemist's Quest for the Thales Principle**

The emergence of corpuscular theories in the 17th century marked the end of Aristotle's theory of the four elements' supremacy. Robert Boyle presented a definitive critique of physical principles from antiquity in his work, the Skeptical Chemist. However, Boyle did not deem all non-corpuscular theories worthless. He was impressed by the experimental procedures and theories of Joan Baptista van Helmont. Helmont's idea of water as the ultimate principle in nature was essentially Thalesian, and he conducted the Willow Tree experiment, one of the pioneering quantitative experiments in the history of chemistry. Boyle adopted the main features of Helmont's experiment but used the seeds of the squash plant to achieve rapid results. Within a year, the sprout of the squash increased its weight by two thirds, enough for Boyle to successfully verify Helmont's experiment.
Boyle conducted another experiment to verify Helmont's hypothesis and took an even bigger step forward. If the plant does not use nutrients from the soil, then it is possible to

grow plants in the absence of soil. Boyle found inspiration for the new experiment in the work Sylva Sylvarum, written by Francis Bacon. The Water Culture experiment was a faster and simpler method of testing the Thalesian assumption than the Willow Tree experiment.
Of all the theories of matter that were rivals to corpuscular interpretations, van Helmont's Hypothesis was the most challenging to refute because it had the support of prominent authorities of antiquity and undoubted experimental confirmation, earning it the respect of adherents of the new philosophy. Boyle accepted that Helmont's hypothesis could explain the origin of organic life, but he disagreed with the conclusion that water could appear in the explanandum of inorganic matter. The paper aims to demonstrate the continuity from -Thales to Alchemist to Boyle - and show that the new experimental philosophy could not easily separate from its roots in antiquity.

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**Philippe Gagnon & Thierry Magnin**
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**Are we heading toward an autonomization of machines?**

Do automata have autonomy, as their name seems to imply? Will they any time soon acquire it? One could react to this question by insisting that degrees of autonomy are conceivable, and that as such an autonomous progression also is. One could also require that a rigorous use of the term only exists if one is "to oneself one's own law," therefore staying closer to what the etymology implies. In all cases, one would have to elucidate how a concept can be used as a heuristic, but can also pose a challenge when one tries to bridge it to other neighboring fields. According to the second viewpoint, none of us would really be free, we'd have rather to say that we navigate between indeterminate possibilities. If we attempt to model dynamic fluxes which are larger and larger, we will see that our world also created a posture wherein individuality disappears, to be washed away by cor- relations which somehow hide the universal in a certain refraction of intelligent activity, which we could characterize as frequential return.
Are we going to learn from a knowledge that we cannot reason backwards, where we would acquire new information (but of which kind?) through mining accidental associations as we would have named them in traditional scholastic terminology? There is an abductive character to knowing, where we can also talk about "deduction from phenomena." If we consider information as an object of value and desire, in the end it remains an information about something, and this means we have to distinguish it from raw matter, that is commercialisable and desirable in economic terms. What is more, this information in itself is valuable only in reference to axiological framing. In this sense, the problem we encounter is to define what are its uses and how much those really matter.
Were we to accord a dignity to the most complex object we can find, such as in the suggestion of Vidal & Delahaye, this would still remain problematic if the object be only made in a conventional fashion, with relations specifiable from outside.

Personal identity links together and makes not only coincide, but entangles together the levels that analysis distinguishes. In the face of this, what makes it such that the living remains under transformation? While living, we explode, or in other words we again create an entanglement, between levels which, should we follow Gregory Bateson, would lead us all the way back to an intuitive look at the theory of types. Raymond Ruyer's suggestion that consciousness be an ideal beyond the "refracted ideals" of regulators, will perhaps enable us to steer a way for- ward in the face of seeming paradoxes of un-integrated new possibilities for "knowledge without a knower."

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### Remarks on Mary Hesse's hermeneutic account of scientific knowledge

In her paper "In Defence of Objectivity" (1972), Mary Hesse defends a post-empiricist account of natural science that closely resembles the hermeneutic analysis of the human sciences as expressed e.g. by Jürgen Habermas. That account is based on a phenomenal or instrumental rather than theoretical view of scientific knowledge, which Hesse conceives of as continuous with the hermeneutic model focused on three key notions such as consensus, dialogue, and interpretation.
In my paper, I would like to reflect on Hesse's attempt to bridge the gap between the approach to knowledge exhibited by the natural sciences on the one hand, and the human or social sciences on the other, with an emphasis on the consequences that this comparison may have on the educational plane. That is, I would like to provide some remarks on how "philosophy of science" as a discipline might benefit from Hesse's view that it is possible (and, for her, even more adequate) to ascribe to the scientific inquiry an hermeneutic and interpretive vs. literal and direct account of knowledge.

M. Hesse (1972), "In Defence of Objectivity", Proceedings of the British Academy 58, pp. 275-292

**Riccardo La Bella**
University of Florence

**An epistemological theory of new machines: how we think about models**

One of the philosophical outcomes of Godelian's theorems is the so-called "The disjunction of Godel". Godel's disjunction asserts that either the mind cannot be mechanized or there are absolutely undecidable statements. In the present day there are difficulties to think about the mind as a symbolic, recursive Turing machine. I want to describe our mind as a machine that can solve mathematical problems, as tights as undecidability, with different methods of abstraction, in different contexts and with different goals. In recent decades, in fact, less conventional solutions to the godelian formula which concern intensional logics, metalinguistic theories, proof theoretic semantics, have been advanced, and all of these concern different aspects of a formal system: the concept of truth, the meaning of provability and mathematical evidence. My topic give a description of how a particular connessionist model of the mind with a open logic structure is highly functional to describe mathematical practice and, more generally, our capability to build different models. I will bring examples of logical structures that they could not have formalized without an arbitrary partition. These partitions will be shown to be not univocally determined by single formal model, but by this logical openness, which we will show to be related to an embodied view of connessionist model of mind. The consequence is that we can build a coherent epistemology, that is not radical constructivist, for mathematical, social and natural sciences. An epistemological theory grounded on processes between observed and observer which help us to analyze adaptive dynamics between models and contexts in which they are applied.

**Robert W Clowes**
LMCK Group, IFILNOVA

**4E Cognitive Science and Deep Learning: Challenges and Paths into the Future**

Until recently, philosophers and cognitive scientists have been surprisingly quiet about the new transformer deep learning AI. But now it is widely recognized that such systems are changing both how we think about AI, but also how we think about intelligence and cognition more generally.
One vantage-point on the new deep learning / generational AI is the 1990s discussion over 4E cognitive science. The (programmatic) work of Rodney Brooks (1991) with creatures, mobots and subsumption architectures seems to suggest that intelligence is embodied, embedded, enactive and maybe (subsequently) enactive. Its influence was profound (e.g., Varela et al, 1991) and ongoing. Yet the generational deep-learning AI systems of today are, on the face of it, deeply at odds with the Brooks programme and arguably with 4E Cognitive Science in general.
ChatGPT, Dall-E and LaMDA seem to be more directly inheritors of connectionism than 4E cog sci and could be argued to be examples of 0E cognition. Moreover, the analysis of such systems by their creators (LeCun, et al, 2015) seem to be shot through with (versions of) representationalist assumptions that many 4E theorists have argued needed to be replaced. With the advent of deep learning and generative AI radical anti-representationalist flavours of 4E cognitive science now face a severe challenge.
So, does the new AI really clash with 4E cog sci, behaviour-based robotics and its

inheritors, and if so, what does that say about the broader 4E programme? I will argue deep learning does indeed offer an existential challenge to the 4E cognitive science although some flavours fair much less well than others. I offer three possible paths forward for the 4E program in the wake of the new AI only one of which I think is very promising. I will briefly offer what I take to be the best bet for synthetic programme for the future of the understanding of minds that builds upon both aspects of 4E cog sci and deep learning.

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Varela, F. J., Thompson, E., & Rosch, E. (1991). The Embodied Mind. Cambridge, MA: MIT Press.
LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. Nature, 521(7553), 436-444.

**Rui Sampaio Silva**
University of the Azores

**The underdetermination thesis and the role of judgement in science**

According to the well-known Duhem-Quine thesis, scientific hypotheses cannot be tested individually, but only in conjunction with other hypotheses. This thesis naturally leads to what Quine called the thesis of the underdetermination of theory by evidence, the idea that physical theories can be logically incompatible and empirically equivalent. Underdetermination means that scientists have some freedom to respond to recalcitrant evidence and may even tenaciously stick to a problematic hypothesis by resorting to what Popper called “conventionalist stratagems”. Duhem appealed to the “bon sens” of the scientist to deal with this problem, which is a recognition that underdetermination problems involves judgement, in the sense of a practical capacity that cannot be reduced to a set of methodological rules.
Popper tried to formulate methodological rules to control “conventionalist stratagems”, but his distinction between ad hoc and auxiliary hypothesis neglects the difficulties that we face in measuring and comparing the empirical content of different hypotheses. More recently, Dorling appealed to a Bayesian solution to the problem, but the subjectivity of prior probabilities, the interdependence of hypotheses and the difficulty of reconciling Bayesian calculations with everyday scientific practice are problematic aspects of his proposal. Darden argued for the possibility of experimentally isolating hypotheses, but although the strategies that she proposes are useful, it is difficult, in practice, to identify all relevant implicit assumptions in an experiment.
Since methodological considerations do not fully solve the underdetermination problem, Duhem’s appeal to “bon sens” or judgment remains necessary, but we can improve his account of “bon sens” with the help of two different research domains. Psychology of expertise helps us to better understand judgment as a practical capacity based on pattern-recognition and experience. Judgment also means that the virtues of the scientist (in addition to the virtues of the theory) do matter, a point that can be illuminated by virtue epistemology.

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Dorling, J. 1979. “Bayesian personalism, the methodology of scientific research programmes, and Duhem’s problem”. Studies in History and Philosophy of Science, 10: 177–87.
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Weber, M. 2009. “The crux of crucial experiments: Duhem’s problems and inference to the best explanation”. British Journal for the Philosophy of Science, 60: 19–49.

**Rush Stewart**
King's College London

**Choice, Freedom, and Norms: Outline of a Theory of Coercive Menu Expansion**

A common objection to legalizing certain types of markets—in sex, organs, sorts of medical care—is that it would result in the coercion of some participants. This complaint raises a general puzzle: how can expanding the set of options an agent has be coercive? I propose a solution in terms of external norms that constrain choice. I axiomatically characterize norm-sensitive generalizations of two prominent ways of assessing the opportunity freedom that a set of options provides. Each assessment method, once generalized to be sensitive to external norms, witnesses the possibility that menu expansion can reduce freedom.

**Sacha Ferrari**
KU Leuven

**How the structure of scientific communities and communication channels impact the public understanding of science**

In this study, we aim to describe how scientific uncertainty impacts the public understanding of science. Civil society is considered to have a good understanding of science if its members adopt the right scientific theory. This understanding (our dependent variable) can be assumed to be influenced by a range of key variables, of which the structure of the scientific community and the communication channel are two main factors. Little is known, however, which role these elements play, and especially how these interact. This is the focus of this paper.
Based on an adapted version of an agent-based model originally presented by Zollman, we determine how the shape of the scientific network (for instance, a highly or lowly connected network) and the communication channels between the scientists and the citizens (for instance, a rapporteur or a journalist) impact the beliefs and degree of uncertainty concerning a scientific hypothesis (one of two mutually exclusive alternatives) of both the scientists themselves and the citizens. Some other parameters such as the openness of scientists to different opinions, the precision of their experimental devices, and the scientists’ prior degrees of beliefs are taken as extra inputs in our model.
Based on our results, we conclude that a highly connected scientific network decreases the chance that the public adopts the right hypothesis. Interestingly, moderately connected networks perform better when scientists are reluctant to listen to others’ beliefs. As for communication channels, our model suggests that citizens only have to be aware of a few of the shared scientific outcomes in order to have a good picture. Furthermore, the citizens in our model reduced their uncertainty faster than the

scientists. Altogether, our findings contribute to a better understanding of the dynamics of scientific uncertainty within the scientific and the public communities.

K. J. Zollman. “The communication structure of epistemic communities.” Philosophy of Science, 74(5):574–587, 2007.

**Sâmara Costa**
University of Porto

**Sainte-Victoire, the many mountains of Cézanne. Concerning what is seen and intended to be seen, of the color and vision**

This paper intends to investigate aspects of life and work of the painter Paul Cézanne. We will also address how color compounds the visual experience in his works. We intend to explore how research in neurobiology approaches some questions about the visual experience that can be related to Cézanne's painting. We analyzed the importance of visibility as an enigma which painting deals with. We had used as a theoretical basis the work of Merleau-Ponty, specifically the Phenomenology of Perception and the Eye and the Spirit. Finally, we will speculate how Cézanne deal with the landscape of the Sainte-Victoire Mountain, fundamental in his paintings and we will suggest some reasons why he painted it countless times.

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**Samir Roy**
National Institute of Technical Teachers Training and Research, Kolkata

**A Pragmatic Approach to Artificial Intelligence (AI) vis-à-vis Evolution of Machines from the Wheels to Superintelligence**

The spectacular success of Artificial Intelligence (AI) in the contemporary scenario of technology has given rise to sharp reactions among current global intelligentsia. The euphoria around the formidable problem-solving capacity of AI is being shadowed by the deep apprehension of the seemingly inevitable extinction of the human race by malicious superintelligence, a pervasive autonomous entity billion times more intelligent and powerful than human. In this context, this paper presents a critical review of the rise of AI in the recent past against the broader perspective of the historical process of evolution of the machines in general, and the possibility of subsequent emergence of Superintelligence. A careful consideration of the man-machine communication through ages, from prehistory to contemporary world, reveals that there is a logic underlying technological progress and even though AI has already revolutionized the traditional concept of a machine, it is still in accordance with this basic principle. Machines prior to the Computer were artifices to augment man’s physical capacity. Computers have

stretched this capacity expansion to the realm of mental ability. Apparently, this was threatening because man's superiority is largely ascribed to his mental capacity. However, the very purpose of a machine is to get those things done which otherwise could not be accomplished by men. Computers, and then AI, have extended man's empowerment from the physical to the mental sphere. Question is, will AI eventually lead to a malicious Superintelligence? While pondering over this question, we should realize that even though curiosity is the foundation of scientific investigation, technology is guided by such mundane factors like necessity, market etc. As in the case of biological evolution, a kind of natural selection, based on the utilitarian value of an object or artifice, guides technological advancement. There is still no reason to assume that AI is an exception to this rule.

**Samuel Fletcher**
University of Minnesota, Twin Cities

**A Functional Classification of Physical Principles, Illustrated by the Theory of Relativity**

Physical principles are statements pertaining to physical theories, the possibilities they represent, and what can be inferred from them. Using the theory of relativity (both special and general) as an example, I describe five functions for physical principles: representational, axiomatic, law-like, inferential, and heuristic.

Representational principles delineate how mathematical structures in the models of a physical theory represent objects, properties, or relations. For instance, the "clock hypothesis" of relativity theory asserts that the length of any timelike curve represents the duration of a point-like process along that curve.

Axiomatic principles, by contrast, serve at once to specify the theory itself and what possibilities the theory represents. In Einstein's original formulation of the special theory of relativity, the principle of (special) relativity allows one to generate possibilities by uniformly translating a coordinate system.

Law-like principles constrain or reduce the possibilities that a theory—constructive or principle—would otherwise endorse. As the name suggests, they are sometimes expressed as physical laws, but often are deemed principles when they find expression across many different theories. In special relativity, energy conservation (i.e., that the energy-momentum tensor is divergence-free) expresses such a principle that is then subsumed under the Einstein Field Equation in general relativity.

Focal principles draw out or emphasize a particular consequence of a theory for understanding, inference, or calculation. They do not provide extra constraints or meaning to mathematical models, but facilitate explanations and deductions. Action principles for deriving field equations are examples.

Heuristic principles suggest connections with or constraints on future theories. In this way, they are like aspiring axiomatic principles. For instance, the strong principle of equivalence suggests a procedure for taking a special relativistic matter theory and producing a corresponding general relativistic matter theory. The principle of background independence suggests constraints for future theories of quantum gravity.

**Sarwar Ahmed**
University of Wuppertal

### An Inferential-Information Transmission Account of Observation

The development of science and technology has transformed the concept of observation. Arguably, the major transformation is discarding the perceptual dimension of observation and preserving its epistemic dimension.
Dudley Shapere (1982) argued that observation contains epistemological and perceptual dimensions and what has become important in scientific practice is the former. Furthermore, Shapere argues, the epistemological dimension is based on information transmission from the source (object) to the receptor (observer). If the information transmission is without intervention, it is direct observation, otherwise, it becomes inferential (indirect) observation in degrees.
Philosophers of science either applied it to historical examples or endorsed a slightly modified version of Shapere's account (Kosso 1986) (Franklin 2017). Most recently, Jamee Elder (2023) criticised Shapere's distinction, and maintained the direct and indirect distinction, however, on another basis.
Shapere's distinction is sensitive, I argue, to historical, practical and epistemological counterarguments. In this talk, I focus on the epistemological aspect. I argue that in addition to the fact that every observation is inferential, the inference-free domain (information transmitted from the source to the receptor) is arbitrary. It depends on the point that one assumes to be the end of the observational process. Furthermore, the epistemological significance is based on standards like repeatability, calibration and variation of the information channel and the justifiability of the involved inferences.
Furthermore, as an alternative, a general account of observation based on causal information transmission combined with inference to the best explanation is developed that can resolve the problems faced by shapere's account. Since inference to the best explanation is ubiquitous in science (Douven 2022), I argue that it plays an important role in modern observations. To demonstrate that, the observation of the binary black hole systems via gravitational waves (Abbott, B. P., et al. 2016a) is presented as a case study.

Abbott, B. P., et al. (2016a), "Observation of Gravitational Waves from a Binary Black Hole Merger." Physical Review Letters 116 (6): 061102.
Douven, Igor (2022), The Art of Abduction, The MIT Press.
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Kosso, P.(1986). Observability and Observation in Physical Science. Dissertation, University of Minnesota.
Shapere, D. (1982), "The Concept of Observation in Science and Philosophy." Philosophy of Science, vol. 49, no. 4, pp. 485–525.

**Sebastian Horvat**
University of Vienna

### An Alleged Tension between Quantum Logic and Applied Classical Mathematics

Timothy Williamson (2018) has recently argued that the applicability of classical mathematics in the natural and social sciences raises a problem for the adoption, in

non-mathematical domains, of a wide range of non-classical logics, including quantum logics (QL). I first reconstruct the argument and present its restriction to the case of QL. Then I show that there is no inconsistency whatsoever between the application of classical mathematics to quantum phenomena and the use of QL in reasoning about them. Once I identify the premise in Williamson's argument that turns out to be false when restricted to QL, I argue that the same premise breaks down also in the case of a logic of vagueness. In the end, I suggest that the alleged tension between these non-classical logics and applied classical mathematics betrays a misunderstanding of the nature of mathematical representation in science.

Williamson, T. (2018). Alternative logics and applied mathematics. Philosophical Issues, a supplement to Noûs, 28(1), 399-424.

**Sepehr Ehsani**
University College London

**Examining Transient Part–Part Interactions toward Improving the Quality of Mechanistic Explanations in Cell Biology**

Mechanistic explanations are a mainstay of causal accounts in cell biology. Such explanations are underpinned in large part by a network of part–part interactions, e.g. protein–protein or protein–nucleic-acid interactions. These interactions have traditionally either been discovered in a focused, experiment-by-experiment manner or via so-called 'hypothesis-free' large-scale interactome studies, which require subsequent verifications of the individual interactions of interest. In all such studies, regardless of the scale and mode of experimentation, there is a tacit assumption that an 'interaction' is constituted simply by the proximity between and/or enzymatic changes imparted on the two parts (of note, multipart interactions can still be thought of as being composed of a number of two-part interactions). However, no substantive theoretical account of what may actually constitute an interaction has found its way into cell biological practice. Starting with the example of a mechanistic explanation of an important cellular phenomenon (the mitochondrial respiratory chain), I argue that an account of the potentially common features of interactions between biological molecules may address a major lacuna in cell biological mechanistic explanations. To answer the question of what features interactions in cell biology might have in common, we could initially look for non-functional aspects of interactions before analyzing their consequences. Any common features of interactions that we propose, I henceforth call interactive dimensions. I discuss three such dimensions based on the mitochondrial respiratory chain and other examples: a temporal, a geometric and an electrochemical dimension. Determining the parameters and details of these dimensions would add greater depth and completeness to a given mechanistic explanation. Finally, and as a topic of further investigation, one could ask whether one or more of these interactive dimensions could be explained using some lawlike generalization, thus augmenting a mechanistic explanation with nomic elements.

**Steven S Gouveia**
Mind, Language and Action Group, University of Porto

### The Search for Explanation in AI Medicine

The influence of Artificial Intelligence in Medicine is evolving rapidly in today's society. The basic assumption behind this technology is to produce health practices more reliable, accurate, efficient and cheaper than traditional medicine, based on human reasoning. The alternative pathway is to create machine-learning algorithms that will assist part or the totality of the processes of decision-making in medical contexts.
Although it is true that algorithms can increase the efficiency and reliability of many different medical processes, it is important to note that most of these technologies are based on complex and multifaceted kind of data and content. Because of that, most of these AI systems are pure "black-boxes": the practitioner will be able to understand the inputs of the system and, then, the outputs. However, she/he will never have access to what happens "inside" the system, turning the medical process an opaque process (epistemically) and careless (ethically).
Because of the nature of this technology, this new approach will create an "epistemic gap" in the relationship between patients and medical experts: the nature of knowledge in that relationship will become doubtful and ambiguous.
The goal of this talk will be to focus on the "epistemic gap" created by the development and use of highly developed algorithms used in the medical practices in several contexts, such as the use of machine learning in diagnostic imaging, elaboration of treatment plans, the use of robotic-mediated surgery, or preliminary diagnosis. Is it possible to retrieve cogent knowledge from algorithmic systems that use millions of data? Can we solidly interpret the results given by these kinds of technological devices? Finally: is it possible to create an Explainable / Transparent Artificial Intelligence in the context of medicine? We will use several instruments from the philosophy of science to inform this epistemic issue with direct influence in the normative use of AI Medicine.

**Tannaz Najafi**
CFCUL, University of Lisbon; University of Geneva

### Super-Substantivalist Becoming in Physics

Recently in the literature the super-substantivalist view on spacetime and entities is gaining more attention, both from a philosophical but also physical perspective. However, what this new interpretation exactly is and how we may conceive of 'becoming' or 'the passage of time' in such a framework remains insufficiently specified. In this paper I will analyze in depth what is meant by super-substantivalism and how many variants of it we may have. Once clarified this the major goal will be that of finding ways in which we can maintain this kind of super-substantivalist becoming also in physics, in particular in relativity and quantum gravity.

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F. Dowker. Being and Becoming on the Road to Quantum Gravity; or, the Birth of a Baby Is Not a Baby. In N. Huggett and K. Matsubara and C.
Wuthrich, Beyond Spacetime: The Foundations of Quantum Gravity. Cambridge University Press, 2020.

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J. Schaffer. Spacetime the one substance. Philosophical Studies, 145(1):131–148, 2009.

**Valeria Becattini**
Humboldt University of Berlin

**Learning to Attenuate Myself: A Predictive Processing Account of Bodily Awareness in Meditation**

Expert practitioners of the body-scan technique (Vipassana meditation) usually develop increased bodily awareness and focus abilities. Yet, during the meditation session, a decreased salience of the perceived body boundaries is largely reported. This paper aims at solving this riddle by linking the phenomenology of the body-scan to a mechanistic explanation of the underlying attentional processes. Recently, a growing number of studies are interested in explaining meditation techniques through the Predictive Processing (PP) and Active Inference (AI) framework. However, a comprehensive account of the body-scan technique is still missing. For such a purpose, we combine recent models of perception and action of the PP and AI framework, phenomenological studies on meditation, and neurophysiological evidence on attention. Specifically, we claim that the body-scan promotes an optimal model of the body that attenuates the perceived body salience. First, we present relevant concepts in PP and AI, and previous accounts on meditation. Then, we propose that the body-scan technique involves four main types of attentional processes, divided into pragmatic and epistemic activities. The model optimization of the body is achieved by the system increasing the accuracy of its predictions on the somatosensory cues. In line with evidence on sensory attenuation, we suggest this model optimization strategy as a mechanism underlying the phenomenology of the body-scan. This way, a comprehensive understanding of the attentional processes of the body-scan technique is provided and linked to its phenomenology. The outcome of this paper is particularly relevant for the philosophical implications involved in cases of disrupted bodily awareness, like in the case of Depersonalisation Disorder.

**Valeriano Iranzo**
University of Valencia

**Is modelling a source of evidence?**

Aim of the talk: to analyze the relationship between modelling, more particularly between computer simulation modelling (CSM) and evidence.
The epistemological status of computer simulation is a controversial subject. The fact is that decision making based on modelling processes is becoming more and more frequent (climate change, COVID-19 pandemic, to give some striking examples).
A basic and relevant distinction here: explanatory/predictive models. The former attempt to describe both the components and the processes underlying the target system, often adopting a "mechanistic" perspective; the latter provide dynamic possible (future) scenarios as output.

Predictive models are particularly interesting for our purposes. Their input incorporates empirical evidence, naturally; the question is to what extent their output, that is, their projections about the future, can be considered evidence in a genuine sense to support a causal hypothesis or a decision by an agent. CSM includes steps such as calibration, verification and validation of the model, which allow estimating predictive errors, readjusting the initial parameters, detecting the sensitivity to possible variations, etc. The goal is increasing the simulation's predictive reliability. My reasons in favour of the evidential status of the output provided by CSM are:
(i) An iterated strategy of self-correction, based on the comparison between the predictions of the simulation and the data obtained over time, allows to refine the initial parameters. The degree of control over the successive outputs can be comparable to that which researchers are able to apply in quasi-observational studies, for instance.
(ii) Modelling and CSM are always based on some assumptions. But the situation is similar to what occurs in experimental testing. Think of the most demanding experimental design, i.e.: randomized controlled trial. There are also some unavoidable assumptions when running that sort of experiment (the delimitation of the sample space that determines which hypothesis is tested, for example).

**Vanja Subotić**
University of Belgrade

**Local and Global Explanatory Dynamics of Deep Learning Models in Cognitive Neuroscience**

Deep learning (DL) is a statistical technique for classifying patterns, through which AI engineers train diverse artificial neural networks containing multiple layers that can process huge amounts of data (LeCun et al. 2015, Skansi 2018). The aim of this talk is to outline what sort of explanations can be reasonably expected from DL models in cognitive neuroscience by setting the following desideratum: the explanatory dynamics within a future-biased research program (Feest 2017). I argue that DL is a typical example of such a research program since it exhibits both global and local explanatory dynamics. The former arises when multiple DL models are used to obtain more details about the mechanisms of a particular cognitive phenomenon. On the other hand, the latter involves the cases when we get a better grasp of a single DL model through elucidating its internal mechanisms (e.g., with Explainable AI techniques for rendering models more transparent). This allows me to address two common and recently rehearsed lines of criticism pertaining to explanatory ambitions of DL models: (i) that their lack of biological plausibility makes them inadequate for explaining human cognition (e.g., Greif 2022), and (ii) that their opacity makes them inadequate for explaining anything at all (e.g., Boge 2021). As for the (i), by dissecting the notion of global explanatory dynamics, we can discern three types of DL models, each offering different explanations, namely how-possibly, how-plausibly and how-actually explanations. This maneouver rests on adopting the mechanistic framework for describing the methodology of DL modelling, which is in line with e.g., Stinson 2018 and Lindsay 2021. Each sort of explanation unravels a part of the cognitive mechanism that is at stake in explanandum, either its components, interactions, or both. As for the (ii), I argue that DL models being opaque is an issue to be settled by engineers in the near future, not an opportunity to thrive on Schadenfreude.

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**Vicent Picó-Pérez**
University of Valencia

### Particle Mass as an Intrinsic Property in Bohmian Quantum Mechanics

The concept of intrinsic properties has played a prominent role in the debate on scientific realism over the past decades. However, there is a lack of consensus on how to define this concept, leading to different interpretations. This paper aims to provide a clear and precise definition of intrinsicality that can be applied to fundamental physical theories, with a particular focus on the Bohmian interpretation of quantum mechanics. Using the primitive ontology approach, we argue that any theory inherently carries metaphysical commitments. In addition, it is necessary to differentiate between primitive and non-primitive entities in any ontology of a fundamental physical theory. In the context of quantum Bohmian mechanics, the primitive ontology comprises particles in space-time, while the non-primitive ontology is determined by the formalism of the theory, including masses, potentials, and wave-functions. While wave-functions and potential interactions are better understood as non-intrinsic properties of particles, we present a series of arguments in favor of the intrinsic character of the particle mass. Based on our analysis, we contend that the particle mass is an intrinsic property and provide evidence to support this claim. Our work provides new insights into the nature of intrinsic properties and their significance in physical theories. It has implications for ongoing debates about scientific realism and offers a more precise understanding of the nature of fundamental physical entities.

**Wigson Rafael Silva da Costa**
FCSH NOVA, Lisbon

### The Eternal Return: Scientific Possibilities and Epistemological Gains

The cosmological thesis of the Eternal Return, popularized by thinkers such as Friedrich Nietzsche, emerges on the scientific landscape in an environment where the debates about the origin and development of the universe entered the daily life of a considerable number of European intellectuals, who objected to the hypothesis of the heat death of the universe, as suggested by Clausius and Kelvin due to the application of the second law of thermodynamics in a cosmological context. Within the framework of the relativistic revolution, cosmology was consolidated as an inexorably scientific knowledge, unified by

the application of Einstein's gravitational field equations to the cosmic realm. In this new context, the model commonly called "Big Bang" stands out as a cosmological paradigm whose geometry predicts the existence of a point in space-time where matter and energy would be concentrated at infinite density and temperature. There, the known laws of physics would no longer apply, and a rational discourse about the total evolution of the cosmos - as Einstein had wanted for the new discipline - would no longer be possible. Until the 1990s, the standard model remained largely unquestioned. However, results from supernova observations cast doubt on the old paradigm, dividing the community of cosmologists between those who sought to rethink solutions to safeguard the standard model (Lambda-CDM) and those who advocated cyclic or bouncing cosmologies as a plausible alternative considering new experimental data. This work examines the emergence of cyclic cosmological models from the 19th century to the turn to contemporary scientific cosmology, highlighting their current position in the cosmological debate; and also, the epistemological gains of such a stance, emphasized by thinkers from the 19th century to the present day.

# SYMPOSIA

**Symposium #1: Philosophy and Science on Film**

Org: Graça Corrêa (CFCUL, University of Lisbon)

This symposium offers three reflections on Film from the fields of Philosophy and Science. Estela Jardim discusses how serial photography and early cinema provided essential data on the neurological pathologies of the human body; and how these new image techniques were used and transformed by Francis Dercum/ Muybridge, Gheorghe Marinescu and Egas Moniz. Proceeding from the Deleuzian conceptual framework of cinema as thought, and refocusing it through the lens of the figure of death, Susana Viegas explores the mental and virtual images of depersonalized memories. Drawing on neuroscientist Vittorio Gallese's model of embodied simulation as well as on studies of empathy in film theory and philosophy, Graça Corrêa investigates how aesthetic modes in film can be emotionally "prefocused."

Dercum FX. The walk and some of its phases in disease. Transactions of the College of Physicians of Philadelphia 1888; 10: 308-338.
Marinescu,G. Un cas d'hémiplégie hystérique guéri par la suggestion hypnotique et étudié a l 'aide du cinématographe. Nouvelle iconographie de la Salpêtrière 1900;14:176–183.
Moniz, E.Myoclonies essentiels. Nouvelle iconographie de la Salpêtrière 1913;26:85-117.
Jardim, Maria Estela, Jardim, Nádia Vera. A cultura visual médica no virar do século XIX: da cronofotografia aos primórdios do cinema. Anais do Instituto de Higiene e Medicina Tropical, 2019; 17: 21-24. DOI: https://doi.org/10.25761/anaisihmt.291.
Daniel Frampton. Filmosophy. NY: Columbia UPress 2006.
Gilles Deleuze, Cinema 2: Time Image, University of Minnesota Press, 1986.
Gallese, Vittorio and Michele Guerra, "The Neuroscience of Film" Projections 16.1 (Spring 2022): 1–10. doi: 10.3167/proj.2022.160101
Plantinga, C. (1999). "The scene of empathy and the human face on film." In Passionate views: Film, cognition, and emotion, ed. G.M. Smith and C. Plantinga Baltimore, MA: Johns Hopkins University Press, 239–56.
Routledge Handbook of Philosophy of Empathy, Heidi L. Maibom ed., London & NY: Routledge, 2017.

### The pathological body, serial photography and early cinema

**Estela Jardim**
CFCUL, University of Lisbon

Serial photography of human movement, first obtained by Etienne-Jules Marey in France and Eadweard Muybridge in the United States, was of key importance for the invention of cinema as well as providing essential data on the physiology of the human body. In 1888, the neurologist Francis Dercum with the collaboration of Muybridge, did some quantification on the abnormal gait of his patients based on serial photographs (Dercum). Similar methodology was used by Gheorghe Marinescu in Romania with the cinematographer: the frames of his films were transformed into line drawings for the analysis of the decomposed movements (Marinescu,1900). In 1913 the neurologist Egas Moniz, Professor at the Faculty of Medicine in Lisbon, produced a film in order to measure time between pathological movements in a patient with the neurological disease myoclonia (Moniz,1913). Both serial photography and cinema were used to segment and quantify pathological movements in neurological diseases.
In this paper we will examine medical cases in the period nineteenth-early twenty centuries and particularly the role played by Egas Moniz and his collaborators in improving knowledge on neurological pathologies using the then new image techniques.

Dercum FX. The walk and some of its phases in disease. Transactions of the College of Physicians of Philadelphia 1888; 10: 308-338.
Marinescu,G. Un cas d'hémiplégie hystérique guéri par la suggestion hypnotique et étudié à l'aide du cinématographe. Nouvelle iconographie de la Salpêtrière 1900;14:176–183.
Moniz, E. Myoclonies essentiels. Nouvelle iconographie de la Salpêtrière 1913;26:85-117.
Jardim, Maria Estela, Jardim, Nádia Vera. A cultura visual médica no virar do século XIX: da cronofotografia aos primórdios do cinema. Anais do Instituto de Higiene e Medicina Tropical, 2019; 17: 21-24. DOI: https://doi.org/10.25761/anaisihmt.291.

### Cinema, death-image and depersonalised movements

**Susana Viegas**
IFILNOVA, NOVA FCSH

When discussing the invention of a cinema of the brain, Deleuze highlights Alain Resnais as the post-war filmmaker who best understood the relationship between death, mortality, and memory and their mutual connection to philosophy. Unlimited by perception-images (i.e., actual and present images), films are involved in mental, virtual images similar to 'depersonalised dream-images', to depersonalised movements and/or recollections that do not belong to any individual character. If, for example, it is possible to recover past images or events explicitly through a flashback, the same applies to a dream sequence. In both cases, the experience of time is anchored in a present, actual moment. In film, however, it is also possible to do so implicitly, such as when, although it does not belong to a single character or subject, a depersonalised memory appears. In this intellectual type of cinema, there is an identity between the brain and the world. If Resnais's characters are 'beings of thought', thought itself is his single character (Deleuze). By refocusing the Deleuzian conceptual framework through the lens of the figure of death, my presentation revisits an enduring debate that puts into question the philosophical potential of moving images.

**Empathy in Art and Science: embodied cognition and affect in film**

**Graça P Corrêa**
CFCUL, University of Lisbon

Empathy is a major aspect of the interplay between filmmaking and reception. As early as 1940, Siegfried Kracauer found that cinema's most distinctive quality derives from how the material elements in film directly stimulate the material layers of the human being. Philosophers have similarly emphasized the sensual and perceptual aspects of film, equating it to a medium capable of rendering through images the very processes of thought (Deleuze), whilst some claim that films may be affectively "prefocused" with a built-in gestalt or perspective in the ways they mobilize the viewer (Carroll; Plantinga). Attempting to understand film viewers' experiences, neuroscientist Vittorio Gallese and film theorist Michele Guerra have recently observed how the process of "embodied simulation" makes possible intense and diversified experiences of space, objects and other individuals. At the basis of empathy, embodied simulation can make an important contribution to the study of how films are experienced and co-created by viewers.
Drawing on these arguments from neuroscience and film theory, in this communication I explore the relationship between empathy and aesthetic modes, investigating how different tools of cinematic storytelling—such as point of view, camera angles, lighting, set design, editing, mise-en-scène, and acting styles—suggest and produce different ethical affects.

Daniel Frampton. Filmosophy. NY: Columbia UPress 2006.
Gallese, Vittorio and Michele Guerra, "The Neuroscience of Film" Projections 16.1 (Spring 2022): 1–10. doi: 10.3167/proj.2022.160101
Plantinga, C. (1999). "The scene of empathy and the human face on film." In Passionate views: Film, cognition, and emotion, ed. G.M. Smith and C.
Plantinga Baltimore, MA: Johns Hopkins University Press, 239–56.
Routledge Handbook of Philosophy of Empathy, Heidi L. Maibom ed., London & NY: Routledge, 2017.

**Symposium #2: The units and levels of evolution: recent philosophical views**

Org: Cristina Villegas (CFCUL, University of Lisbon)

Evolutionary biology is a major focus of attention for philosophers, since it concerns the history of all living organisms, including ourselves. Many philosophical discussions revolve around the potential extension of the classical evolutionary synthesis with the tools of other biological domains (Pigliucci and Müller 2010). One classical concern that has received renovated attention is the nature of biological traits. From a traditional perspective, organisms can be decomposed into traits almost in an arbitrary fashion, typically abstracting away from their biological basis. However, contemporary work points at the need for biological criteria for determining what is a trait, insofar as phenotypes evolve in a modular way and there are biases in the dimensions that can vary in a particular trait. Recent philosophical work on the nature of homology is representative of this evolutionary problem (e.g., DiFrisco et al. 2020). On the other hand, the conventional populational approach to evolution coexists with typological ideas coming from branches such as evolutionary developmental biology (Brigandt 2007, Love 2009), and with the centrality of lineages as the study subject of systematic biology (Reydon 2005) and as

bearers of variational potential (Calcott 2009, Nuño de la Rosa and Villegas 2022).
In this symposium, we intend to bridge the methodological issues that derive from the former philosophical concern to the metaphysical ones that relate to the latter. In particular, the contributions range from epistemological problems in the individuation of highly complex traits (exemplified in the cases of eutherian pregnancy and human musicality) to the problem of understanding species as individuals and as bearers of variational tendencies. Our aim is to point at a common theme in apparently dispare evolutionary concerns: that the way we understand potential evolutionary variation makes an important difference in what we take to be the relevant units and levels of evolution.

Brigandt, I. (2007). Typology now: homology and developmental constraints explain evolvability. Biology & Philosophy, 22(5), 709-725.
Calcott, B. (2009). Lineage explanations: explaining how biological mechanisms change. The British Journal for the Philosophy of Science.
DiFrisco, J., Love, A. C., & Wagner, G. P. (2020). Character identity mechanisms: a conceptual model for comparative-mechanistic biology. Biology & Philosophy, 35(4), 44.
Love, A. C. (2009). Typology reconfigured: from the metaphysics of essentialism to the epistemology of representation. Acta biotheoretica, 57, 51-75.
Nuño de la Rosa, L., & Villegas, C. (2022). Chances and propensities in evo-devo. The British Journal for the Philosophy of Science.
Reydon, T. 2005. "On the Nature of the Species Problem and the Four Meanings of 'Species', Studies in History and Philosophy of Biological and Biomedical Sciences, 36, pp.135-158.

### Inter-organismic traits as units of evolution

**David Cortés-García**
University of the Basque Country, UPV/EHU

Traits are presumed to belong to individual organisms: flies have wings and monkeys have tails. However, certain traits apparently cannot be attributed to any single organism. Current philosophy of biology is paying attention to many traits that seem to be inter-organismic in the sense that they developmentally arise from interactions between organisms, and do not constitutively belong to any of them: for instance, microbiome-host features, organs for mother-embryo interactions such as placentas, and various social behaviors. In this talk, we will focus on the interplay between gestating organisms and their embryos across diverse viviparous taxa, seeking to distinguish and explore different instances of interactive trait emergence.
The starting point of our analysis is the case of eutherian pregnancy, in which placentas are a feature depending on both mother and embryo. We argue that in different viviparous clades interactions are orchestrated through different structures and processes. Our goal here is to explore the potential of considering some evolutionary features as inter-organismic traits according to the criteria of several disciplines and of philosophical analysis, in order to expand upon their limitations, and shed light on the challenges they pose to the philosophy of biology examining the phenomena of viviparous reproduction.

### Music as a relative stabilization of cognitive traits for social interaction

**Luis Alejandro Villanueva**
Konrad Lorenz Institute for Evolution and Cognition Research; University of Music and Performing Arts of Vienna

Evolutionary models about the origins of music tend to focus on specific survival functions that music may have conferred on early humans (e.g. sexual reproduction, caregiving, social bonding and emotional communication) during the Upper Paleolithic. From this perspective, music is seen as a full-blown biocultural trait that emerged through natural selection. However, this approach misperceives the fact that the human capacity for music is supported by a wide range of capacities (e.g. motor coordination, join-action, gesture communication, and procedural memory), which most likely did not emerge as a package to fulfill a specific adaptive function. Instead, in this paper, I argue that music should be seen as the result of the coordination of distinct capacities related to multiple cognitive tasks. Moreover, I show that this understanding of music provides a new theoretical ground for developing evolutionary narratives where music can be analyzed as the result of a relative stabilization of cognitive traits that could have also served as crucial scaffolds for the evolution of complex and varied patterns of social interaction.

**Typology and organismal dispositions in evo-devo: a metaphysical approach**

**Cristina Villegas**
CFCUL, University of Lisbon

Variational tendencies are the dispositions of biological systems to generate evolutionarily relevant variation. Modularity, robustness, plasticity and evolvability are chief among them. Evolutionary developmental biology, or evo-devo, considers these properties as intrinsic dispositions of traits as differentiated units of development and evolution. In this paper, we address the characterization of these variational tendencies attributed to traits in evo-devo. After arguing that current theories in evo-devo cannot properly explain why traits do, in fact, vary, we propose to characterize them as natural dispositional kinds. In doing so, we appeal to metaphysical resources regarding the characterization of dispositions. From this metaphysical framework, it is possible to argue that only by attributing dispositions to traits (conceived of as natural kinds), it is possible to make sense of their causal and explanatory power. We argue that this particular case study constitutes an example of a kind of interaction between metaphysics and biology that we label Metaphysics from Biology, where the specific demands of a complex reality such as evolution require the development of metaphysical notions that seem to go beyond those given in the literature.

**Metaphysical implications of synchronic and diachronic species**

**Vanessa Triviño**
Complutense University of Madrid

According to Reydon (2005), the term ‘species’ is a homonymous one that refers to two biological entities: evolverons and phylons. Evolverons are dynamic entities that participate in the evolutionary process. These are the entities referred to by the term ‘species’ in evolutionary biology. Phylons are static entities that result from the evolutionary process. They are what biologists in systematic biology call ‘species’. Reydon associates evolverons with a 3D-endurance theory of persistence, and phylons with a 4D-perdurance theory, and argues that these offer a counterexample for the metaphysical thesis of equivalence between 3D and 4D (McCall and Lowe 2003, 2006). In the case of species, the criteria of intertranslatability is not met since evolverons and phylons are constituted by different organisms. Thus, evolverons contain as parts only living (present)

organisms and fertile hybrids, while phylons contain living and dead (present and past) organisms, as well as both fertile and sterile hybrids. In this talk, I will challenge the association between both evolverons and an endurant 3D conception of an object, and phylons and a perdurant 4D conception. Under this perspective, inter translatability is possible for both synchronic and diachronic species, and therefore 3D/4D equivalence can be restored.

McCall, S., and Lowe, E.J. 2003. "3D/4D Equivalence: The Twins Paradox and Absolute Time". Analysis, 63:114-123.
McCall, S., and Lowe, E.J. 2006. "The 3D/4D Controversy: A Storm in a Teacup". Noûs, 40:3. 570-578.
Reydon, T. 2005. "On the Nature of the Species Problem and the Four Meanings of 'Species', Studies in History and Philosophy of Biological and Biomedical Sciences, 36, pp.135-158.

**Symposium #3: Towards a Philosophy of Technology of Proxies**

Org: Alexander M. Gerner (CFCUL, University of Lisbon)

How do we deal with the uncertainties and errors arising from using proxies? How do we make sure proxies seemingly innocuous characteristics that correlate with scientific and socially sensitive attributes such as aesthetic forms or political, religious, or techno-scientific beliefs, categories, complex data -sets such as on public opinion, personal and political preferences, and do not mislead us into reductive formalized models (validity, reliability, uncertainty, accuracy, interpretation) and perform as algorithms, or data that not only make decisions or predictions on passive representations but actively transform realities by constructing, modelling and testing. How do we ensure that the design challenges are met in the use of data proxies such as postal codes, names, or language concepts that do not introduce hidden human values or social bias or discriminate against certain types of people and might simulate, but fundamentally unreflectively transport political opinion, transform social encounters or aesthetic experiences? How do we evaluate judgments and interpretations based on proxies that introduce technological innovation, machine learning applications, or social theory?
Depending on views on ethics, law, aesthetics, and epistemology, the proxy problem in the philosophy of data-driven, digital, and algorithmic rationalities arises as the problem of how to understand and evaluate the role of formalized and digital technologies as proxies for human agency, communication, sociality, politics, and aesthetic experience in different contexts such as cyberspace, social networks, political and scientific institutions, and digital platforms. The concept of proxies can be examined through multiple lenses, including performative philosophy of technology, political representation, advocacy, and having a voice for groups of people taking up roles and speaking for others in political and theatre or court stages on the human social scale and beyond, which offer different perspectives on the use of proxies in communication and representation. In theatre, proxies are characters who act on behalf of another character or group of characters or symbols (the chorus for common sense or society), either by their own choice or by coercion. These characters can serve various functions, such as representing a community or a social group, challenging authority, exposing contradictions, or creating ambiguity.
Proxies can mediate between different perspectives and interests, allowing for a more nuanced understanding of the world mediated by digital technologies such as machine learning and digital technologies using abstractions, data-driven applications, or

human-like behaviour simulation. At the same time, proxies can also be seen as a form of manipulation or distortion, obscuring the true motives and intentions of the actors involved.
The concept of proxies offers a rich and multifaceted perspective on the intersection of data and formal sciences, culture (theatre), law, aesthetics, rhetoric, and technology, highlighting the role of (political, social, and personal) representation, simulation, and manipulation in aesthetic judgment and choice, public opinion, social and political discourse, and technological mediation.

**From Science as explanation to Science for action: how data proxies can endanger diversity**

**Jorge Louçã**
ISCTE-IUL

Sciences can be seen according to their role in society: explaining natural phenomena, or proposing tools for improving some course of events. The Observatorium will be mentioned as an example of the explanatory perspective in the context of the dynamics of public opinion. Otherwise, examples of sciences for action include economics, as well as engineering or medicine. The climate change movement illustrates science specifically for political action. Other, not so obvious example of science for action, are the recent advances in AI, known as language models that are based on human data. When presenting human values or political opinions, data proxies based on such models may behave as recursive algorithms and influence structural values of humanity, namely endangering diversity. This feature will be suggested for discussion.

**Hacking into Avatars as Proxies: Towards a Philosophy of technology of digital substitution Author**

**Alexander M. Gerner**
CFCUL, University of Lisbon

This paper presents a scenic philosophy of technology of digital proxies in Avatar Studies working on *Digital Substitution*. We discuss the possibility of proxies in Avatar Studies in different scenes: a) Stellvertretung, b) Advocacy, c) Delegation, d) Substitution, e) Data Othering, related to human rationalities of cognition, will and sensibility such as learning, thinking and listening, speaking, socially behaving, autonomous acting, and creating inside a framework for exploring digital substitution of these categories and their relations. We examine ethical and aesthetic implications of different avatar types, including creative, heritage, and digital twins, and quantify others. Working with Levinas' philosophy, we explore the concept of substitution confronting ML/"AI" avatar creations. We highlight the ambivalent nature (e.g., stochastic hallucinations of language vectors vs. dialogue) of using digital proxies as representatives, actuating systems as substitutes, surrogates and digital twins (for remote monitoring, enhancements, personalization for what-if scenarios) as spokespersons. Avatars can be used as proxies for physical presence in virtual space. The history of theatrical, theological, juridical, and narrative models of proxies demonstrates their constitutive ambivalence enhanced by virtual, animated and image-like entities such as Avatars when endowed by technical tools such as Machine Learning and other AI and digital tools that displace them. Yet, personification and representation enable agency only by simultaneously complicating an agent's integrity,

authority, and presence. Can digital proxies such as AI Avatars be our representatives, spokespersons, and testimonies? We question whether digital proxies can be our (personal, political, social) spokespersons (such as the chorus in Greek theatre) by exploring the intersection of ethics and aesthetics, law, and politics in avatar studies, we contribute to the broader philosophical debate on the digital in dramaturgies and technologies of becoming other.

**Mediation as substitution. A psychoanalytical interpretation of the Metaverse**

**Luca Possati**
TU Delft

In Freudian psychoanalysis, substitute formations are always the expression of a defense mechanism rooted in forms of repression. This paper intends to investigate the forms of repression and substitution that occur in digital technologies, and especially in the case of the Metaverse. The central thesis of this paper is that the Metaverse institutes a new form of repression and substitutive formations, especially through the AI avatars. The substitute formation, in AI avatars, implies a form of imaginative projection which goes beyond the idea of doppelganger, of double. The avatar is not a doppelganger, but a more complex imaginative formation that interacts with the subject's daily life. The post phenomenological idea of mediation includes that of substitution.

**Epistemological Issues of Music Recommender Systems**

**Vinícius de Aguiar**
CFCUL, University of Lisbon

The massive popularization of music streaming platforms and the rapid expansion of data sciences toolkits have fostered the emergence of a new technology named music recommender systems (MRSs). In a simplified way, MRSs can be defined as a tool to help users cope with the so- called information overload problem by automatically browsing through millions of songs available on a platform and identifying those that are likely to be relevant to a certain user. Nowadays, state-of- the-art MRSs are capable of high levels of personalization. Besides audio content, they can also process user- and context-related data to reach better, more accurate, or helpful recommendations to individual users. This is supposed to enrich the user experience. In this talk, I propose to analyze some epistemological issues of MRSs. I will focus on the "proxy problem". I will analyze what kind of knowledge is taken into account by MRSs and how this knowledge influences their epistemic products, such as profiles and predictive models. I will address the inevitably provisory status of this knowledge and the ethical and aesthetic implications of using proxies as an epistemic paradigm in the design of music recommendations.

**Symposium #4&6: Feminist epistemology in Philosophy of Science**

Org: Silvia Di Marco (CFCUL, University of Lisbon) & María de Paz (University of Seville)

In a review paper of 2010, Sarah S. Richardson lamented the marginalization of feminist philosophy within mainstream philosophy of science, largely due to a hostile academic environment that is eager to trivialize feminist accounts of the non-neutrality of science as

"anti-science" and "relativist" (Gross and Levitt, 1994; Kitcher, 2022). In the same article, on a more positive note, she examined the benefits and limitations of case-study-based research in feminist epistemology that explores gender bias in science, and suggested that "a project for the next generation of feminist philosophers of science is to continue to explore, develop, and articulate philosophical frameworks for modeling the interaction between gender ideologies and science—in ways inclusive of, but not restricted to, the question of bias." (Richardson, 2010).
Drawing on Richardson's suggestions and preoccupations, and keeping in mind that feminist philosophical analysis of science is an eminently interdisciplinary endeavor, for this symposium we invite scholars working in the field of philosophy of science, history of science, (social) epistemology, STS, anthropology, social sciences, visual studies, and post/decolonial studies to present: (1) papers that discuss how gendered norms, assumptions, languages, and metaphors shape scientific theories, models, and practices; (2) papers that discuss the current situation of feminist epistemology as a legitimate theoretical position within mainstream philosophy of science, with particular attention to the seminal debates on objectivity, scientific realism/antirealism, and the scientific method.

Gross, P.R. and Levitt, N. (1994), Higher Superstition: The Academic Left and its Quarrel with Science, John Hopkins University Press
Kitcher, P. (2022), The third way: Reflections on Helen Longino's The Fate of Knowledge. Philosophy of Science, 59, 549-559
Richardson, S.S. (2010), Feminist philosophy of science: history, contributions, and challenges. Synthese, 177(3), 337–362

## Part I: Theoretical Considerations

### Does feminism contribute to a naturalistic epistemology?

**Blanca Luque Linero**
CFCUL, University of Lisbon

Although naturalist epistemology and feminist epistemology differ in their specific aims, they are both based on a common idea; they aim to fight against the positivist ideals of traditional epistemology, characterized by Reutsche (2020) as "pristine" because of its absolute and timeless pretensions in the characterization of knowledge. However, while the first has become one of the most important approaches in the philosophy of science today the contributions of the second remain marginal.
Our aim is to point out the contributions of feminism to naturalism to show the necessity of its inclusion and recognition within naturalist epistemology. The interest that this may arouse is related to the relevance and importance of the naturalist approach.
To do that, we will focus, in particular, on the contributions of empiricist feminism, represented by authors such as Longino (2005), Anderson (1995) or Nelson (1995).
In short, if the aim of naturalist epistemology is to move away from traditional aprioristic consideration and towards actual scientific practice, the contribution of empiricist feminism becomes fundamental as it points out the different roles of feminist scientific practice, that are usually excluded from mainstream epistemological investigations.

Anderson, E. (1995) Feminist epistemology: An Interpretation and a Defense. Hypatia, 10 (3): 50-84.
Longino, H. (1981) Scientific objectivity and feminist theorizing. Liberal Education, 67 (3): 33-41.

Nelson, L.H. (1995) A feminist naturalized philosophy of sciences. Synthese, Feminism and science, Springer, 104 (3): 399-421.
Okruhlik, K. (1994) Gender and the Biological Sciences. Canadian Journal of Philosophy, Suppl. (20): 21-42.
Reutsche, L. (2020) What it ś like to be a woman in philosophy of physics. The Routledge Handbook of feminist Philosophy of Science Routledge, University of Michigan.

### Challenging patriarchy and hierarchies of knowledge in defining progress

**Elisa García Lara**
Independent scholar

There is a current trend in our Western society to think of progress as any scientific innovation, regardless of its social improvement or implications.
This assumption is grounded in hierarchical and patriarchal thinking that overvalues “masculine”-associated traits while delegitimizing “feminine”-associated ones. Specifically, the historical association of objectivity and “hard sciences” with masculinity, and subjectivity and “soft sciences” with femininity, has situated “hard sciences” in a hegemonic position, causing the scientific community to resist opening a dialogue with more subjective and "feminine" disciplines.
In the biomedical sciences, this lack of communication and collaboration has resulted in phenomena such as (1) the production of medicalized plasters for social systemic problems; (2) the boost of research in super longevity and rejuvenation, avoiding questioning the potential social implications this might have.
This talk is rooted in my personal experience as a biomedical scientist and seeks to challenge the hierarchy of thought itself by accepting the “feminine” and liberating it from its negative and fluffy connotations so we can take it seriously. For instance, questioning and destabilizing these rooted beliefs and hierarchies could eventually lead us to overcome the binary narratives that characterize our collective mindset to define a more critical, representative and mindful progress.

### Making Science Worthy of Trust: Lessons from Feminist Epistemology

**Elena Popa**
Jagiellonian University, Krakow

Trust in science has been subject to increasing philosophical attention, particularly concerning health and environmental issues, with current approaches focusing on epistemic or ethical aspects of the problem. This paper will draw from analyses of trust that seek to be politically valuable, connecting trust to acting as justice requires (Krishnamurthy 2015) and concerns about justice and the debate over values in science (Ludwig 2023). Ludwig highlights that discussions of trust neglect questions over what values are just or politically legitimate, focusing on anti-science populism while neglecting legitimate concerns of oppressed groups. I will argue that classic feminist contributions to philosophy of science (Longino 1995; Haraway 1988; Harding 1991; 1992) can explain the current crisis of trust, as well as provide the tools to shape science as worthy of trust. Despite disagreements between their overall views, the virtues highlighted by Longino, Haraway’s notion of expanding vision, and Harding’s standpoint epistemology all draw attention to neglected perspectives and research goals beyond the pursuit of profit and domination. I will show how how these contributions originally

shaped around scientific objectivity, can help move forward current investigations over trust.

Haraway, D. (1988). Situated knowledges: The science question in feminism and the privilege of partial perspective. Feminist studies, 14(3), 575-599.
Harding, S. (1991). Whose science? Whose knowledge?: Thinking from women's lives. Cornell University Press.
Harding, S. (1992). Rethinking standpoint epistemology: What is" strong objectivity?". The centennial review, 36(3), 437-470.
Krishnamurthy, M. (2015). (White) Tyranny and the democratic value of distrust. The Monist, 98(4), 391-406.
Longino, H. E. (1995). Gender, politics, and the theoretical virtues. Synthese, 104(3), 383-397. Ludwig, D. (2023). Science and Justice: Beyond the New Orthodoxy of Value-Laden Science Preprint, URL = <http://philsci-archive.pitt.edu/21647/>.

## Part II: Gendered Norms in Scientific Practice

### Towards an Epistemically Robust Midwifery in India

**Abhishek Kashyap**(*) **& Priya Sharma**(**)
(*) Indian Institute of Technology Guwahati; (**) Indian Institute of Technology Bombay

The Indian government rolled out the ‘Guidelines on Midwifery Services in India’ in 2018 with the stated objective of training and integrating midwives into the public health system. The guidelines seek to establish practices that will promote respectful maternity and newborn care, reduce over-medicalization, decongest higher levels of healthcare facilities, and expand access to quality maternal and neonatal services in remote areas. A guiding motivation for this initiative is to ensure compliance with the Sustainable Development Goals for maternal and newborn health. In this presentation, we intend to critically examine this initiative and suggest ways that would make midwifery in India epistemically robust. We locate midwives as producers of knowledge and interrogate the practices which would enhance the objectivity of diagnosis during childbirth. More specifically, we emphasize on the contextual salience of two requirements that have been identified in Longino (1990, 2001), namely, the responsiveness of the epistemic community to criticism, and the inclusiveness of intellectual authority. We argue that a failure to meet these two requirements will prevent such an initiative from meeting its stated objectives. We conclude by offering suggestions that would enhance objectivity in diagnosis and lead to an epistemically robust midwifery practice in India.

Government of India, Ministry of Health and Family Welfare, 2018, Guidelines of Midwifery Services in India, New Delhi: Author.
Longino, Helen, 1990, Science as Social Knowledge, Princeton, N.J.: Princeton University Press.
Longino, Helen, 2001, Fate of Knowledge, Princeton: Princeton University Press.

### Demystifying ‘camouflaging’ in autism

**Emma Otterski**
The University of Edinburgh

‘Camouflaging’ – the use of compensatory strategies in social situations and repression of specific behaviours – is increasingly given as a reason for the late and under- diagnosis of

autistic women and girls (Attwood, 2007; Hull, Petrides and Mandy, 2020) who are thought to be more motivated to camouflage (e.g., Tierney, Burns and Kilbey, 2016) or 'better' at doing so (e.g., Gould and Ashton-Smith, 2011). Autistic people have socio-communicative difficulties, while camouflaging appears to show that these can be compensated for in some way or covered up.
However, it is not always clear whether 'camouflaging' refers to a clearly demarcated phenomenon. This has caused some to be sceptical about the prospect of camouflaging research uncovering anything novel about autism (Fombonne, 2020). This paper agrees that the concept of camouflaging is ambiguous at present but suggests that the ambiguity has proved fruitful, both in terms of autistic people's self-understanding and in terms of teasing apart related phenomena in empirical research. With regards the latter, I outline how the two operationalisations of camouflaging in the empirical research give us traction on gender bias in diagnostic tests, socialisation differences that may lead to 'implicit' compensation, and intentional compensation.

### Sex traits and individual differences: Binary assumptions in biological practice

**Alex Thinius**(*) **& Rose Trappes**(**)
(*)Harvard University; Radboud University; (**) University of Exeter

Life scientists frequently treat sex as an "easy difference," a low-hanging binary variable that explains further phenotypic differences for minimal effort (Trappes under review). Yet, as decades of feminist research has taught us, variation is rife when it comes to sex (Richardson 2013; Fausto-Sterling 2012; 2020; Voß 2010). Scientists are constantly dealing with variation in the would-be sex traits of the organisms they encounter; from genitals and hormones to morphology, neurology and behavior, there is rarely (if ever) a categorical binary. When actively facing such variation, researchers employ several conceptual strategies. One of them is treating variation as idiosyncratic divergences (Thinius under review). By individualizing variation in sex traits, researchers stabilize the ontological picture that sex is "basically" binary and as such self-evident. This stabilized ontological picture in turn supports the use of sex as a binary explanatory variable in life sciences research. In this presentation we examine this stabilizing strategy of sex trait identification, distinguishing sex traits from individual variation. We highlight how binary sex is both assumed and constructed in the ways life science researchers deal with variation, and we explore the consequences this has for explanatory practices and biological concepts.

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Richardson, Sarah S. (2013): Sex Itself: The Search for Male and Female in the Human Genome. Chicago / London: The University of Chicago Press.
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Trappes, Rose. Under review. "The easy difference: Sex in behavioural ecology" in Purple Brains, Working on the limits of feminist philosophy, edited by Annabelle Dufourcq, Annemie Halsema, Katrine Smiet & Karen Vintges.
Voß, Heinz-Jürgen (2010): Making Sex Revisited: Dekonstruktion des Geschlechts aus biologisch-medizinischer Perspektive. Bielefeld: transcript Verlag

## Symposium #5: Biological Mistakes: Metaphysical Foundations and Experimental Promise

Org: David S Oderberg (University of Reading)

We propose a symposium on 'Biological Mistakes', the subject of our research project Mistakes in Living Systems, funded by the Templeton Foundation as part of their global research programme Agency, Directionality and Function.
Biologists make mistakes. There are mistaken biological theories. But the targets of their investigation - organisms, parts, sub-systems, species, populations - also make mistakes. We humans make mistakes in ways that usually involve self-awareness, or free choices, or moral responsibility, care and attention, effort, and so on. But when a fish takes the bait, a flock of birds fly into a wind turbine, or an antibody is fooled by a pathogen, they also get things wrong, even without the characteristics that accompany human mistake making. This phenomenon cries out for conceptual and metaphysical analysis, along with application to empirical work in biology.
We will outline the conceptual framework for the investigation of mistake-making by organisms and other living systems, which we argue is a phenomenon ubiquitous in biology across all scales and levels. Mistake theory is a unifying scheme for biological research, complementary to existing powerful frameworks. Not only does it focus on the normativity inherent in living systems, but it is capable of generating novel, testable hypotheses of interest to the working biologist.

Biological Mistakes: What They Are and What They Mean for the Experimental Biologist' (D.S. Oderberg, J. Hill, C. Austin, I. Bojak, F. Cinotti, J.M. Gibbins), British Journal for the Philosophy of Science, doi 10.1086/724444
'Mistake-Making: A Theoretical Framework for Generating Research Questions in Biology, With Illustrative Application to Blood Clotting' (J. Hill, D.S. Oderberg, J.M. Gibbins, I. Bojak), The Quarterly Review of Biology 97 (2022): 2-13

### Biological Mistakes: A Conceptual and Metaphysical Overview

**David S Oderberg**
University of Reading

Mistake-making is a ubiquitous feature of living systems. Organisms get things wrong, but so do collectives and sub-organismal systems and parts such as cells. I present the outlines of the theory of biological mistakes, giving key definitions relating mistakes to agency, function, threat, and environment. Mistake-making is a robustly normative phenomenon, involving the concept of an organism's flourishing or well being, which is subserved by its effective action in its environment. Mistakes threaten such action, undermining function broadly and normatively conceived. I show the constraints mistake theory places on the definition of 'function' in the longstanding functions debate, focusing on the popular selected effects theory. Several objections are assessed, concerning the relativity of mistakes, the ability of mistakes to generate novelty, and whether the concept of threat should be part of the definition of mistake. Finally, I briefly show that mistake theory can be a productive tool for generating testable hypotheses of interest to the working biologist.

**Biological Mistakes and the Ontology of Powers**

**Christopher Austin**
University of Reading

Some things happen of necessity, others merely happen to occur – but are there things that happen to occur but should not have? The latter constitute mistakes and, prima facie, they are everywhere – from our setting the wrong cutlery at the dinner table to young turtles crawling in the wrong direction to the safety of the sea. As obvious and ubiquitous as they may seem, the question of whether mistakes are real is not an unfounded one. For inherent in the nature of mistakes is the core concept of normativity – as mistakes imply the existence of states of affairs that are supposed to occur, but which unfortunately do not. Whether normativity is a feature of the ontological fabric of our world, rather than an epistemological by-product of the heuristic framework we use to comprehend its denizens and their activities, is a question at the centre of a long-standing debate in the philosophy of science. In this paper, I will ask: what must the world be like if mistakes are really out there? In answering that question, I will highlight some central aspects of the nature of mistakes that any ontological foundation which purports to include them must somehow accommodate. After showing that even the most promising ontological framework that might do so – namely, a powers ontology – is seemingly not up to the task, I will propose a novel refocusing of the analysis of the nature of mistakes, one centred on the metaphysics of causal feedback and the concept of organismal flourishing.

**Biological Causation, Reductionism, and Mistakes**

**Jonathan Hill**
University of Reading

Following up on arguments presented in the other two papers, I argue that normativity is integral to biological causation. I approach this through a thought experiment based on the observations of Eddington and colleagues (1920) during a solar eclipse, of the displacement of light from a star by proximity to the sun. Among the possibilities for their observations, “which it was especially desired to discriminate between”, they did not consider, “the path of light is influenced by gravity, but not observed in the experiment as the result of a mistake in one or more of the operations of gravity or light”. A possibility which would have been considered routinely in biological research is entirely absent. This we suggest vividly illustrates the distinctive operation of normativity in biology. More generally the conditions for causal sufficiency, causal necessity, and causal closure are profoundly affected by considerations of normativity. In biological systems the sufficient conditions of an event may be present, and the event yet not take place, where there is a mistake in the connection between the conditions and the event. For the same reasons the necessary conditions of an event may be absent, and the event yet take place, where the event mistakenly occurs. The causal closure argument is powerful because it applies equally in the correct and mistaken instances; but it fails to distinguish between them!

**Symposium #7&9: The evolutionary origin of sentience as a bio-philosophical problem**

Org: Davide Vecchi (CFCUL, University of Lisbon)

The evolutionary origin of sentience is a foundational problem in biology. The object of

analysis might be defined (arguably without sufficient precision) as the organismal capacity to have subjective experiences with attractive or aversive qualities, such as pain and pleasure. While most sentience research is focused on animals, the growing literature on plants' behaviour, cognition and putative sentience is an indication of the relevance of the question. Moreover, identifying sentience is fundamental for any ethics that has a sentientist foundation (i.e., whereby suffering grounds moral considerability). A noticeable trend stemming from animal research is that the growing phylogenetic and behavioural evidence is interpreted in terms of widening sentience ascription (as shown by the protection granted to some invertebrate species in some legislative frameworks). Biologically, this interpretive change is rooted in the Darwinian theory of common descent. However, evolutionism by itself is silent on the question of the origin and phylogenetic distribution of sentience. Indeed, this symposium aims to show that there is no straightforward answer to the following question: does contemporary biological research provide good reasons to cut phylogeny sharply between sentient and non-sentient organisms? The symposium features talks on a variety of topics related to sentience research, such as the definition of the object of study (Airoldi), the nature of sentience (Santos), its relation to organismal agency (Esposito) and organismal responses (Baravalle and Vecchi) as well as the status of sentientist ethics (Marques da Silva). The topics will be addressed philosophically, biologically and historically.

**Part I**

### Seeking a definition of sentience apt for sentience research

**Giorgio Airoldi**
UNED; CFCUL, University of Lisbon

Lying at the frontier between the physical and the mental, sentience holds a central role in contemporary philosophy: hypotheses about its ontological status not only transpire in the mind-body debate but also entail profound ethical consequences. Despite such a paramount role, there is little agreement around what sentience is (an ontological property, an emergent phenomenon, an epiphenomenon?), its origin (an evolutionary trait? an adaptation or an exaptation?), and to what extent it is epistemically accessible (beyond its purely physical and functional manifestations). In this talk, I focus on a topic that touches all the above issues: the definition of sentience. On the one hand, intensional definitions appealing to ontological features (e.g. awareness) might entail ethical consequences (e.g. granting/denying protection to some animals). On the other hand, definitions based on extensional properties tend to fall into a "petitio principii" by instrumentally referring to some external evidence of sentience supported by a particular theory (e.g. a view of sentience in terms of mechanically replicable behavioural manifestations of attraction/aversion, supports eliminativism). I shall argue that a proper definition should mix elements of these two extreme positions to avoid the corresponding pitfalls.

### On the nature, origin and explanation of sentience

**Gil Santos**
CFCUL, University of Lisbon

First, I will contrast the panpsychist, panprotopsychist, bio-psychist, and neutral monist

views of the nature and existence (or generation) of sentience. Next, I will argue that the scientific explanation of sentience, as well as the conceptual unpacking of that notion, cannot dispense with a naturalistic emergentist perspective. The main argument is that the problems of the origin and explanation of the qualitative novelties associated with sentience cannot be avoided, regardless of whether one opts for a more discontinuous or gradualist perspective or whether one focuses more on the origin of sentience as such (however defined) or its many kinds or degrees of functional complexity (e.g., in bacteria, plants, animals, etc.).

### "Organismal Agency" in the history and philosophy of the Life Sciences

**Maurizio Esposito**
CIUHCT, University of Lisbon

The talk focuses on the historical and philosophical career of the concept of "organismal agency." By drawing on the neglected studies of Georges Gusdorf, I suggest that the notion of organismal agency emerged out of three great philosophical debates addressing 1) the relations between "wholes" and "parts" in organic entities, 2) the dynamic connection between "external" and "internal" factors accounting for life processes and 3) the dichotomy "creativity" versus "determinism" in nature. I also employ Gusdorf's perspective to address one historical episode that has not received the attention it deserves: the extraordinary intellectual partnership between the polymath Patrick Geddes (1854-1932) and the zoologist John Arthur Thomson (1861-1933) who considered all living forms, from bacteria to mammals, creative agents constantly and actively transforming their abiotic and biotic environments. I conclude by noticing that after WWII, Geddes and Thomson's synthesis emphasizing the centrality of "agency" in biology was replaced by other alternatives where the organism was reconceived as an epiphenomenon of intracellular activities.

## Part II

### Automata, languages and plant cognition

**Lorenzo Baravalle**
CFCUL, University of Lisbon

Computing oriented plant biology is an increasingly growing field. Its applications go from the implementation of non-conventional computers to environmental exploration and monitoring, up to urban sustainable development. The interaction between plants and experimenters has to be established through the implementation of suitable interfaces. This involves, among other things, the choice of proper protocols for communication. In order to interact with the plant, the experimenter must first understand which properties of a natural stimulus make a plant reactive to the environment and, then, encode this information in an artificial signal.
A way to consider the interaction between plants and machines is as an application of automata theory. This approach has already been employed to model non-biochemical reactions and processes. By extending it to machine-plant communication, I aim to identify some constitutive features and limitations of plants' computational power. This kind of analysis is interesting for at least two reasons. First, it provides a conceptual

framework for future research on human-plant interactions. Second, it can be an important building block for a theory of natural automata, aimed to identify hierarchies of computational complexity in biological phenomena.

**Sentience research and criteria of behavioural flexibility**

**Davide Vecchi**
CFCUL, University of Lisbon

Different kinds of evidence are taken into account in sentience research. Given the potential biases of phylogenetic evidence, the analysis of behaviour has a foundational role. In this respect, sentience is associated to high degrees of behavioural flexibility - as the latter is supposed to be evidence of some kind of organismal "choice". Several notions of behavioural flexibility can be distinguished, whereby all are vernacularly contrasted to mechanistic notions of automaticity and determination. I shall attempt to provide a taxonomy of notions of behavioural flexibility and illustrate how such notions might be deployed – whether coherently or incoherently remains an open question - to support sentience ascription claims to different lineages.

**Sentience as the ground for moral standing: from Decapoda to Poales**

**Jorge Marques da Silva**
BIOISI, University of Lisbon

Although the use of the term "sentience" in philosophy dates to the 17th century, its use expanded extraordinarily in the second half of the 20th century, with the emergence of non-anthropocentric ethics. A search for sentience in the animal kingdom began, which required the construction of an evidential basis in support of its existence. The difficulty in establishing, beyond any reasonable doubt, the existence of sentience in animals of intermediate complexity, and the consequences that the matter has for the legislation on animal protection, led to the proposal of the application of the precautionary principle in animal policy. This principle states that minimum criteria must be established for the admissibility of the existence of sentience. This led to the admissibility of sentience in invertebrates, namely molluscs, insects, and crustaceans. In particular, the possibility of integrating decapod crustaceans into animal legislation has been under discussion. In this talk, I will briefly discuss sentience as a criterion for granting moral status, and we will conduct a comparative exercise of the application of the minimum sentience criteria to the orders Decapoda (Animalia) and Poales (Plantae).

**Symposium #8: Science, Expertise and Trust**

Org: Andrei Moldovan (University of Salamanca)

We live in times in which the general public's trust in science and scientific expertise is going through a major crisis (Nichols, 2017). One recent example is the reaction of some sectors of the population to the recommendations the authorities gave during the covid pandemic. These reactions revealed a distrustful reception of scientific information and of the scientific credentials of government made decisions, and in some cases, it showed

how scientific information is manipulated by pseudo-experts (Sorial 2017). In this symposium we discuss three different aspects of this problem, all of them revolving around the notion of "expert" and "expert knowledge" (Goldman, 2001, 2017). First, we look at how, from the philosophy of the social sciences, trust in experts is related to decision-making (Bennett 2020, 2022), especially those decisions that involve uncertainty or complexity in terms of risks and benefits. Second, we discuss the role a "folk philosophy of science" has played a role in the general public's expectations of the kind of results that science should provide. This image of science corresponds roughly to a conception promoted by traditional philosophy of science (John 2017), and it projects an idealized image of scientific knowledge as a guarantor of absolute certainties. The conceptions of science provided by recent work in philosophy of science are much more nuanced. It is essential to find a way to transfer a more accurate view of science to citizens, as it helps to restore confidence in it. Finally, we look at how a certain view of what critical thinking is, promoted by popular introductions to critical thinking, in academic environments and beyond, has indirectly favored skepticism towards experts (Huemer 2005, Grundman 2021, Matheson 2022). This conception, with deep roots in the history of philosophy, puts too great an emphasis on autonomous reasoning, while portraying appeals to intellectual authorities as unreliable or even fallacious. Such a view of what a rational thinker is needs to be reconsidered, as it undermines trust in scientific knowledge.

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Huemer, Michael (2005). 'Is Critical Thinking Epistemically Responsible?' Metaphilosophy 36, 522–31.
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Sorial, Sarah. (2017). The Legitimacy of Pseudo-Expert Discourse in the Public Sphere. Metaphilosophy 48: 304–24.

### Experts, Trust and Decision

**Obdulia Torres**
University of Salamanca

There are two requirements that an expert must fulfil: being qualified and being trustworthy. Trust is defined as a relation where one of the parts accepts a vulnerable position, assuming the best interests and competence of the other, in return for a reduction in decision complexity. Trust becomes important when there is a power imbalance due to asymmetric information in taking complex decisions in which risks and benefits are implied. The question is, what does trust in experts depend on? First, it

depends on credentials and recognition of peers, but different surveys have shown that trust in science and in scientific experts increases or decreases depending on political ideology. This suggests that both epistemic aspects, as well as ideological issues and moral principles, have an impact on trust in experts. We wonder how this interrelation affects scenarios where decisions implying risk and benefits have to be taken.

### The new face of expertise

**Ana Cuevas Badallo**
University of Salamanca

The general public has been given a stereotypical and idealized characterization of scientific knowledge and how it is produced. This can be called a "folk philosophy of science" (John, 2017). This characterization, which would correspond to a philosophical view that has been outdated for several decades, hypostatized science and makes it a guarantor of absolute certainties. Although this philosophical notion of science has already been superseded, it does not seem that current philosophers of science have been able to convey a more critical view to the public. On the one hand, it is necessary to avoid a relativistic conception of science, arguing that science provides more reliable knowledge, but precisely because it is produced within communities of experts. It is necessary to change the idea of Science with a capital S, for the idea of scientific production by epistemic communities of experts where the values that govern scientific production are precisely those that guarantee the quality of knowledge. The recognition of uncertainty in scientific knowledge and the non-existence of absolute truth must be understood as a virtue and not as a defect. Therefore, we must find a way to transfer this epistemic conception to citizens.

John, Stephen (2018). Epistemic trust and the ethics of science communication: against transparency, openness, sincerity and honesty, Social Epistemology, 32:2, 75-87, DOI: 10.1080/02691728.2017.1410864

### Critical thinking and the epistemic authority of science

**Andrei Moldovan**
University of Salamanca

Various authors (Huemer 2005, Sorial 2017, Grundmann 2021, Matheson 2022) have recently pointed out that classical introductions to logic and critical thinking emphasize the importance of developing reasoning skills and criteria to "decide for ourselves what to think" (Johnson and Blair 1994: 167) about a particular topic under consideration. The insistence on autonomous critical thinking abilities, while motivated by a conception of the rational autonomy of the person that has its historical roots in the Enlightenment, ignores the extent and importance of specialized knowledge in argument evaluation, and can end up fostering, and in some cases does so explicitly, a general mistrust in epistemic authorities. This conception of critical thinking is still very popular and continues to have socially detrimental effects, as it undermines trust in science, and it might indirectly promote science denialism. My aim in this talk is twofold: first, I consider the way in which contemporary approaches to critical thinking treat scientific knowledge and its scope and importance in the evaluation of arguments. Second, I connect the observation made by the authors quoted with the discussion in the literature on argumentation theory – very significant at the turn of the century – which builds on Toulmin's (1958) idea that criteria

for evaluating arguments are field-dependent.

Grundmann, Thomas (2021). Facing Epistemic Authorities: Where Democratic Ideals and Critical Thinking Mislead Cognition. In Sven
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# BIOGRAPHICAL NOTES

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**Adam J. Chin** is a PhD Candidate at the University of California, Irvine, Department of Logic and Philosophy of Science. His main research is in religion-and-science.

**Alberto Colombo** has a background in agro-environmental science. He is currently a Master's student in Cognitive Science at University of Lisbon. He is working on a thesis about depersonalization and the connection between the bodily self and the narrative self. His aim is to assess whether and to which extent the disruption of the sense of self observed in depersonalization also involves the narrative aspects of individuals' identity and how these are intertwined with body representations.

**Alejandro Gracia Di Rienzo** (Caracas, 1998) is a PhD student at the Universidade de Santiago de Compostela. He is writing his doctoral thesis on mathematical structuralism and the foundations of measurement under the supervision of Concepción Martínez Vidal (USC) and Mary Leng (University of York). He graduated in 2020 from the Universidad Autónoma de Madrid and earned a Master's degree from the University of Salamanca with a thesis on classical translations for paraconsistent logics under the supervision of Mara Manzano. In 2022 he received an Extraordinary Prize to the best expedient of the Master in Logic and Philosophy of Science at the University of Salamanca. His main interests are logic, the philosophy of mathematics, and metaphysics. He has participated in the Salzburg Conference for Young Analytic Philosophy (Salzburg, September 2022).

**Alejandro Rosas** obtained his PhD in 1991 at the University of Münster, Germany, with a dissertation on Kant's theoretical philosophy. He later made a turn to philosophical naturalism and began research on the explanation of moral behavior, drawing insights from the evolutionary biology of cooperation and from the behavioral and cognitive sciences. He teaches and does research in the Philosophy Department of the Universidad Nacional de Colombia since 1992. His research has been funded by the Deutsche Forschungsgemeinschaft, the Alexander von Humboldt Foundation, the Konrad Lorenz Institute for Evolution and Cognition Research, and the John Simon Guggenheim Memorial Foundation. His publications can be seen at https://

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**Alessandro Demichelis** is a Ph.D. candidate in Cognitive, Computational, and Social Neuroscience at the IMT School for Advanced Studies Lucca (Italy). His background is in Logic and Philosophy of Science, with a special regard on Philosophy of Medicine and Pharmacology. He specialized in analysing phenomena of resistance to medical practices, such as vaccine hesitancy. As a broader target, he studies the epistemic relationships between experts and non-experts, with a particular focus on the description and definition of the notion of trust. At the moment, he is working in an interdisciplinary collaboration project with the Tuscan NHS called "Spingevacs: SPInte GEntili VACcini Sanitari" with the aim of designing non-incentive based architectures of choice to increase vaccination rates and decrease vaccine hesitancy amongst healthcare personnel.

**Alexander Belak** is a PhD Candidate at the University of Zurich, Department of Philosophy.

**Alexander M. Gerner** is a playwright and researcher in the philosophy of science and technology at the Faculty of Science, University of Lisbon (FCUL). He holds a Ph.D. in History and Philosophy of Science in 2012. He is head of the Philosophy of Technology, Human Sciences, Arts and Society research group at CFCUL and teaches "History and Philosophy of Technology" and "Computers and Society." He is currently writing a book on A.I. avatars. He explores human technology, social resonance, ethics, and aesthetics in a critical approach to algorithmic rationalities in his research on "Hacking Humans. Dramaturgies and Technologies for Becoming Other".

**Alexandros Constantinou** is an MSc Philosophy student at the University of Glasgow, where he also received an MA in Politics & Philosophy. He is a host at the student-led podcast Thoughts: Philosophy Untangled.

**Alex Thinius** is a philosopher and interdisciplinary socio-cultural researcher, specializing in conceptions of sex-gender. They are currently researching "The Reconceptualization of Sexual Difference" at the GenderSci Lab at Harvard University, as NWO Rubicon Postdoctoral Fellow. In 2021, Alex completed a PhD titled Genders as Genres, drawing on social philosophy, metaphysics, and gender studies, at the Amsterdam School for Cultural Analysis. They have since lectured at Universiteit van Amsterdam in the departments of

Literary and Cultural Analysis and in Philosophy.

**Ana Cuevas-Badallo** is Associate Professor at the Philosophy Department, University of Salamanca, and Researcher at the Institute for Science and Technology Studies (Ecyt) at the University of Salamanca (Spain). She received her PhD in Philosophy from the University of the Basque Country. Nowadays she is the head of the Philosophy, Logic, and Aesthetic Department of the University of Salamanca. She published on the epistemology of technological sciences, technological bio-artefacts and public participation in science and technology. She coordinated several research projects on Public Understanding of Science focusing on biotechnology and public participation in scientific and technological controversies. She has been visiting researcher at the University of Helsinki (Finland), the University of Delaware (USA), the University of Delft (The Netherlands) and the University of Valparaiso (Chile). Author of several articles on epistemology, ontology and axiology of technology.

**Andrei Ionuţ Mărăşoiu** is an Assistant Lecturer in the Department of Theoretical Philosophy and a vice-chair of the Faculty of Philosophy at the University of Bucharest. Previously, Andrei was an UEFISCDI postdoctoral fellow, received an ICUB Fellowship for Young Researchers (both at UB since 2020), after having previously gained a PhD in Philosophy from the University of Virginia in 2019, and an MA in Neurophilosophy from Georgia State University in 2013. Andrei's work primarily concerns grasp, understanding and "Aha" moments, at the crossroads of phenomenology, cognitive semantics, philosophy of psychology, and a virtue epistemology of scientific expertise.

**Andrei Moldovan** is Assistant Professor at the Faculty of Philosophy, the University of Salamanca, Spain. He holds a Master in Philosophy from the University of Windsor, Canada (2007) and a PhD in Philosophy of Language from the University of Barcelona (2015) with the thesis "The Literal Meaning of Definite Descriptions". His research focuses mainly on topics of philosophy of language and argumentation theory. He has published articles in journals such as Topoi, Argumentation, Informal Logic, Axiomathes and others. He is part of the team of the research project "The role of distributive and dialogic expertise for the solution of scientific and technological public controversies" (http://expercitec.usal.es). Within this project he works on topics at the intersection between philosophy of language, argumentation theory, epistemology and philosophy of science. He is the director of the Interuniversity Masters Program in Logic and Philosophy of Science (http://epimenides.usal.es).

**Aurore Franco** is a PhD student at the IHPST (Institute of History and Philosophy of Sciences and Techniques) at the University of Paris 1 Panthéon-Sorbonne. She specialized in social and political philosophy at the École Normale Supérieure de Paris and at the École des Hautes Études en Sciences Sociales. Her thesis "Lynn Margulis and the Endosymbiotic Theory" focuses on the specifics of eukaryogenesis and the emergence of its modern theory developed by Lynn Margulis.

**Benjamin Toth** trained in medical sciences and then the history and philosophy of science. His PhD was in the history of randomised controlled trials. In recent years he has focused on the borderland between science and art.

**Bojana Grujicic** is a PhD student in philosophy of neuroscience at the Max Planck School

of Cognition; Humboldt University of Berlin; and UCL.

**Blanca Luque Linero** is a PhD fellow at the Centre for Philosophy of Sciences of the University of Lisbon. She is carrying out a research project on naturalistic epistemology in relation to the scientific-philosophical ideas of the nineteenth century. She graduated in Philosophy at the University of Seville in 2019, with a thesis on Auguste ś Comte Philosophy of mathematics and its application to Astronomy. In 2020 she took a Master ś degree in Philosophy, Science and Values at the University of Basque Country and did her thesis on Naturalism in Auguste Comte ś Positive Philosophy.

**Carla Feliciano** has an academic and professional background in biomedical sciences, namely virus-host interaction and molecular approaches to human transplantation. Currently, she is a Ph.D. student in History and Philosophy of Sciences at the Faculty of Sciences of the University of Lisbon. She studies the Philosophical Challenges in Immunology, more specifically those related to immunological memory. She is an integrated member of the Centre for Philosophy of Science at the University of Lisbon in the Life Sciences Research Group (RG2) and a researcher in the EVORISE project.

**Charlotte Erika Zito** is a Ph.D. student at the University of Geneva under the supervision of Professor Christian Wüthrich. Currently she is working on philosophical issues in the early universe cosmology and in the metaphysics of quantum gravity. She obtained an MA degree in Analytic Philosophy at Università della Svizzera Italiana (Lugano, Switzerland) and an MA degree in Philosophy at University of Studies of Milan (Italy).

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**Paulo Castro** graduated in Anthropology at University Nova de Lisboa in 1996. In 2014 he

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**Pedro Farinha Gomes** is a non-PhD integrated member of the Center for Philosophy of Sciences (CFCUL) and a collaborating member of the Center for Research and Studies in Fine Arts (CIEBA), both belonging to the University of Lisbon. His research is focused on relationships between art and science. In his master's thesis, he made research on the art made at the intersection between science and technology, using concepts from the philosophy of art that allowed him to formulate a theoretical framework covering all the different existing artistic subgenres. In his doctorate, his concerns are the social and human sciences, especially their relationship with the interpretation of art. In the past, he worked in 3D animation and multimedia, having initially studied management and economics.

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**Ray Pedersen**' s research interests span the philosophy of physics, metaphysics, and feminist epistemology. More specifically, their work concerns how we conceptualize the physical properties of ordinary objects in various metaphysical accounts of quantum

mechanics, while simultaneously interrogating how systems of oppression shape agent-relative and global epistemic outcomes, both through the history of physics and in the modern context.

**Riccardo La Bella** studies Logic, Philosophy and History of Sciences at the University of Florence. In 2021 he received his B.S. degree in Philosophy and sciences and psychological techniques from University of Perugia with a dissertation on the problems of mathematical and natural languages in Frege and Quine. His current research concerns philosophy of mind, philosophy of language, epistemology and cognitive semantics.

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**Sâmara Costa** is a PhD Candidate in Philosophy at the University of Porto.

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Physics from the Presidency College of the University of Calcutta, he acquired Bachelors, Masters and Ph. D degrees in Computer Science & Engineering. For almost thirty years he is teaching Artificial Intelligence (and other courses) at graduate and post-graduate levels, as well as conducting training programs for the teachers of technical institutes in India. He has about fifty articles in various international journals and conference proceedings. He has authored a text book on Soft Computing, published by Pearson Education. His areas of interest include Educational Informatics, Artificial Intelligence, Soft Computing, Theory of Computation and Philosophy of Science. He has authored two collections of nonsense poems written in Bengali, his mother tongue.

**Samuel C. Fletcher** is an Associate Professor in the Department of Philosophy at the University of Minnesota, Twin Cities, a Resident Fellow of the Minnesota Center for Philosophy of Science, and an External Member of the Munich Center for Mathematical Philosophy (MCMP), Ludwig-Maximilians-Universität. He received his PhD in Philosophy, with an emphasis in philosophy of physics, from the University of California, Irvine in 2014. Before coming to Minnesota in 2015, he was a Marie Curie Fellow at the MCMP, and since then, has held visiting positions at the Universities of Geneva, Pittsburgh, California at Irvine, Oxford, Bristol, and the London School of Economics. Currently he is also a Humboldt Experienced Research Fellow at the University of Bonn. Much of his research so far has concerned the foundations of physics and of statistics, and how problems in these fields inform and are informed by broader issues in the philosophy of science. He also has interests in the conceptual and physical basis of computation, metaphilosophy, and the history of physics and philosophy of science.

**Sarwar Ahmed** completed his bachelor's degree in physics at the University of Sulaimani, Iraqi-Kurdistan in 2015. By the end of 2019, he moved to Germany to study Philosophy of Science at the University of Hannover, where he earned his Master of Arts in Philosophy of science in 2022. Now, he is in the first years of his PhD at the University of Wuppertal as part of the DFG Research Training Group 2696 “Transformations of Science and Technology since 1800”. His PhD project is titled “From the Atom to the Higgs Boson: Transformations in Scientific Observability”. It is a philosophical project with a historical dimension. His areas of interest are integrated history and philosophy of science (IHPS), philosophy of physics and the interrelated topics.

**Sebastian Horvat** is currently in the last stage of completing his PhD studies at the Faculty of Physics at the University of Vienna, where he has worked on topics in the foundations of quantum mechanics and quantum information theory. He collaborates with Dr Iulian D. Toader on projects in the philosophy of quantum logic. He is going to be a fellow at the Institute Vienna Circle (University of Vienna), where he is going to work on the role of empirical science in logical theory-choice, thereby aiming to contribute to the current discussions concerning anti-exceptionalism about logic.

**Sepehr Ehsani** studied laboratory medicine and pathobiology at the University of Toronto at the BSc (2008) and PhD (2012) levels. While completing his undergraduate degree, he was part of a neuropathology research group, and during his postgraduate study he worked in a protein biology lab with a focus on the prion protein, which has been implicated in a number of neurodegenerative diseases. Sepehr was a postdoctoral fellow at the Whitehead Institute for Biomedical Research and the MIT Computer Science and AI Lab, both in Cambridge, Massachusetts, from 2013 to 2016, working mainly on the

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**Valeria Becattini** holds a Bachelor's degree in Philosophy (University of Florence), and a Master’s in Cognitive Science (Humboldt University). In the last few years, she has been conducting empirical and theoretical research with Dr. Anna Ciaunica (Centre for Philosophy of Sciences of the University of Lisbon, CFCUL) on meditation, time perception, and the epistemology of scientific observations. At the moment Valeria and Dr. Ciaunica, in collaboration with a research team, are running two studies, and working on more than one philosophical paper together. Valeria is also part of the coordination of academic events and workshops. The most recent experience is the management of the It's a kind of 'Blue' Magic Workshop organized by Dr. Ciaunica (hosted by the Champalimaud Foundation in collaboration with CFCUL).

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**Vanessa Triviño** is a philosopher of biology focused on the way metaphysics can help to clarify and characterize conceptual and theoretical problems in biology and philosophy of biology. She graduated in Philosophy in 2012 and obtained a Master's Degree in Contemporary Philosophy in 2013, in the University of Murcia. In 2014 she obtained a PhD fellowship from the Fundación Séneca: Agencia de Ciencia y Tecnología de la Región de Murcia, to work on her Ph.D. In 2019 she obtained her Ph.D on 'Questions at the intersections between metaphysics and biology: towards a metaphysics of biology', at the University of Murcia. After being a lecturer and assistant professor at Rey Juan Carlos University (2019-2022), she is currently an assistant professor at the Complutense University of Madrid.

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**4th Lisbon International Conference on Philosophy of Science - LICPOS 2023**
Satellite event: 2nd Meeting of the Iberian Network of Philosophy of Science (ReIFiCi)

12-15 July 2023
Faculty of Sciences of the University of Lisbon

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