Idealization Across the Sciences
12-14 June, 2019

Institute of Philosophy, Czech Academy of Sciences
Academic Conference Center (AKC), Husova 4a / Jilska 1, Prague

12TH JUNE - WEDNESDAY

09:50 – 10:00	**Introduction**	
10:00 – 11:15	**Dingmar van Eck** (University of Ghent)	Mechanist Idealization in Systems Biology
11:30 – 12:45	**Martin Zach** (Charles University / Czech Academy of Sciences)	On Abstraction and Idealization in Molecular Biology
12:45 – 14:30	**Lunch break**	
14:30 – 15:45	**Alkistis Elliott-Graves** (University of Helsinki / Australian National University)	Agreeing to Disagree: Pluralism about Optimal Model Complexity
16:00 – 17:15	**Michela Massimi** (University of Edinburgh)	The Perspectival Nature of Scientific Representation

13TH JUNE - THURSDAY

10:00 – 11:15	**Demetris Portides** (University of Cyprus)	Decomposition: A mode of Idealization
11:30 – 12:45	**Uskali Mäki** (University of Helsinki / Nankai University)	Idealisation and Omission, Isolation and Abstraction
12:45 – 14:30	**Lunch break**	
14:30 – 15:45	**Angela Potochnik** (University of Cincinnati)	Why It Matters that Idealizations are False
16:00 – 17:15	**Christopher Pincock** (Ohio State University)	A Defense of Veritism about Explanation

14TH JUNE - FRIDAY

10:00 – 11:15	**Ladislav Kvasz** (Czech Academy of Sciences / Charles University)	Idealization in Science: Bridging the Analytic and the Phenomenological Traditions
11:30 – 12:45	**Tarja Knuuttila** (University of Vienna) & **Mary Morgan** (LSE)	De-Idealization - No Easy Reversals
12:45 – 14:30	**Lunch break**	
14:30 – 15:45	**Michael Strevens** (New York University)	The Meaning of Infinity in Idealization

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Alkistis Elliott-Graves (University of Helsinki / Australian National University)

Agreeing to Disagree: Pluralism about Optimal Model Complexity

The debate about the optimal level of *model complexity* is becoming increasingly important in many disciplines. In the first camp are those who argue that models should be simple so as to *reduce* the inherent complexity of systems, making them more tractable and generalizable. In the second camp are those who believe that models should *incorporate* complexity, so as to provide more accurate pictures of complex systems. Illustrating with examples from Sustainability Science, I will show that scientists on *both* sides of the debate are frequently correct, in the sense that the cases (examples of particular studies) they use to support their own position are valid and evidentially strong, as are the cases they use to point out weaknesses of the opposing position. I will argue that many of the differences between the two frameworks arise from different research goals (general vs. particular explanation, long-term vs. short-term prediction, mitigation vs. adaptation etc.), while the aforementioned weaknesses often stem from a mismatch between the stated goal and the method used to achieve it. Thus, I advocate for a more pluralistic framework which accommodates multiple related but independent models. This conclusion also has implications for accounts of scientific disagreement, as it provides an argument in support of a certain type of epistemic diversity.

Tarja Knuuttila (University of Vienna) & **Mary Morgan** (LSE)

De-Idealization - No Easy Reversals

De-idealization as a topic in its own right has attracted remarkably little philosophical interest despite the extensive literature on idealization. One reason for this is the often implicit assumption that idealization and de-idealization are, potentially at least, reversible processes. We question this assumption by studying the challenges of de-idealization through four categories: de-idealizing as re-composing, de-idealizing as re-formulating, de-idealizing as concretizing, and de-idealizing as situating. We will draw on examples from economics and the existing literature on the philosophy of economics on model application. As our discussion shows, models are much more inflexible objects than the reversal thesis would have us believe—and de-idealization emerges as creative a part of modeling as any other dimension of it.

Ladislav Kvasz (Czech Academy of Sciences / Charles University)

Idealization in Science: Bridging the Analytic and the Phenomenological Traditions

Philosophical analysis of idealization in science has been developed in two rather independent traditions. In the tradition of analytical philosophy idealization is usually understood as a simplification or deformation of the description of a certain physical system, of a particular phenomenon or of a natural law. On the other hand in the phenomenological tradition idealization is understood in a more radical way, as a quantification of a certain phenomenon of the life-world in the process of measurement the following replacement of that phenomenon by its mathematical representation. The aim of the present paper is to give a short account of these two notions of idealization and to try to clarify their relation. I will argue that both these notions of idealization describe really existing processes in science and thus they do not exclude, but rather complement each other. In the concluding part of the paper a third notion of idealization will be sketched. It is a notion of idealization that has not received due attention in the literature so far.

Michela Massimi (University of Edinburgh)

The Perspectival Nature of Scientific Representation

In this talk I ask the following question: what makes a representation perspectival? And what is distinctive about it? I use an analogy with art to explicate two possible ways of understanding the perspectival nature of a scientific representation and I will defend the second one with an example taken from the history of the electron around 1897-1906.

Uskali Mäki (University of Helsinki / Nankai University)

Idealization and Omission, Isolation and Abstraction

Sometime in the late 1980s, a practice started spreading in political philosophy and philosophy of science of distinguishing between "abstraction and idealization" as two distinct ways of creating theories and models, put in terms of truth and falsehood, omission and addition. In 1992, I proposed a somewhat different image, distinguishing between idealization and omission as techniques of isolation. Abstraction on this image was to be a species of isolation, viz what I called vertical isolation, effected by elimination of token detail (or specific detail at higher levels of abstraction). Abstraction would be the reverse of concretization. My proposal was adopted in limited circles, while the dominant slogan "abstractions and idealizations" prevailed. I now want to revisit the dominant view and its later refinements, and contrast it with my alternative view, also with later refinements.

Christopher Pincock (Ohio State University)

A Defense of Veritism about Explanation

Veritism about explanation is the view that truth is a necessary condition on genuine explanation. After clarifying what veritism does and does not involve, I respond to several recent objections to veritism that purport to draw on scientific practice. Five sorts of cases are often emphasized: (i) explanations that use entities like models that are not truth apt, (ii) past scientific theories that explain, despite their falsity, (iii) explanatory fictions or fables, (iv) abstract models that explain despite the omission of relevant details, and (v) idealized models that explain despite the distortion of relevant factors. I show how a defender of veritism has the resources to address these cases through a principled interpretation of these scientific practices.

Demetris Portides (Univerity of Cyprus)

Decomposition: A mode of Idealization

Simplifications are ubiquitous in scientific model building. One way by which modelers simplify is by idealizing. It is common to identify two modes of idealization. Namely, leaving out actual features of physical systems from scientific models and modifying aspects of the features retained in the models. Some philosophers call the first mode abstraction and the second idealization, but the names used are not of much importance. In this paper I want to identify a third mode of idealization, which I call decomposition. This mode involves the conceptual act of isolating a cluster of constitutive components of a physical system. I draw from modeling in nuclear physics (which can be easily extended to most applications of Quantum Mechanics), from examples of models in hadron physics, and from examples of models in evolutionary theory, in order to argue that it is quite common in model building to pursue idealizing assumptions beneath which lies decomposition. Furthermore, I argue that this mode of idealization, in particular, demonstrates that one of the purposes of idealizations (other than the obvious pragmatic purpose of simplifying the mathematics involved) is to either gain understanding, or to provide an explanation, for the processes involved in giving rise to a certain behavior of the system under study.

Angela Potochnik (University of Cincinnati)

Why It Matters that Idealizations are False

An increasing range of philosophers of science believe the use of idealizations in science is justified, including in permanent roles. Disagreement now largely regards how broadly idealizations can be employed and the epistemic consequences of their use. In this talk, I argue that idealizations are extremely widespread and comparatively little is needed to justify the use of most idealizations. In other words, idealizations are rampant and unchecked. I then argue that it is philosophically important to emphasize the ways in which idealization involves a sacrifice of truth. The recognition that false posits positively contribute to science's epistemic success sheds light on the nature of that epistemic success, as well as ways in which the features of science are shaped by its practitioners and audience.

Michael Strevens (New York University)

The Meaning of Infinity in Idealization

The use of infinite idealizations in models can be a complicated, even a dangerous, enterprise. According to John Norton, some infinite idealizations verge on incoherence. On my own view incoherence is typically avoided, but at the cost of models that represent infinitude only in the most nominal sense. Why bother? What is so valuable about infinity in idealization? In this paper I develop ideas from previous papers about the "code of idealization", a system of conventions for communicating theses about difference-making when deploying scientific models for the purposes of explanation, prediction, and control.

Dingmar van Eck (University of Ghent)

Mechanist Idealisation in (Systems) Biology

Whereas idealisation is part and parcel of scientific mechanistic modelling, idealisation in the philosophical literature on mechanistic explanation has garnered scant attention. We seek to add momentum to this important (but underdeveloped) line of research by elaborating two (related) explanatory functions of idealisation in mechanistic models as used in systems biology. The first function concerns explaining the presence of structural/organizational features of mechanisms by reference to their role as difference-makers for performance requirements. The second concerns tracking counterfactual dependency relations between features of mechanisms and features of mechanistic explanandum phenomena. To make these functions salient, we discuss systems biological research on the mechanism(s) for countering heat shock—the Heat Shock Response (HSR) system—in *Escherichia coli* (*E.coli*) bacteria. We also draw a general lesson from our research: ontic constraint views on mechanistic explanation provide uninformative normative appraisals of mechanistic models.

Martin Zach (Charles University / Czech Academy of Sciences)

On Abstraction and Idealization in Molecular Biology

Abstraction and idealization are two notions that are most often discussed in the context of assumptions employed in the process of model-building. However, closer inspection shows that the standard construal of these notions turns out to be problematic. I further argue against a recent attempt to pick a fight with the mechanistic account of explanation. As the objection goes, the mechanistic view of explanation cannot account for the practices of idealization. Using an example from molecular biology that the critics themselves rely on, I argue that the objection is misguided because the critics fail to adequately characterize both abstraction and idealization. Finally, I caution others to pay more attention when speaking of abstraction and idealization in a context where these concepts play a significant role, such as the one on mechanistic explanation. Arguably, this is important as some have embraced the criticism without realizing that it builds on confused notions.