

INDISPENSABILITY AND EXPLANATION **WORKSHOP**

Monday, November 19, 2012 - Tuesday, November 20, 2012

IHPST
Salle de Conférences
13, rue du Four, 75006 PARIS
1^{er} étage

Organisateurs

Denis Bonnay, Marco Panza, Fabrice Pataut

PROGRAM & ABSTRACTS

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Monday, November 19, 2012

Morning

10:00 - 12:00

David Liggins

(Philosophy, University of Manchester)

THE FAST LANE

Respondent

Matteo Plebani

(Philosophy, Università Ca' Foscari, Venice)

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Afternoon

14:30 - 16:30

Mark Colyvan

(Philosophy, University of Sidney)

THE INS AND OUTS OF MATHEMATICAL EXPLANATION

Respondent

Fabrice Pataut

(Philosophy, IHPST)

Coffee Break

17:00 - 19:00

Daniele Molinini

(Philosophy, REHSEIS, SPHERE, Paris)

EVIDENCE, EXPLANATION, ENHANCED INDISPENSABILITY

Respondent

Andrea Sereni

(Philosophy, Università Vita e Salute San Raffaele, Milan)

Tuesday, November 20, 2012

Morning

10:00 - 12:00

Jacob Busch

(Philosophy, University of Aarhus)

THE IBE BABY AND THE MATHEMATICAL BATHWATER

Respondent

Joshua Hunt

(Philosophy, University of Pittsburgh)

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Afternoon

14:30 - 16:30

Christopher Pincock

(Philosophy, University of Missouri)

PRINCIPLED LIMITATIONS ON INFERENCE TO THE BEST EXPLANATION

Respondent

Denis Bonnay

(Philosophy, Université Paris Ouest - Nanterre)

Coffee Break

17:00 - 19:00

Marco Panza

(in collaboration with Andrea Sereni)

(Philosophy, IHPST)

THE VARIETY OF INDISPENSABILITY ARGUMENTS

Respondent

Henri Galinon

(Philosophy, Université Blaise Pascal, Clermont-Ferrand)

JACOB BUSCH
(*Philosophy, University of Aarhus*)

THE IBE BABY AND THE MATHEMATICAL BATHWATER

Indispensabilists like Colyvan and Baker have argued that mathematics is indispensable to science in the sense that mathematics raises the theoretical virtues of theories, making theories in which mathematics feature “best” theories on (probably) most standards of theory evaluation. Therefore the existence of mathematical entities can be argued for by using inference to the best explanation (IBE). In arguing in this way, it appears that both Colyvan and Baker believe that IBE is a reliable principle of inference. When presenting this line of arguing, Colyvan (*Colyvan 2001 and Colyvan 2006*) suggested that this ought to make indispensability considerations particularly convincing to scientific realists (as they in large part accept IBE).

Because the reliability of IBE has to be argued for (it cannot be taken for granted), the challenge for a scientific realist is in part to show that theoretical virtues are truth tracking. However, in this process, it appears that the role of mathematics in scientific theories may play a surprising part in putting the reliability of IBE, based on widely recognised truth tracking theoretical virtues, in jeopardy. I argue that this will be all the more obvious once we recognize that the appropriate contrast class for evaluating the benefit of mathematics to scientific theories are mathematized *vs.* nominalized theories, rather than the set of “candidates for being a best theory” *vs.* the set of non-appropriate candidates.

Respondent
JOSHUA HUNT
(*Philosophy, University of Pittsburgh*)

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MARK COLYVAN
(*Philosophy, University of Sidney*)

THE INS AND OUTS OF MATHEMATICAL EXPLANATION

Proofs of mathematical theorems tell us that the theorems are true, but some proofs go further and tell us why the theorems are true. That is, some, but not all, proofs are explanatory. Call this “intra-mathematical explanation”. It has been argued that whenever there are physical applications of the theorems in question, we also have mathematical

explanations of physical phenomena. Call this “extra-mathematical explanation”. In this paper I will consider both intra- and extra-mathematical explanations and discuss why they are of philosophical interest. I will also make some speculative remarks about two promising accounts for a theory of intra-mathematical explanation.

Respondent

FABRICE PATAUT

(Philosophy, IHPST)

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DAVID LIGGINS

(Philosophy, University of Manchester)

THE FAST LANE

I discuss a neglected sort of response to the indispensability argument (IA). First of all, I’ll investigate the metaphysical commitments of platonists who endorse IA. This reveals some resources which nominalists are entitled to use. Then I’ll present the neglected response to IA — a liberalized version of Field’s — and discuss its significance. I argue that if it succeeds, it provides a new refutation of IA, and that, even if it fails, its failure may bolster some of the fictionalist responses to IA already under discussion.

Respondent

MATTEO PLEBANI

(Philosophy, Università Ca’ Foscari, Venice)

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DANIELE MOLININI

(Philosophy, REHSEIS, SPHERE, Paris)

EVIDENCE, EXPLANATION, ENHANCED INDISPENSABILITY

The first step in every analysis of the notion of mathematical explanation should be a plausible answer to the following question: What is a genuine mathematical explanation in science and on what basis do we consider it as such? This is a question that unveils the philosophical conception of the philosophers engaged in the debate and which represents a particularly urgent starting point in the context of the enhanced indispensability arguments (EIA) debate. In this paper I will start by addressing this question,

which I call the “question of evidence”. I will maintain that scientific practice does provide an indicator of the goodness of an explanation and, therefore, that the move made by philosophers such as Alan Baker (who refers to genuine mathematical explanations by appealing to the observation of scientific practice and then plug them into the new indispensability argument) is perfectly legitimate. However, I will criticize the claim that the notion of the explanatory power of mathematics has some ontological import in the EIA. I will maintain that the “genuineness” of mathematical explanations of scientific facts is dependent on pragmatic criteria and therefore cannot be used to establish existential claims about numbers (or, more generally, about mathematical objects). To illustrate my point, I will provide two examples of mathematical explanations in science that are dependent on such pragmatic constraints. These examples show that genuine mathematical explanations in science are dispensable (in the sense intended in EIA) because they depend on scientists’ preferences and interests.

Respondent

ANDREA SERENI

(Philosophy, Università Vita e Salute San Raffaele, Milan)

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MARCO PANZA

(IN COLLABORATION WITH ANDREA SERENI)

(Philosophy, IHPST)

THE VARIETY OF INDISPENSABILITY ARGUMENTS

The Indispensability Argument (IA) comes in many different versions that all reduce to a general valid schema. Providing a correct IA reduces to providing a full interpretation of the schema according to which all premises are true. Hence, arguing whether IA is valid results in wondering whether the schema admits such an interpretation. In the case of IA with explanation, it is doubtful that this could be obtained.

Respondent

HENRI GALINON

(Philosophy, Université Blaise Pascal, Clermont-Ferrand)

CHRISTOPHER PINCOCK
(Philosophy, University of Missouri)

PRINCIPLED LIMITATIONS ON INFERENCE TO THE BEST EXPLANATION

Some discussions of inference to the best explanation (IBE) defend it by tacitly restricting this form of ampliative reasoning to special situations. One example of this approach is Lipton's defense of IBE only in cases where the explanations are both causal and contrastive. However, other influential discussions of IBE view it as having a much wider scope. Harman, for example, argues that IBE is involved even in simple forms of reasoning like enumerative induction. In this paper, I sketch a third position that claims that IBE can be applied more widely than Lipton acknowledges, but not as widely as Harman maintains. These limitations result from an analysis of what explanations accomplish and suggest that IBE arguments for the existence of abstract objects face significant obstacles.

Respondent
DENIS BONNAY
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