New Directions in the Philosophy of Science

Series Editor
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The philosophy of science is going through exciting times. New and productive relationships are being sought with the history of science. Illuminating and innovative comparisons are being developed between the philosophy of science and the philosophy of art. The role of mathematics in science is being opened up to renewed scrutiny in the light of original case studies. The philosophies of particular sciences are both drawing on and feeding into new work in metaphysics and the relationships between science, metaphysics and the philosophy of science in general are being re-examined and reconfigured. The intention behind this new series from Palgrave Macmillan is to offer a new, dedicated, publishing forum for the kind of exciting new work in the philosophy of science that embraces novel directions and fresh perspectives. To this end, our aim is to publish books that address issues in the philosophy of science in the light of these new developments, including those that attempt to initiate a dialogue between various perspectives, offer constructive and insightful critiques, or bring new areas of science under philosophical scrutiny.

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Rolf Hvidtfeldt

The Structure of Interdisciplinary Science

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Series Editor's Foreword

The aim of this series is to map out exciting new directions in the philosophy of science. Sometimes, this leads to familiar ground being viewed from a fresh perspective; at other times we are taken somewhere entirely different. Such is the case here. As Rolf Hvidtfeldt notes in his introduction, 'interdiscplinarity' is very much a 'hot topic' these days, yet it has not been philosophically analysed. Deploying the tools of philosophy of science—in particular those developed through consideration of scientific representation—Hvidtfeldt offers a novel framework for evaluating the *epistemic* virtues and vices of interdisciplinarity. This stands in stark contrast to the work one tends to find in 'Interdisciplinarity Studies' where a focus on social factors dominates.

Taking representation to be the central activity of science, Hvidtfeldt insists that the effects of interdisciplinarity must be reflected in the relevant representational activities as manifested in scientific publications. In particular, he focuses on the notion of a 'scientific approach', in the sense of a '*a specific way of using a specific vehicle to represent a specific target*.' Identifying the representational vehicle and target may be more or less straightforward, but between the two lies a 'conceptual layer' of assumptions, tools and models, both physical and mathematical, that is often overlooked. This approach-based framework can then be used to supply an analysis of interdisciplinarity in which existing vehicles of

representation can be understood as imported into a new domain or hybridised in interesting ways, with consequent changes to that mediating 'conceptual layer'.

As an illustrative example, Hvidtfeldt looks at a specific interdisciplinary project within research into schizophrenia. Drawing on his own training in the fundamentals of this project, he is then able to identify the relevant vehicles of representation and the associated targets, as well as the various elements of the conceptual layer that are combined, modified and, in some cases, distorted almost beyond recognition. Contentiously perhaps, Hvidtfeldt argues that although this particular project may enrich our understanding of schizophrenia, his application of the approach-based framework reveals certain crucial problems that result from not paying sufficient attention to the difficulties involved in bringing together distinct approaches within an interdisciplinary context. As he concludes, the non-universal nature of certain elements of representation means that importing them into a new context runs the risk of violating the relevant ceteris paribus clauses. And when the scientists involved do not possess the 'deep' expertise associated with the field in which those elements were first developed, serious problems may then arise.

Interdisciplinary work may yield positive benefits, of course, but Hvidtfeldt's point is that it is by means of the application of his approach-based framework that the various elements of such work may be disentangled and the benefits as well as the pitfalls then discerned.

There is, as he acknowledges, much more to be said, not least with regard to the application of this framework to other interdisciplinary case studies as well as to transdisciplinary work. Nevertheless, this book offers perhaps the first clear analysis of interdisciplinarity from the perspective of the philosophy of science and as a result, not only advances this particular debate but also sets out an entirely new direction for the field. In this respect, it represents a very worthy addition to the *New Directions* series.

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Preface

Before embarking on the somewhat complex discussions of this book, a few elucidatory remarks are in place by way of preface.

The book before you is about interdisciplinary science. It will be obvious to most that interdisciplinarity is quite a popular phenomenon in science today. One important question is "Why is interdisciplinarity this popular?" Another equally important question is "Is this popularity merited?" On the one hand, it appears that many activities, which fit the concept "interdisciplinarity" reasonably well, have delivered remarkable results. On the other hand, it is quite clear that we do not have good criteria for evaluating interdisciplinarity at our disposal. There is always a danger of being allured by phenomena which you do not know how to systematically assess.

With this book, I offer a framework for evaluating the extent to which particular cases of interdisciplinary science contribute to raising epistemic standards. The central contribution of this book is an application of recent and contemporary philosophy of scientific representation to cases of interdisciplinarity. This requires some adaptions to the philosophical framework as well as some discussion of how best to distinguish between different scientific approaches. The reward is a method, approach-based analysis, for assessing relevant epistemic aspects of cases of interdisciplinary science. The framework developed in this book is suitable for evaluating existing interdisciplinary projects. It may also, however, provide useful guidance for the ambitious practitioner of scientific crossbreeding.

The home of this project is in philosophy of science. Among people devoted to the study of interdisciplinarity, philosophy of science is not especially popular. Therefore, I believe, there is reason to assume that those engaged in what I refer to as 'Interdisciplinarity Studies' might not welcome my efforts with great enthusiasm. As I will discuss below, it is a broadly established "truth" in Interdisciplinarity Studies that philosophy of science is a redundant (and rather annoying) intellectual exercise, and that it has little relevance for actual scientific activities.

Without doubt, there are some core problems within philosophy of science. One is the trade-off between philosophical scholarship and genuine scientific expertise among theorists. In many cases, philosophers end up discussing issues which practitioners of the relevant types are actually in a much better position to handle (due to their deeper knowledge of the subject matter). On the other hand, many scientists are not motivated, and lack the training, for carrying out philosophical work with the conceptual rigour required. In some ways, then, philosophy of science is built on compromise.

It is my impression, though, that at least some ways of doing philosophy of science have unmistakeable utility. If I did not believe so, I would spend my time on something different. But philosophers should attempt to curb their propensity for trying to come up with a priori answers to questions which are essentially a posteriori in nature. One such question is, of course, whether or not philosophy of science contributes to developing science towards higher standards. This is, in the end, a matter for empirical research.

To handle such questions, we should, perhaps, establish a few new disciplines. A couple of suggestions could be "empirical meta-philosophy of science" and "science studies studies". We could categorise such enterprises as reflexive intradisciplinarity (intelligently?) designed to get to the bottom of what theorising about science is actually good for. It would be nice to have experts trained in these topics who could declare categorically ex cathedra that philosophy of science is immensely important.

Until that is established, I can only hope that reading (and writing) this book appears to be worth the effort.

This book has indeed required substantial effort and has been a long time in the making. Parts of the inspiration for this project popped up

while I was a Masters student at the University of Copenhagen; other parts occurred to me while I was working as a research assistant at a psychiatric facility in the Capital Region of Denmark. Most of the central elements, however, were developed during my time as PhD student at the University of Southern Denmark. I would like to take this opportunity to thank a number of colleagues and friends for constructive discussions of some of the elements that make up this manuscript. These discussions have helped me considerably towards developing and refining the original raw ideas. While preparing this manuscript for publication, I enjoyed the encouragement and support of Department of Communication and Psychology at Aalborg University. Especially worth mentioning is my indebtedness to the Humanomics Research Centre generously funded by The Obel Family Foundation and The Velux Foundations.

To different extents and in different ways, the following have all provided helpful comments and suggestions as well as general encouragement along the way. They have each contributed in their way to the maturation and realisation of this project—probably without realising the full impact of their contributions. I am, obviously, grateful for all the inputs and inspiration.

I list in no particular order: Nikolaj Nottelmann, Signe Wolsgård Krøyer, Finn Collin, Jan Faye, Lasse Johansson, Mikkel Gerken, Simo Køppe, Esben Nedenskov Petersen, Jens Hebor, Mikael Vetner, Sara Green, Jonas Grønvad, Søren Harnow Klausen, Frederik Stjernfelt, Caroline Schaffalitsky de Muckadell, Jacob Luge Thomassen, Søren Engelsen, Cynthia M. Grund, Uffe Østergaard, Stig Børsen Hansen, Tom Børsen, Andreas Brøgger Jensen, Carl Bache, Lars Grassmé Binderup, Thomas Trøst Hansen, Peter Wolsing, Louise Amstrup, Jørgen Hass, Anne-Marie Søndergaard Christensen, Claus Emmeche, Emily Hartz, Joachim Wiewiura, Josef Parnas, Hans Siggaard Jensen, and David Budtz Pedersen.

During my stay in Sydney in the first half of 2015, I received helpful, inspiring, and (in some cases) even friendly comments and suggestions from, among others, John Matthewsson, Peter Godfrey-Smith, Dominic Murphy, Alan Chalmers, Paul Griffiths, Ofer Gal, Georg Repnikov, Sahar Tavakoli, Ian Lawson, and Chloe Collins.

I have further received helpful suggestions from a number of anonymous referees commenting on previous publications of mine.

Let me also express my gratitude towards my parents (without whom… and so on and so forth), all my brothers and sisters, brothers and sisters in law, and nephews and nieces.

Projects such as the one resulting in the manuscript before you take their toll—not just on the individual composing it, but also on the members of his or her nuclear family. In this respect, I must thank and apologise to my wife and our children: You have been incredibly patient and supportive even though your husband and father has been far more tense, preoccupied, and, indeed, physically absent than you (and I) would have preferred. I am fortunate and grateful!

Even though all the people mentioned (and forgotten) above have provided helpful comments and (direct or indirect) encouragement, I have no reason to believe (and considerable reason to doubt) that they or anybody else would approve this manuscript in its entirety. I take full responsibility for all the shortcomings exhibited in the following. It is clear that yours truly is solely to blame for anything that has made its way into this manuscript.

Copenhagen, Denmark Rolf Hvidtfeldt

Contents

List of Figures