This book is a further contribution to the series *Cambridge Studies in Philosophy and Biology*. It is an ambitious attempt to explain the relationship between intelligence and environmental complexity, and in so doing to link philosophy of mind to more general issues about the relations between organisms and environments, and to the general pattern of "externalist" explanations.

Two sets of questions drive the argument. First, is it possible to develop an informative philosophical theory about the mind by linking it to properties of environmental complexity? Second, what is the nature of externalist patterns of explanation? What is at stake in attempting to understand the internal in terms of the external?

The author provides a biological approach to the investigation of mind and cognition in nature. In particular he explores the idea that the function of cognition is to enable agents to deal with environmental complexity. The history of the idea in the work of Dewey and Spencer is considered, as is the impact of recent evolutionary theory on our understanding of the place of mind in nature.

Complexity and the function of mind in nature

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Complexity and the function of mind in nature

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For Rory Donnellan and George Madarasz

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Preface

Although this book was brewing for a number of years, it owes many aspects of its present form to a series of discussions with Richard Francis during 1992 and 1993. Through these discussions a vague plan to investigate the "function of mind in nature," and the relations between intelligence and environmental complexity, took on a more definite shape. It was also in these discussions that this set of questions in the philosophy of mind became linked to more general issues about the relations between organisms and environments, and the general pattern of "externalist" explanations – explanations of internal properties of organic systems in terms of external properties.

So the book is intended to address two types of questions at once. First, is it possible to develop an informative philosophical theory about the mind, by linking mind to properties of environmental complexity? The second set of questions concerns externalist patterns of explanation in general. What are these explanations like? What are the characteristic debates and issues that surround the attempt to understand the internal in terms of the external?

I see these questions as closely linked, and in this book they are often examined simultaneously. However, for practical reasons the book is divided into two parts which are largely self-contained. This division is partly methodological and partly a matter of content. Part I is intended as a self-contained essay in the philosophy of mind, and it is completely nontechnical. Part II is focused on some specific biological models, which treat properties such as adaptive plasticity and their relation to variability in the environment. Part II has some technical discussions, although it is intended to be comprehensible to people with just a very basic knowledge of evolutionary biology and mathematics. Part II could in principle be read by itself, but those who are interested in philosophy of biology, or philosophy of science more generally,

may do better to read the first few sections of Chapter 1, then Chapters 2 and 5, and then Part II. Of course, my hope is that all the philosophers of mind who get to the end of Part I will surge on into Part II, and that the philosophers of science will find themselves reading the rest of Part I as well.

Although much of the book is the product of a particular set of discussions, this acknowledgement should not be taken to suggest that Richard Francis agrees with the positions advanced in this book. One of the useful things about these discussions was the fact that they took place between one person who has long felt the pull towards various externalist views, especially externalist doctrines about the mind, and another person (Francis) who is more constitutionally suspicious of this pattern of explanation. I am also grateful to Richard Francis for his incisive comments on drafts and many solutions to specific problems that arose along the way. In keeping with the focus on environments I should also acknowledge the favorable physical environment in which the original discussions took place – the old Encina Gym at Stanford.

This project has also been greatly influenced by the writings of Richard Lewontin, and by discussions and correspondence with him. That influence will be evident in nearly every chapter. In addition, this book is the product of ten years of thinking about Fred Dretske's work in epistemology and the philosophy of mind. In some respects this book is an attempt to knit together a set of themes from three very different writers: Dewey, Dretske and Lewontin.

Important parts of the treatment of externalist and internalist explanations in biology were worked out in discussions with Rasmus Winther, and these discussions have benefited at many points from his ideas and his scholarship. Other themes in the book derive from my PhD thesis, written at UCSD under the superlative supervision of Philip Kitcher. Key improvements were also made as a consequence of the constructive antipodean skepticism of Kim Sterelny and others in the philosophy department at Victoria University, New Zealand, when I visited there in 1994.

In my attempts to come to grips with the models discussed in Part II of the book, the expertise, advice and patience of Sally Otto were invaluable. The software package *Mathematica* was constantly useful in this part of the project as well. For help on biological matters I am also indebted to Aviv Bergman, Carl Bergstrom, Ric Charnov, Marc Feldman, Deborah Gordon, David Pollock, Jon Seger and Sonia Sultan. Remaining errors in these discussions are my own efforts.

Sally Otto, Tim Schroeder, Elliot Sober, Kim Sterelny, Stephen Stich and Rasmus Winther all wrote detailed comments on earlier drafts. Devin Muldoon assisted with the graphics. For other comments, correspondence

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