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For Carl Ginet

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Preface

My concern with the nature of properties and causation goes back a long ways, but it is only fairly recently that it has led me to focus on the issues discussed in this book—on what it is for properties, especially mental properties, to be physically realized, and how the existence and nature of such realization bears on fundamental metaphysical issues. I have long held that properties are individuated by their causal features. (The strong version of this view is the causal theory of properties, which I first presented in my "Causality and Properties" in 1980—this makes the causal profile of a property essential to it. I still believe this as fervently as ever, but do not defend or assume it in the present work—my purposes here require only the less controversial claim that in any given world each property has its own unique causal profile.) Ten years ago Michael Watkins pointed out to me that my views about this lead naturally to a view—here called the "subset view"—about what it is for one property to be realized in another. I first developed this in "Realization and Mental Causation"—a short version of this was presented at the 20th World Congress of Philosophy in1998 (and published in the Congress Proceedings), and a longer version was published in 2001. Subsequently I realized that physicalism requires an additional sort of realization in which the instantiation of properties in macroscopic objects requires that they be realized in microphysical states of affairs. My first stab at developing this view is my 2003 paper "Realization, Micro-realization, and Coincidence." Although the present book draws on those papers, my views about both sorts of realization have evolved since they were written. Much of material here was developed in a seminar on realization that I gave at New York University in the Spring of 2004.

I am indebted to those who attended my NYU seminar for many helpful questions and comments, and for setting me straight on a number of points—special thanks are due to Geoffrey Lee, Thomas Nagel, and Jonathan Simon. I am also indebted to Carl Ginet, Christopher Hill, and Michael Watkins for reading earlier versions of this work and giving me helpful comments and advice, and to Ned Block for discussion of the issues raised in the final chapter. And I wish to thank three readers for Oxford University Press for their comments and suggestions.

The philosopher with whom I most frequently take issue in this work is Jaegwon Kim. By writing so lucidly, and boldly addressing fundamental issues, Kim inevitably attracts critical fire. He deserves much of the credit for the philosophical progress that results from attention to his work. Hoping that this book represents such progress, I want to add his name to the list of those I thank for their help. I owe a special debt to Michael Watkins, for starting me on the investigations that led to this book and for reading and commenting on two drafts of it.

In writing this book I have drawn on several of my earlier publications. Two of these have already been mentioned: "Realization and Mental Causation," in Carl Gillett and Barry Loewer (eds.), *Physicalism and its Discontents* (2001a), and "Realization, Micro-realization, and Coincidence," in *Philosophy and Phenomenological Research* (2003b). A third is "Kim on Emergence," in *Philosophical Studies* (2002). I am grateful to the editors of the original publications for permission to incorporate passages from them into the present work.

I have also drawn on a paper that is not yet published: "Microrealization and the Mental," to appear in Supervenience and Mind, a festschrift for Jaegwon Kim, edited by Terry Horgan, Marcelo Sabates, and David Sosa, to be published by MIT Press.

I have dedicated this book to Carl Ginet, a good friend for over half a century and a valued colleague for much of that time.

1

Introduction

The things we encounter in the world, including ourselves and other persons, have many properties that do not present themselves as physical properties, including some—in particular mental properties—that have often been thought to present themselves as non-physical. But if physicalism is true, all of these properties must in some sense be determined, constitutively rather than just causally, by physical properties or physical states of affairs. And even if physicalism is not true, many of these properties must be so determined. Even someone who is a dualist about the mental is likely to hold that the colors of things are determined by such things as spectral reflectances, and everyone will hold that functional properties like being a braking system are determined by physical properties of their possessors. In all of these cases we can express the determination claim by saying that instantiations of the properties in question are realized in the instantiation of physical properties of some sort or in physical states of affairs of some sort.

The notion of realization figures prominently in recent discussions of physicalism. Most frequently it figures in discussions of "multiple realization," and the use of this idea to support the version of physicalism (or materialism) known as non-reductive physicalism—it was the acceptance of the idea that the same mental property can be realized in different ways that led to the widespread rejection of the psychophysical identity theory. But it is arguable that this notion provides the most revealing characterization of physicalism itself: physicalism, we can say, is the view that all states and properties of things, of whatever kind, are physical or physically realized.

One of the dictionary meanings of the verb "realize" is "make real." But the ordinary notion that the dictionary definition captures has to do with the fulfillment of plans, intentions, desires, etc.; as we might put it, what realizes a desire is what makes real the intentional object of the desire. And this is not the notion that is in play when a philosopher speaks of mental states as realized in physical states. My desire to see

the Taj Mahal is realized in the dictionary sense by my actually seeing the Taj Mahal, whereas what realizes it in the philosopher's sense is some state of my brain.[1] So "realize" as philosophers use it is a term of art. Still, defining it as "makes real" is a good first stab at capturing its meaning. The relation between a realizer and what it realizes is a constitutive relation—the having of a realized property consists in the having of whatever property realized it on that occasion. The occurrence of realized states is "nothing over and above" the occurrence of their realizers. Another term with much the same meaning is "implement."

Physicalism is often characterized in terms of the notion of supervenience—as the thesis that all properties (and in particular all mental properties) supervene on physical properties. But I think that the characterization in terms of realization is better. Applied to mental properties, the supervenience claim says that for any mental property there is some set of physical properties (its "supervenience base") such that, necessarily, that mental property is instantiated in a thing just in case it instantiates some member of that set. And, as Jaegwon Kim and others have pointed out, that claim is compatible with a version of property dualism on which instantiations of non-physical mental properties are caused by instantiations of physical properties belonging to the supervenience base. It is also compatible with the view that the supervening properties are epiphenomenal. What we must add to the supervenience claim to get physicalism is that the necessitation by the properties in the supervenience base is constitutive rather than causal.[2] And to add that is to make those properties realizers of the property that supervenes on them.

The brief history of the notion of realization is entangled with the history of functionalism in the philosophy of mind. The idea that mental states can be multiply realized figured centrally in Hilary Putnam's rejection of type physicalism in his seminal paper "The Nature of Mental States" (Putnam 1967). It also figured prominently in Jerry Fodor's "Special Sciences" (Fodor 1974). I do not know who was the first to use the word "realizer" for what does the realizing.

[1] I take this example from Malcolm 1984: 97–8. Malcolm presented this as an objection to the view that mental states are realized in neural states—I take it as showing only that the philosophical use of the term "realize" is a slightly technical one.

[2] One might think that we should also add that the necessitation by the properties in the supervenience base is metaphysical rather than nomological. That, indeed, is how it is on my own view. But I want here to leave room for a view according to which properties have their causal profiles contingently, but on which the instantiation of properties in the supervenience base constitutes, rather than causes, the instantiation of the supervening properties.

While discussions of realization have nearly always been discussions of the realization of mental properties, it is important to remember that the application of the notion is much broader than this. As noted earlier, one can speak of colors as realized in spectral reflectances. One can speak of the chemical and physical realization of biological properties, and of the mechanical, hydraulic, electronic, etc. realization of properties like being a braking system, being a clock, etc. Indeed, I will argue later that all properties of macroscopic things that figure in our thought and discourse about them are realized in properties other than themselves.

What I have spoken of so far is what I will call *property-realization*—the realization of one property by another property. More specifically, it is what we can call *same subject property-realization*—realization in which the realized property and its realizer are instantiated in the same thing. We will see that there is room for property realization that is not same subject property realization—in which a property of one thing is realized by a property of a different thing (one coincident with it). Strictly speaking, the realizer in a case of property-realization is the instantiation of a property, i.e. a property instance, and what is realized is likewise a property instance—to speak of one property as realizing another is shorthand for saying that instances of the one are among the possible realizers of instances of the other.[3] Property-realization is so called because the realizer, what does the realizing, is a property instantiation.

But while property-realization is what philosophers usually have in mind when they speak of realization, it is not the only sort of realization. If physicalism is true, all of the facts are determined, constitutively, by the microphysical facts—by how fundamental physical micro-entities are distributed in the world, and how they are, as I will say, propertied and related. And this means that instantiations of properties in macroscopic entities will be realized in, will have as realizers, microphysical states of affairs. These microphysical states of affairs will of course involve

[3] A terminological note: In many contexts, but by no means in all, "instance" and "instantiation" are interchangeable. In such contexts, when what is referred to is a particular state of affairs consisting in a thing's having a property at a time, I will normally use "instance," because it is shorter. On one natural understanding, a property instance can last for a period of time—it can last for as long as a property can be instantiated in a thing. But on my use of the term, a prolonged instantiation of a property would be a series of property instances, each instance being individuated by a moment of time as well as by what property is instantiated and what subject it is instantiated in.

the instantiation of properties, namely properties of the micro-entities involved. But these will not be realizers of the macroscopic property instantiations; what will be constitutively sufficient for the instantiation of the macroscopic properties will not be instantiations of these micro-entity properties, taken individually, but states of affairs that involve these. It is, of course, not only instances of mental properties that have microphysical states of affairs as realizers; this will be true of all instances of properties of macroscopic things—properties like size, shape, color, mass, and electrical charge. This, call it *microphysical realization*, seems to me the most fundamental sort of realization.

In general, X realizes Y just in case the existence of X is constitutively sufficient for the existence of Y—just in case Y's existence is "nothing over and above" X's existence. In the case of property realization what is thus constitutively sufficient for the existence of a property instance is an instance of a different property. In the case of microphysical realization what is constitutively sufficient for the existence of a property instance is a microphysical state of affairs. In both of these kinds of realization what is realized is a property instance; but it is not excluded that other sorts of entities should be said to be realized.

The purpose of this work is to give an account of property realization and microrealization and the relations between them, and to discuss their bearing on a number of central topics in metaphysics and the philosophy of mind. These topics include mental causation, personal identity, material constitution, emergence, and the phenomenal character of sensory states. I will now say a little about how the topic of realization impacts on each of these issues.

As noted above, the view that mental properties are multiply realizable, i.e., that the same property may be, on different occasions, realized by different properties, is frequently invoked in support of non-reductive physicalism because of its apparent implication that a mental property cannot be identical to any one of its physical realizers. But this has led to a backlash. It has been argued by Jaegwon Kim and others that the multiple realization thesis threatens to make mental properties epiphenomenal.[4] The idea is that it is the physical realizers of mental properties that "do the causal work," and that if these are not identical with the mental property then they preempt whatever causal role the mental property might otherwise seem to have. To hold that both the

[4] See Kim 1998 for one formulation of this argument.

realizer and the realized property do the causal work is held to commit oneself to an objectionable sort of overdetermination. This seems to be supported by the standard way of characterizing property realization, namely that a realized property is a "second-order property," the having of which consists in the having of one or another first-order property that plays a certain causal role. The causal role will be that which figures in a functional characterization of the realized property; but it is a consequence of this line of thought that what plays the causal role is not the realized property itself but rather its various realizers.

In the company of many, I find this consequence unacceptable, and one of my major aims here is to give an account of realization that avoids it. We need an account of property-realization that assigns the relevant causal role to the realized property itself, while acknowledging that it is in virtue of causal roles played by its realizers that it is able to play this causal role. And we need an account of microphysical realization that allows an instance of a mental property to have a microphysical state of affairs realizer that is distinct from (although embedded in) the microphysical state of affairs that realized the instance of the physical property that property-realized the mental property on that particular occasion.

It is sometimes assumed that it is only functional properties that can be realized and multiply realized. But I think that this is true only on a conception of functional properties that makes all properties of concrete things functional properties. I believe that it is true of all such properties that they are individuated by causal profiles—by their forward-looking causal features (the contribution their instantiations are capable of making to the producing of various effects) and their backward-looking causal features (the ways their instantiation can be caused). To hold this one needn't hold the "causal theory of properties" I have defended in previous work, the view that for each property there is a causal profile that it has in every possible world in which it can be instantiated, and which is such that having that causal profile is sufficient for being that property.[5] One need only hold that in the actual world, and worlds nomologically like it, having that causal profile is sufficient for being that property. To reject this view is to hold that for all we know what we take to be instantiations of single properties are really instantiations of clusters of causally equivalent properties, and this seems to cut off the

[5] See my 1980 and 1998. See also Appendix, this volume.

possibility of reference to particular properties. And that, I think, is an unacceptable consequence.[6]

If being individuated by a causal profile makes a property a functional property, all properties of concrete things are functional properties. I will suggest later that if we want a narrower notion of a functional property, we should see the functional/non-functional distinction as in the first instance a distinction between two sorts of concepts, where functional concepts specify causal profiles that abstract away from the material compositions of the things having the properties the concepts pick out. We can then say that a property is functional if it is picked out by a functional concept—but since a property picked out by a functional concept may also be picked out by a non-functional concept, properties will be functional or not only relative to ways of thinking about them. At any rate, a property needn't be a functional property in any restricted sense in order to be multiply realizable.

The realizer of a property instantiation should be metaphysically sufficient for the occurrence of that property instantiation. It should be noted that unless one holds (as I do, but will not insist on here) that properties have their causal profiles essentially, one cannot hold that the instantiation of a realizer property is, in and of itself, sufficient for the instantiation of the property it realizes—for if the realized property has a different profile in some other possible world, the instantiation in another world of its realizer in this world may not be sufficient there for the instantiation of that property. We can get around this by including in the realizer the obtaining of a set of causal laws—normally the laws that obtain in the actual world. Where the instantiation of property P is said to realize the instantiation of property Q, the full realizer is the occurrence of P together with the obtaining of the laws that give P the causal profile it has in the world in question. On a causal theory of properties this addition is unnecessary, for on that view the laws are internal to the property.

The relevance of the topic of realization to the problem of personal identity has to do with the commitment of some prominent accounts of personal identity—namely neo-Lockean, psychological continuity, accounts—to the existence of coincident entities. On a neo-Lockean view, it is possible in principle for a person to change bodies by way of

[6] In Chapter 4, section I, I discuss an objection to this argument and offer an additional reason for accepting its conclusion.

a brain-transplant or cerebrum transplant.[7] This has the consequence that persons are not identical with their bodies; also, that they are not identical with biologically individuated human animals. But each person is coincident with a body and with a human animal. It would seem at first that a person and the coincident body and biological animal must have all their physical properties, of whatever kind, in common. And if physicalism is taken as implying that all properties of concrete things supervene on, and are realized in, physical properties, it would seem that the person and the coincident body and human animal must have all of their properties in common. But to avoid what I have called the "too many minds problem," a neo-Lockean must deny that the body and human animal share the mental properties of the person—otherwise there will be three different possessors of these properties, and (so it would seem) three different persons, where there should be only one. Here is one place where we need the notion of property-realization that is not same-subject property-realization. The body's having the physical properties it has necessitates the existence of something having the mental properties of the person, and so does the biological animal's having the physical properties it has; but this "something" is the person, not the body and not the biological animal. I will argue in Chapter 5 that once we see what the microphysical realization of property instances amounts to, the possibility of coincident entities follows as a matter of course. Allowing that possibility requires us to distinguish what I call "thin" properties, properties that can be shared by coincident things of different kinds (e.g. by a person and her body), and "thick" properties that can belong only to things that are of certain sorts and have certain persistence conditions. (One can think of the thinness and thickness as thinness and thickness of causal roles.) Mental properties are thick, and the physical properties a person shares with her body are thin. But not all physical properties are thin; physical properties that are realizers of thick properties, e.g. of mental properties, must themselves be thick.[8]

[7] A reason for making it a cerebrum transplant is to forestall the objection that a full brain transplant might be person-preserving because the full brain includes the brainstem which is the biological control center for the organism, and not because the transplant yields psychological continuity between the "donor" and the "recipient." See Olson 1997.

[8] It may be that thickness can vary in degree, and that where the persistence conditions of two sorts of entities are similar but not identical, there will be some properties that things of these sorts share that cannot belong to things of sorts with very different persistence conditions, and that these properties will count as less thick than properties

Turning to the problem of material constitution, one way the topic of realization is related to this has already been touched on, namely its relation to the idea that there can be coincident entities. Another is its bearing on the debate between endurance ("three dimensionalist") and perdurance ("four dimensionalist") accounts of the persistence of objects through time. I will argue in Chapter 5 that the nature of microphysical realization, and the fact that properties are individuated by causal profiles, favors an endurance account. Finally, I will use the account of microphysical realization to give an account of what it is for a set of micro-entities to constitute a single macroscopic thing. This starts from the point that the microphysical state of affairs that realizes an instance of a property must realize the existence of an object in which the property is instantiated. Once we see how microphysical states of affairs can realize property instances, and how microphysical realizers of different property instances must be related in order for the properties to belong to the same thing, we can see how it is that the micro-entities involved in these states of affairs make up a single object.

It is sometimes suggested that mental properties, and perhaps other properties as well, are "emergent" relative to the physical properties of things, in a way that is incompatible with full-fledged physicalism. Emergentism is usually understood as holding that the emergent properties of a subject supervene on its physical properties. But it is taken to deny that instantiations of emergent properties are physically realized. I will argue, however, in Chapter 4, that there is an account of emergence, based on C.D. Broad's account, which permits instantiations of emergent properties to be physically realized, and is compatible with full-fledged physicalism.

Finally, the phenomenal character of mental states is often cited as a reason for questioning the truth of physicalism. We can take the issue here to be whether qualia, the properties of sensory states that give them their phenomenal character, are physically realizable. It is widely agreed that qualia are not functional properties, and some take this as sufficient to show that they cannot be physically realized. This recently led Jaegwon Kim to qualify his adherence to physicalism, as indicated by the title of his most recent book: *Physicalism, or Something Near Enough*. The reason his view is only "near enough"

that can only belong to creatures of one or the other of the two sorts, but more thick than properties that can be more widely shared. But here I will work with the dichotomy of thick versus thin.

to physicalism is that qualia are not "functionalizable" and so are not reducible to physical properties in the way other mental properties are. I agree that qualia are not functional properties in the restricted sense favored above, but, as I have already said, I do not think that it is only such properties that can be physically realized. In Chapter 6 I will defend the view that qualia are physically realizable. And I will defend a version of this view that allows creatures that are physically very different from us—e.g. the Commander Data of Ned Block's "harder problem of consciousness"—to be phenomenally conscious. Such creatures can have states having phenomenal character—though the qualia that bestow this character will probably be "alien qualia," i.e. qualia different from any of those that figure in our experience.

As I have indicated above, it is not only mental properties that have microphysical state of affairs realizers. And it is not only mental properties that have physical property realizers. This will be true of such functional properties as *being a braking system*, and I think it will be true generally of "determinables," the realizers of determinables being their determinates—e.g. scarlet, a determinate of the determinable red, can be said to be a property-realizer of red. So the notion of physical realization will have application whether or not physicalism is true. Nevertheless, much of this work will be concerned with the physical realization of mental properties, and this does require the truth of physicalism. I will not undertake to establish the truth of physicalism, or to defend it against standard objections; my concern will be with what must be true of mental properties and their instances if physicalism is true.

2

Property Realization

My concern in this chapter is with cases in which the instantiation of one property is realized in the instantiation of another property. In such cases we can say that the one property is realized in the other, as well as saying that the instantiation of the one is realized in the instantiation of the other—property P has property Q as one of its realizers if it can be the case that an instantiation of P is realized in an instantiation of Q. For the most part, I will be concerned with what I earlier called "same-subject property-realization," i.e. with the sort of realization in which the realized property and its realizer are both instantiated in the same subject. But I will also define a notion of realization that permits the instantiation of a property in one object to be realized by the instantiation of a different property in a different object that is coincident with it. To realize is to "make real" in a sense of "makes" that is constitutive rather than causal. So a property-realizer of a property is a property whose instantiation constitutively makes real an instantiation of the realized property.

I

The introduction of the notion of realization was in part a response to type physicalism, the view that mental properties are identical with physical properties. A case for holding that a given mental property is identical with a certain physical property would have to consist largely in the fact that instantiations of the physical property cause the things instantiations of the mental property are taken to cause, and are caused by things that instantiations of the mental property are taken to be caused by. This case is undermined if it turns out that there are other physical properties whose instantiations also have the effects and causes of the mental property instantiations. For the mental property cannot be identical with each of these physical properties if they are not identical

with each other, and there would be no reason for identifying it with any given one of them rather than with any of the others. This is the core of "multiple realizability argument" against type physicalism. And it brings out why accounts of realization have focussed on the causal role played by the realized property and its relation to the causal roles of the realizers.

As noted in Chapter 1, the standard account of same-subject property realization invokes the distinction between first-order and second-order properties. A realized property is said to be a second-order property, and its realizers are said to be first-order properties. Since the properties that realize a property may in turn be realized by other properties, it might be better to say that the realized property is a higher-order property and its realizers are, relative to it, lower-order properties. But for the sake of simplicity I will stick with the formulation in terms of first-order and second-order properties. A second-order property is the property of having some first-order property that satisfies a certain condition. And the condition, at least in the case of first-order properties that realize functional properties, is said to be the having of a certain causal role—being apt to contribute in certain ways to the causing of certain effects, and being apt to have its instantiation caused in certain ways. So, in short, the realized property is the second-order property of having some property or other that plays a certain causal role, and its realizers are the first-order properties that play that role.

A prima facie objection to this account is that it seems to make it true, by stipulation, that any causal role we might want to assign to the realized property is preempted by its realizers. So any effects—e.g. wincing—we attribute to someone's being in pain are really due to whatever neural property realized pain on that occasion.[1] And this of course has the consequence that mental properties, if physically realized, are epiphenomenal.

I favor an account that is designed to avoid this consequence.[2] (Similar views have been advanced by Lenny Clapp and Michael Watkins.)[3] This starts from the point, mentioned in Chapter 1, that properties are

[1] There is of course no pre-emption if we take the property of being in pain and the neural property to be identical. But that won't be a view on which the property of being in pain is multiply realized. It might be urged that even if these properties (being in pain and its physical realizer) are different, the instance of the first just is the instance of the second, and for that reason there is no preemption. That view is discussed, and rejected, in the following section.

[2] See Shoemaker 2001a. [3] See Clapp 2001 and Watkins 2002.

individuated by causal profiles. The causal profile of a property consists of two sorts of causal features—forward-looking causal features, having to do with how the instantiation of the property contributes to producing various sorts of effects (and contributes to bestowing causal powers on its possessors), and backward looking-causal features, having to do with what sorts of states of affairs can cause the instantiation of the property.[4] Realized properties as well as their realizers will have causal profiles, and realization consists in there being a certain kind of relation between the causal profile of the realized property and the causal profile of the realizer. As a first approximation, property P has property Q as a realizer just in case (1) the forward-looking causal features of property P are a subset of the forward-looking causal features of property Q, and (2) the backward-looking causal features of P have as a subset the backward-looking features of Q.[5] In a particular case an instantiation of property P is realized by an instantiation of property Q just in case P and Q are instantiated in the same thing and Q is a realizer of P. Call this the "subset account."[6]

[4] Obviously causal features are a kind of properties—properties of properties. But they are properties of a different sort than those they characterize, and the account here is not meant to apply to them, just as it does not apply to properties of numbers and sets.

[5] My first version of this account, in Shoemaker 2001a, included only the provision about forward-looking causal features. The provision about backward-looking causal features was added to deal with the (alleged) possibility that different properties could share all the same forward-looking causal features, and could be distinguished only by differences in their backward-looking causal features. Whether that is a genuine possibility is controversial; for discussion see Shoemaker 1998. If it is not, the first version will suffice. If it is a genuine possibility, the different properties that share the same forward-looking causal features will be distinguished by their different backward-looking causal features. Suppose that P and Q are two such properties, and that their backward looking causal features are disjoint. Then there will be a third property, call it R, of which both P and Q are realizers—its forward-looking causal features will be the same as those of P and Q (so won't be a *proper* subset of those of either, though they will be a subset of them), and its backward looking causal features will include (will have as proper subsets) those of both. So whenever either P or Q is instantiated, R will be instantiated. This saves the intuition that when things are alike in having properties having a certain set of forward-looking causal features, there is a genuine property they share. I think, in any case, that the forward-looking causal features enjoy a kind of primacy. The backward-looking causal features of a property correspond to possible causes of its instantiation, and in order to discover what these possible causes are we have to see what causes the dispositions to contribute to the production of effects that correspond to its forward-looking causal features.

[6] The view that properties are individuated by causal profiles, and so the subset account of realization that presupposes that view, might be challenged on the grounds that it cannot handle properties like being a heart, or having the function of circulating blood. Something x has that function at a particular time in part because of an evolutionary

The reason why this is only a first approximation is that as worded it makes any conjunctive property a realizer of each of its conjuncts—for the forward-looking causal features of each conjunct will be a subset of the forward looking causal features of the conjunction, and the backward looking causal features of each conjunct will have as a subset the backward-looking causal features of the conjunction. Obviously this must be avoided. We might try to avoid it by stipulating that the subset relation gives us realization only when the one property, the one having the smaller set of forward-looking causal features, is not a conjunct of the other, the one having the larger set of which the smaller set is a subset. But we will see in Section V that this would rule out cases we do not want to rule out, and that a more complex formulation is needed.

The subset account obviously avoids the threat that the causal role of the realized property will be preempted by its realizers. It starts with the assumption that the realized property has a causal profile, and nothing in the account takes this assumption back.

It may seem that the account endorses an objectionable sort of overdetermination. Suppose that one of the forward-looking causal features of P is its aptness in circumstances C to produce effect E, and that this is one of the causal features it shares with its realizers, including property Q. And suppose that P is instantiated in virtue of Q being instantiated, and that effect E is produced. Won't it be true on this account that two different property instantiations, that of P and that of Q, caused effect E? And won't this be overdetermination? We can of course avoid this sort of overdetermination by denying that the instantiation of P and the instantiation of Q are different. But for reasons I will give later, I think it is better to say that the instantiations of P and Q are different, but that the latter includes the former. We can then say that while the Q instance causes E, it does so because it includes the P instance that causes E. We might compare this with the case in which Smith dies as the result of a salvo of shots fired by a firing squad, but in which the only shot in that salvo that hit Smith was the one fired by Jones—the salvo killed Smith, but it did so because it included a particular shot, Jones', that killed Smith. This is obviously not a case of overdetermination.

history that may not be reflected in its causal powers at that time. A defective heart may have that function at a time even if it is not capable of circulating blood; it therefore seems that no property of it at that time has a causal profile that makes it the property of having that function. The problem arises generally for properties that are historical or partly historical. I address this in Chapter 3, note 11.

Here a variation on an example of Stephan Yablo may be helpful.[7] Sophie is a pigeon who has been conditioned to peck at red things. Her sister Alice has been conditioned to peck at scarlet things (and not things of other shades of red). Now a scarlet tile is presented to them, and both peck at it. It seems right to say that Sophie pecks at the tile because it is red and Alice pecks at it because it is scarlet. Now we can take scarlet as a realizer of red. The forward-looking causal features of red are a subset of the forward-looking causal features of scarlet and the backward-looking causal features of scarlet are a subset of the backward-looking causal features of red. This instantiation of red was realized in an instantiation of scarlet, and the instantiation of scarlet was of course causally sufficient (in the circumstances) for the occurrence of Sophie's pecking. But it seems right to say that it was the instantiation of red, not the instantiation of scarlet, that caused Sophie's pecking.

On both the subset account and the higher-order properties account the instantiation of a realizer is sufficient for the instantiation of the property realized. This may seem incompatible with the view that properties have their causal profiles contingently, owing to their being governed by different laws in different worlds. If there are possible worlds in which P does not have the forward-looking causal features of Q, then the instantiation of P cannot be sufficient for the instantiation of Q, and P cannot be a realizer of Q. On my own view of properties this problem does not arise, since that view denies that the same property can have different causal profiles in different worlds.[8] If one is unwilling to accept this, one can preserve the sufficiency of realizers for realized properties by taking the realizer to include the causal laws that hold in the worlds in which the realization relation exists.

II

Although I first thought of the subset account as an alternative to the higher-order property account, I now think it is better seen as a version of it. For it can be expressed by saying that the realized property is a second-order property the having of which consists in having some first-order property or other that satisfies a certain condition, namely that its forward-looking causal features include as subset those

[7] See Yablo 1992. [8] See my 1980 and 1998.

of the realized property, and it's backward-looking causal features are a subset of those of the realized property. (This goes with the following version of the view that properties are individuated by causal profiles: for any property P that can be instantiated in a world, there is a causal profile such that a necessary and sufficient condition of P's being instantiated in that world is that there be instantiated in that world a property Q having the forward-looking causal features of that profile and having backward-looking causal features that are among the backward-looking causal features of that profile. Here Q can be P itself, but it can also be any property that realizes P according to the subset account.)

This of course differs from other versions of the second-order account in explicitly assigning a causal profile to the realized property. One might wonder how it can be that different versions of the second-order account differ with respect to whether they imply the epiphenomenality of realized properties. I think the difference has to do not only with how the condition on the first-order properties is characterized but with how second-order properties are conceived.

How are we to understand the claim that a property is the property of having some property or other satisfying a certain condition (e.g. being such as to play a certain causal role)? On the most general understanding of the claim this means simply that the property is one that, necessarily, something has just in case it has some property or other (other than the property in question) satisfying that condition. If this is what it is to be a second-order property, clearly all determinables will be second-order properties. And there seems no reason why a property that is second-order in this sense should not have a causal profile—indeed, as we will see in Chapter 3, all properties of macroscopic things that we can refer to, and have knowledge of, are second-order in this sense.

But often the notion of being a property of having some property or other that plays a certain causal role is characterized in a way that makes it seems problematic, at best, that such a property can be causally efficacious. Such properties are said to be defined by existential quantification over first-order properties, and are viewed as logical constructions out of first-order properties. And then it can seem that they are constitutionally incapable of having causal efficacy in their own right. Properties that are second-order in this sense are of course second-order in the general sense—each is a property something has just in case it has some property or other (other than itself) satisfying a certain condition. But many properties that are second-order in the

general sense are not naturally seen as second-order in this sense—e.g. determinables like red and rectangularity are not.

It is not easy to make precise the difference between these two ways of viewing second-order properties. But one way to get at the difference is by contrasting two ways of thinking about the instantiation of these properties. If P and Q are different properties, one might expect that any instance of P will be different from any instance of Q. If on a particular occasion pain is realized in C-fiber stimulation (to cite a familiar philosophical fiction), the instance of the property *is in pain* will be distinct from, although of course realized in, the instance of the property *has C-fiber stimulation occurring in one*. And if something is red in virtue of being scarlet the instance of red will be distinct from, although realized in, the instance of scarlet. Indeed, this is what we would expect on the property-exemplification account of events set forth many years ago by Jaegwon Kim; events, on this conception, will be different if their constituent properties are different, even if the constituent objects (the subjects of the property instantiations) and the constituent times (the times of instantiation) are the same.[9] But Kim himself has held, along with others, that where P is a second-order property and Q is the first-order realizer of P instantiated on a given occasion, the instance of P on that occasion just is the instance of Q[10] e.g. the instance of pain just is the instance of C-fiber stimulation. I think this goes with the way of viewing second-order properties that sees such properties as logical constructions out of first-order properties. On this way of thinking it will be natural to deny causal efficacy to the second-order property. If its instances just are instances of its realizers, the causal efficacy of these instances is a manifestation of the causal features of the realizer property; and then supposing that the realized property has causal features of its own will seem like positing a bizarre sort of overdetermination.

In a number of places Kim has put forward what he calls the "causal inheritance principle." Sometimes this is expressed by saying that the causal powers of an instance of a higher-order property are identical with those of its lower-order realizer, but in a couple of places he puts it by saying that the causal powers of the realizer property instance are

[9] See Kim 1973.

[10] See Kim 1993c: 364; Kim 1998: 55–6; and Kim 1999: 15. Kim recognizes that this requires a revision of his property exemplification account of events; assuming that mental properties are second-order properties, it requires "the exclusion of mental properties as constitutive properties of events" (note 5 of Kim 1993c: 364–5).

"identical with (or are a subset of) the causal powers of its realizer."[11] We learn from a note to one occurrence of the latter formulation that his reason for inserting "or are a subset of" is to allow for the case in which the realizer is a conjunctive property having a realizer as one of its conjuncts.[12] But putting aside cases of that sort, the subset version of the causal inheritance principle goes nicely with the subset account of realization that I have suggested. If the forward-looking causal features of a realized property are a subset of the forward-looking causal features of its realizers, it stands to reason that the causal powers of an instance of the realized property will be a subset of the causal powers of the instance of the property that realized it on that occasion. But of course, if the causal powers of one property instance are a proper subset of those of another, the instances cannot be identical. And if the instances are not identical we can dismiss the argument from their identity to the causal impotence of the realized property. So I favor the way of viewing second-order properties according to which the instances of second-order properties are not identical with instances of their first-order realizers, and, what goes with this, second-order properties have causal profiles of their own, distinct from, although of course intimately related to, the causal profiles of their realizers.

Corresponding to the different ways of viewing second-order properties are different ways of viewing disjunctive properties. On the most general conception, a disjunctive property is simply a property something necessarily has if and only if it has one or another of a certain set of properties. There is nothing in this conception to rule out a disjunctive property having a causal profile of its own, and entering into causal laws. But if we characterize a disjunctive property as "the property of being F or G or . . . ," specifying it by a list of its disjuncts, it can easily seem that the property is defined into existence, is in some sense a logical construction out of its disjuncts, and is not the sort of property that could enter into causal laws or have causal efficacy in its own right. If there is a set of all the possible realizers of a second-order property, the second-order property will be necessarily coextensive with the disjunction of members of that set, and arguably will be identical with it. But here we must be operating with the most general conception of second-order properties and the most general conception of disjunctive properties—i.e., the conceptions that allow these properties to be causally efficacious.

[11] See his 1998: 54. [12] Kim 1998: 129, note 45.

Obviously, the choice between these different ways of thinking of second-order properties and disjunctive properties bears on the "causal exclusion argument" discussed by Jaegwon Kim and others. If realized properties are thought of as second-order properties or disjunctive properties that are logical constructions out of their realizers or disjuncts, and whose instances just are instances of one or another of those realizers or disjuncts, then it will certainly seem that any causal efficacy we might be tempted to ascribe to them is preempted by their realizers or disjuncts. If instead the realized properties are conceived in such a way as to allow them to have causal efficacy in their own right, it remains to be considered how the exercise of their causal powers is related to that of their first-order realizers, or their disjuncts, and whether the exercise of both amounts to overdetermination. I return to this in Chapter 3, sections V and VI.

III

There is a common understanding of the Ramsey-Lewis method for giving functional definitions that goes with the idea that the causal role associated with a functional property is really a role played by its realizers. Letting P be the property to be defined, and letting "$\exists F1 \ldots \exists Fn(\ldots F27 \ldots)$" be the Ramsey sentence of a theory in which P figured, where "F27" is the variable that replaced "P" in forming the Ramsey sentence, we define P as the property something $\times$ has just in case $\exists F1 \ldots \exists Fn[(\ldots F27 \ldots) \,\&\, \times$ has F27]. If the existential quantifiers that prefix the Ramsey sentence are understood as ranging over first-order properties, the Ramsey sentence will say that there are first-order properties standing in certain relations (including causal ones) to one another and to certain other properties, and the definition will say that P is the second-order property something has just in case the Ramsey sentence is true and the thing has a certain one of these first-order properties. And then it will be some first-order property that plays the role that in the original theory was played by P.

The first step to avoiding this is to stipulate that the existential quantifiers at the beginning of the Ramsey sentence range over all properties, and not just first-order ones. But this won't be enough to guarantee that P itself plays the causal role. We could achieve this by replacing the quantifiers with ones that assert uniqueness—i.e. replacing "$\exists F$" (read "there is an F") with "$\exists !F$" (read "there is a unique

F''). But then our Ramsey sentence would say that there is just one set of properties that satisfy the relevant description, which would seem to exclude the first-order realizers of P from playing the causal role they must play in order to realize it. We can fix this by formulating our definition as follows: P is the property something x has just in case

∃!F1 . . . ∃!Fn{(. . . F27 . . .) & [∀G1 . . . ∀Gn (if (. . . G27 . . .) then ∀y∀ i(Giy → Fiy))] and x has F27} [Letting "i" range over the numbers that figure in the property variables.]

This says, in effect, that P is the unique property that (a) plays the relevant functional role and (b) is implied by every other property that plays it.

It is still true, on this version of the account, that each of the realizers of P plays the relevant functional role. Each of them does this by playing a richer role that embeds that of P. As before, if we think of the instance of the realizer as containing the instance of the realized property as a part, this will not amount to overdetermination.

IV

I will now explain more fully how the subset view of realization works by considering its application to mental properties. It is a commonplace that the behavior we attribute to mental states is typically a manifestation of a combination of mental states rather than of any single mental state taken by itself. Assuming that the manifestations of mental states are caused by them, we can illustrate this by saying that a given belief caused a piece of behavior in conjunction with certain of the subject's desires and certain of the subject's other beliefs. So the forward-looking causal features of the property *believes that it is raining* include, among countless others, one that can be roughly characterized as *being such that if it is instantiated together with the desire to keep dry and the belief that umbrellas keep off rain, this results in the subject's taking an umbrella when she goes out*. Suppose that on a particular occasion the belief that it is raining, call it Br, is realized in physical property P1. I say that the causal feature just characterized belongs to P1. P1 is such that in combination with mental states other than Br, certain desires and other beliefs, it causes certain behaviors.

But of course, those other mental states will themselves be physically realized. Suppose that in the case just envisioned the relevant desires

and other beliefs are realized in properties P2, P3, and P4. P1 will "combine" with the mental properties in question to produce the behavior by combining with the realizers of those properties, namely P2, P3, and P4. So in the first instance the forward-looking causal feature of P1 is *being such that if it is instantiated together with P2, P3, and P4 this results in the subject's taking an umbrella when she goes out*. But given that P2, P3, and P4 are realizers of the mental states in question, having this causal feature will amount to having the causal feature that belongs to the belief-property, Br, that P1 realizes. Let's say that a forward-looking causal feature is a *mental causal feature* if the properties referred to in specifying it are mental properties, and that it is a *physical causal feature* if the properties referred to in specifying it are physical properties. We can now say that when mental property Br is realized by physical property P1, the forward-looking mental causal features of Br are realized in the forward-looking physical causal features of P1. But I should emphasize that these mental causal features of Br are shared by P1; they are realized in P1 by physical causal features.[13]

Assuming that Br is multiply realizable, it will have possible realizers other than P1. Each of these will share the forward-looking mental causal features of P1 and Br. But they will not necessarily share the forward-looking physical causal features in which these are realized. A creature in which Br cannot be realized by P1, because P1 is not in its repertoire of possible properties, will most likely be such that P2–P4 are also not in its repertoire of possible properties. Its having the causal features that interest us will not consist in its being such that in combination with P2–P4 it produces certain results. For it will not be capable of combining with those properties. It's mental causal features will be realized in some quite different physical features, including its being such that in combination with some quite different physical properties—call them Px, Py, and Pz—it causes certain behavior.

It should be clear that when mental properties M1 . . . Mn combine to produce certain effects, and these properties are physically realizable, it will not be the case that just any set of physical properties P1 . . . Pn that are, respectively, realizers of M1 . . . Mn will combine to produce those effects. This will be so only if P1 . . . Pn are jointly instantiable.

[13] Here I speak of causal features being realized in other causal features. Since causal features do not themselves *have* causal features, this cannot be realization in accordance with the subset conception. The idea here is just that a property can have a causal feature in virtue of its realizer having a certain causal feature.

The different physical properties that are realizers of mental properties will fall into a number of different "families" of properties, the members of each family being jointly instantiable. The forward-looking causal features of a realizer property will have to do with how instantiations of it can combine with other members of the same family to produce various effects. Presumably the physical realizers of mental states of Earthlings and the physical realizers of the same mental states in the Martians and supercomputers of philosophical fiction will typically not be jointly instantiable, and will not belong to a single family.

V

Given that the instantiation of a realizer of a property must be sufficient for the instantiation of the property, a property like having C-fiber stimulation could not be by itself a realizer of the property of being in pain. For, presumably, C-fiber stimulation will not have the standard effects of pain unless it occurs in a brain that is wired in such a way that C-fiber stimulation tends to contribute in certain ways to behavior and to the production of neural states that realize the beliefs and other attitudes that pain tends to give rise to. And it will not have the standard causes of pain unless it occurs in a brain that is wired in such a way that the standard causes of pain cause C-fiber stimulation in it. C-fiber stimulation in a Petri dish will not realize pain, or any other mental state. At best C-fiber stimulation will be what I call a *core realizers* of pain, rather than a *total realizer* of it.[14] A total realizer of a property will be a property whose instantiation is sufficient for the instantiation of that property. A core realizer will be a property whose instantiation is a salient part of a total instantiation of it. In the case where having C-fiber firing occurring in one is of the core-realizers of being in pain, the total realizer will be something we might call "C-fiber-stimulation-plus"—having C-fiber firing occurring in one *and* having a brain that is so wired that C-fiber stimulation in it has the standard causes and effects of pain. One can think of the core realizer as a property whose instantiation comes and goes as the instantiation of the realized property comes and goes, while the non-core part of the total realizer (what we might call the "surround") is a relatively permanent property of the subject.

[14] See Shoemaker 1981b.

In the case of a property like being in pain it seems plausible that the "surround" part of the total realizer will be internal to the subject—i.e. will consist in its brain and nervous system being organized in a certain way. But it should not be assumed that the surround will always be wholly internal.[15] Assuming externalism about content, having thoughts about water will require (at least to a first approximation) living in an environment in which there is water. And in that case the total realizer of the thought that there is water in the glass will be partly a relational property that something has only in an environment in which there is, or has been, water. If it is a requirement for having such a thought that the subject should in the past have interacted in certain ways with her environment, or with other members of her linguistic community, then the total realizer will be not only in part a relational property but in part an historical property.

To the extent to which the domain of mental properties is holistic, the surrounds of total realizers of mental properties will overlap. Supposing that Z-fiber stimulation is the core of the realizer of the belief that one is in pain, the neural organization that permits it to play this role will be largely the same as that which permits C-fiber stimulation to be the core of the realizer of pain. Different beliefs will have different core-realizers, but because their contents can stand in inferential or evidential relations to one another their total realizers will extensively overlap—only so will the having of beliefs tend to give rise to other beliefs they logically or inductively support. If a state is constitutively self-intimating, i.e. such that having it necessarily generates (under certain conditions) the belief that one has it, the total realizer of the state will overlap with that of the belief that one has it.

The core/total distinction made here applies to property-realizers. In Chapter 3 I will make use of a different core-total distinction that applies to microphysical states of affairs that are realizers of property instances.

VI

On the account I am suggesting, instances of the determinate-determinable relation are instances of the relation between a property and a realizer of it; for example, being red can be said to be realized by being

[15] This is pointed out by Antony and Levine in their 1997.

scarlet.[16] In any case, it is clear that properties fall into hierarchies, where the properties higher in the hierarchy are those whose forward-looking causal features are proper subsets of the forward-looking causal features of properties lower in the hierarchy, and whose backward looking causal features include as subsets those of properties lower in the hierarchy. Those higher in such a hierarchy will be realized by those further down, and in some cases will be determinables of which those further down are determinates.

One might describe a first-order property as one that is, as I shall say, *self-constituted*—i.e. is such that its instantiation is not realized in the instantiation of some other property.[17] A self-constituted property will be at the bottom of one of the hierarchies mentioned above. It will realize properties above it in the hierarchy, which will in turn realize properties still higher in the hierarchy.

It might be supposed that if we start with the forward-looking causal features of a self-realized property, there will be a property associated with every subset of this set, and each of these will have the self-constituted property as a realizer. If this were so, then what is grounded in the self-constituted property would be not a single hierarchy but a very complex treelike structure.

But it clearly will not do to say that given a property and its set of forward-looking causal features, there is a property corresponding to every subset of that set. And as was noted in section I, it also will not do to say that in every case in which the forward-looking causal features of one property are a subset of those of another, and the backward looking causal features of the second are subset of those of the first, the second is a realizer of the first or is a determinate relative to it.

Let me start with the last point. Assuming that there are conjunctive properties, it is clear that the forward-looking causal features of such a property will include as subsets the forward-looking causal features of its

[16] In an earlier treatment of this topic (in my 2001a) I wrote as if the converse holds—as if being a realizer of a property is always being a determinate relative to which it is a determinable. I am now persuaded by Matthew Haug that this was a mistake—that it obscures the important differences between the way scarlet is related to red, or squareness to rectangularity, and the way physical properties are related to the mental properties they realize. I now take the relation of determinates to determinables to be a special case of the realization relation.

[17] In my 2001a I called such properties "self-realized." But taken literally that term yields nonsense. If "subset" in my definition of property-realization means "proper subset," the notion of a property that realizes itself is self-contradictory. And if it is used in such a way that a set can be a subset (an "improper" subset) of itself, every property will be self-realized.

conjuncts, and the backward-looking causal features of the conjunctive property will be a subset of the backward-looking causal features of each of the conjuncts. But clearly we do not want to say that each of the conjuncts of a conjunctive property is realized by it. Assuming that there is a conjunctive property corresponding to every pair of properties that can be instantiated together, and that every property belongs to such a pair, this would have the consequence that every property is realized by other properties. There would be no self-constituted properties, and no first-order properties. Clearly, if we are to define realization in terms of the subset relation, we need to impose some restriction that rules out some conjunctive properties as realizers of their conjuncts.

Let's turn to the suggestion that there is a property corresponding to every subset of the forward-looking causal features of a property. I have said that the forward-looking causal features of the property of being red are a subset of the forward-looking causal features of the property of being scarlet. But consider the forward-looking causal features of being scarlet that are *not* included in the set associated with being red. If there is a property corresponding to the subset consisting of these, then the property of being scarlet is the conjunction of this property and the property of being red. It is commonly said about the determinable-determinate relationship that a determinate cannot be regarded as the conjunction of the determinable and some other property. And of course we do not want every conjunctive property to count as a determinate, or realizer, of one, or (worse) both, of its conjuncts. But the reason being scarlet is not the conjunction of being red and the property corresponding to this set of forward-looking causal features is not that there is some general ban on conjunctive properties as determinates, but rather that there is, as I shall now attempt to show, no property corresponding to this set of forward-looking causal features.

Corresponding to every forward-looking causal feature of a property is a *conditional power* that property bestows on its possessors. A thing has a conditional power if it has a power *simpliciter* conditionally on its having certain properties—i.e. if it is such that were it to have certain properties, additional to the one that bestows the conditional powers, it would have a certain power *simpliciter* e.g. the property of being knife-shaped bestows on its possessor the conditional power of being able to cut wood if it is made of steel.[18] Powers *simpliciter* will count as a special case of conditional powers. What we need here is an account

[18] See my 1980.

of the conditions under which a set of conditional powers is such that there is a property that bestows just that set of conditional powers.

In an earlier work I addressed this issue for a different reason, and suggested the following as a "unity relation" for properties: conditional powers X and Y are bestowed by the same property if and only if it is a consequence of causal laws that either (1) whatever has either of them has the other, or (2) there is some third conditional power such that whatever has it has both X and Y.[19] In line with this, we could suggest that there is a property that confers all and only the members of a set of conditional powers just in case every pair of the members of the set satisfies this condition. This has to be modified so as to allow for conjunctive properties. Obviously, if for any coinstantiable properties P and Q there is a property something has just in case it has both P and Q, then where P and Q are nomically independent there will be conditional powers C1 and C2 conferred by P and Q respectively and conferred by the conjunction of the two, that will not satisfy this condition. But we can give this as an account of what it is for there to be a basic, nonconjunctive property that bestows all and only the conditional powers in a set, and then allow for conjunctive properties by saying that there is a property that bestows all and only the members of a set of conditional powers just in case either (1) the set satisfies the conditions just stated, or (2) the set can be partitioned into two or more sets, each of which satisfies that condition.

While the satisfaction of the condition I have just formulated is, I believe, a necessary condition for a set of conditional powers being such that there is a property corresponding to it, it is not a sufficient condition. A further requirement is that the set be closed under nomic and metaphysical entailment—that for every conditional power contained in the set, the set contains every conditional power nomically or metaphysically entailed by that conditional power. It is this further requirement that I will put to work in what follows.

Let us return to the example of red and scarlet and the set of conditional powers conferred by scarlet and not by red. These conditional powers will include the power to elicit pecking in the likes of Alice (the pigeon conditioned to peck at scarlet things, but not at things of other shades of red), the power to produce an experience having a certain phenomenal character in human observers, and so forth. Although these are not conditional powers bestowed by the property of being red, they

[19] See my 1980: 125.

cannot be instantiated in something unless it has that property and so has the conditional powers bestowed by it. So the set in question fails to contain conditional powers that are nomically entailed by the conditional powers in it; it is not closed under nomic and metaphysical entailment. That being so, there cannot be a property corresponding to that set of conditional powers.

I think that the same will be so if we consider a physical realizer of a functional property and consider the conditional powers bestowed by it that are not bestowed by that functional property. The property of being a braking system is a multiply realized functional property. Consider then a complex physical property the instantiation of which would give us a mechanical braking system of a certain design. This property confers whatever conditional powers are conferred by the property of being a braking system, but confers a number of others that are not conferred by other realizers of that functional property—for example, those that give us hydraulic braking systems, or electronic ones. So consider the set of conditional powers it confers that are not conferred by the functional property. This set will not be closed under nomic and metaphysical entailment, since anything having all of these will have the conditional powers conferred by the functional property. This is a consequence of the fact that the physical property is a realizer of the functional property. So there will be no property that confers all and only the members of this set.

In an earlier discussion of these issues I took these considerations to support the view that it can never be the case that a realizer is a conjunction of the realized property and some other property, or that a determinable is a conjunction of a determinable and some other property.[20] But this was a mistake.[21] Consider again the properties red and scarlet. Red might be the property something has just in case it is such that it absorbs all light except in the range 400nm–500nm, and reflects some light in that range, and scarlet might be the property something has just in case it is such that it absorbs all light except in the range 400nm–500nm, and reflects some light in that range, and also absorbs all light in the range 440nm–500nm. In that case scarlet would be the conjunction of red and some other property, namely the property *such that it absorbs all light in the range 440nm–500nm*.

[20] Shoemaker 2001a.

[21] Here I am indebted to Jonathan Simon, who showed that this was a mistake. The example that follows is his.

Notice, however, that the property *such that it absorbs all light in the range 440nm–500nm* is not a property that bestows all of the conditional powers bestowed by scarlet and not by red. It does not bestow the power of eliciting a pecking response in the likes of Alice, or the power of producing an experience of a certain qualitative character in normal human perceivers. It does, however, contribute to bestowing such powers. One can think of the way it contributes as follows. Consider the power bestowed by scarlet to produce an experience with a certain phenomenal character, call it PC, in normal human perceivers. This is not a power bestowed by red, but one can think of it as a determinate of a determinable power bestowed by red—the power to produce experiences with phenomenal characters falling within a certain range, where PC is one of the phenomenal characters in that range. What the property of being such as to absorb all light in the 440nm–500nm range does, when it is instantiated in something that is red, is to *narrow* the way in which this determinable power can be exercised so that all that remains is the power to produce experiences with phenomenal character PC. The story is similar in the case of the power of scarlet things to produce a pecking response in the likes of Alice. Here the determinable power bestowed by red is the power to elicit a pecking response in creatures with perceptual systems with a variety of constitutions, where these include Alice's perceptual system. What the property of absorbing light in the 440nm–500nm range does when coinstantiated with the property of being red is to narrow the ways that power can be exercised, leaving the power exercised by the property of being scarlet.

As noted earlier, the subset view needs to be formulated in such a way that it is not true in general that conjunctive properties are realizers of, and determinates of, their conjuncts. But as we just saw, the formulation must not be such as to imply that no conjunctive property can be a realizer of one of its conjuncts. What we want to rule out is, for example, that the property of being red and square should count as a realizer of the property of being red, or of the property of being square. We might try to rule this out by stipulating that the conjunction of two properties will not count as a realizer of either of these properties if the conditional powers produced by the conjunction is just the sum of those bestowed separately by the conjuncts. But it is not clear that the conjunctive property of being red and square doesn't bestow powers not bestowed separately by the properties red and square; there might be a distinctive gestalt one experiences when one perceives things having this conjunctive property, or, as Jonathan Simon suggested to me, there

might be a pigeon (different from Sophie and Alice) that is conditioned to peck at things that are red and square. What we don't have here is the situation we have in the case of red, scarlet, and the property of being such as to absorb all light in a certain range: we don't have an asymmetrical relation between the conjuncts, consisting in the fact that the instantiation of one of them narrows the way in which the determinable powers bestowed by the other can be exercised, yielding powers bestowed by the conjunction of the two, where this narrowing does not occur in the opposite direction. I think, then, that a conjunctive property counts as a realizer of one of its conjuncts only when there is such an asymmetrical relation between the conjuncts, one of them being such that its instantiation narrows the way determinable powers bestowed by the other (the one that is realized) can be exercised.[22] This of course rules out that both conjuncts of a conjunctive property could be realized by the conjunctive property—and it rules out that both conjuncts of a conjunctive property could be determinables of which the conjunctive property is a determinate.

VII

Until now the sort of property realization under discussion has been same-subject property realization—cases in which the instantiation of

[22] It might be questioned whether there really is such an asymmetrical relation in the case of scarlet, red, and the property—call it Abs—of being such as to absorb all light in the range 440nm–500nm. Jonathan Simon has pointed out to me that just as a red thing's having Abs narrows the way the determinable powers of red can be exercised, thereby contributing to bestowing the more determinate powers of scarlet, so an Abs thing's being red narrows the way the disjunction of powers of the Abs thing can be exercised (it knocks out some of disjuncts), thereby contributing to the bestowing of the powers of scarlet (these being the remaining disjuncts of the Abs thing's disjunction of powers). This is true. But there is still an asymmetry. Although a determinable power can be thought of as a disjunction of powers (its determinates), not every disjunction of powers is a determinable power—just as not every disjunction of properties is a determinable of which the disjuncts are determinates. Abs is not a determinable of which scarlet is a determinate, and Abs does not have powers of which the powers of scarlet are determinates. That Abs is not a determinable relative to scarlet, and that its powers are not determinables relative to those of scarlet, has partly to do with the fact that there is no resemblance among things having Abs comparable with the resemblance amongst things that are red. But more needs to be said about what distinguishes mere disjunctions of properties from determinables—this is related to, although not the same as, the question discussed in Chapter 4, section V, of what it takes for a disjunction of properties to be a genuine property.

a property in a thing is realized by the instantiation of another property in that same thing. Call this realization$_1$. We can use this to define a different kind of property-realization, call it realization$_2$, in which the instantiation of a property in one thing can realize the instantiation of another property in a numerically different thing.

There is need for the relation of realization$_2$ if, and probably only if, there can be coincident entities, and properties in one of a pair of coincident entities can be said to realize properties of the other. Coincident entities will figure prominently in my discussion in Chapter 5, and my main defense of the view that there are such entities will be there. But there is at least a prima facie case for there being entities that are numerically different despite occupying the same space and being composed of the same matter. There is the familiar example of the statue and the piece of clay that constitutes it; these seem to have different modal properties (the piece of clay can survive the destruction of the statue), and may have different historical properties (the origin of the piece of clay preceded the origin of the statue), and that seems a reason for regarding them as numerically different. Yet the shape of the piece of clay seems to realize such properties of the statue as having a nose. And, as noted in Chapter 1, on neo-Lockean accounts of personal identity persons are capable of changing bodies (e.g. by way of brain-transplants), and so seem to be numerically different from, although coincident with, their bodies. Assuming that human animals have biological rather than psychological persistence conditions, such views also imply that persons are numerically different from, although coincident with, human animals. Yet there seems a good sense in which, assuming physicalism, the physical properties of a person's body, and those of the coincident human animal, determine the mental properties of the person; where there is a body having the physical properties my body has, there has to be a person having the mental properties I have.[23]

Here is where we need the distinction, mentioned in Chapter 1, between thick and thin properties. The properties I share with my body will be thin properties. They are thin because their causal profiles do not limit their instantiation to things of a particular kind, things having particular persistence conditions. Thick properties are ones whose causal profiles do limit their instantiation to things of a particular kind. On a neo-Lockean view mental properties are thick, because their causal

[23] To allow for externalism about mental content, we need to include among the physical properties of the body its relations to the environment.

profiles limit their instantiation to things with psychological persistence conditions. Thick properties are not realized$_1$ by thin properties. That is why my body does not share my mental properties, despite sharing my thin physical properties, and that is how we avoid the "too many minds problem." But in some sense the thin properties of my body realize my mental properties. That is why we need realization$_2$. The definition I give of this will allow thin properties of a thing to be realizers$_2$ of thick properties of that same thing, and it will also allow thick properties of one thing to be realizers$_2$ of thick properties of a different thing coincident with it. But its main purpose is achieved by its allowing thin properties of one thing to be realizers$_2$ of thick properties of a different thing concident with that thing.

I will first define realization$_2$ for the case in which the realizer is a thin property instantiation, and then use this definition to define it for the case in which the realizer is a thick property instantiation. While a thin property of a thing cannot realize$_1$ a thick property of it, the conjunction of a thin property and a sortal property will itself be a thick property, and when instantiated in a thing can realize$_1$ other thick properties of it. So let's say that the instantiation of thin property F in a thing realizes$_2$ thick property G of that thing if that same thing has a sortal property such that the conjunction of F with that sortal property realizes$_1$ G. Since coincident objects necessarily share their thin properties, let us also allow that the instantiation of thin property F in a thing realizes$_2$ thick property G in a thing coincident with that thing if the coincident thing has a sortal property such that the conjunction of F with that property realizes$_1$ G. So, for example, the instantiation of C-fiber stimulation in my body realizes$_2$ pain in me because (a) I am coincident with my body, (b) I satisfy the sortal *person*, and (c) the conjunction of C-fiber stimulation and being a person realizes$_1$ the property of being in pain.

Turning to thick properties, it can happen that thick property F and thick property G, which entail incompatible sortal properties and so cannot be coinstantiated, are so related that any thin property realizer$_2$ of F is a thin property realizer$_2$ of G, and thus that if F is instantiated in a thing then G will be instantiated in anything coincident with that thing which has the sortal property entailed by G. In such a case, let's say that the instantiation of F in the one thing realizes$_2$ the instantiation of G in anything coincident with that thing that has the sortal property entailed by G. Suppose, for example, that the biological properties of human animals are thick properties whose causal profiles are tied to biological persistence conditions, and so cannot belong to persons (here assumed

to have psychological persistence conditions); but that persons have biological properties corresponding to these that have causal profiles that are tied to the psychological persistence conditions of persons e.g. a person's being immune to smallpox might be a slightly different property than a coincident animal's being immune to smallpox, because the causal profile of the first property allows it to be lost in the case where the person changes bodies via a cerebrum transplant, while the causal profile of the second does not allow it to be lost in such a case. (So if my cerebrum is transplanted to the body of someone who lacks the immunity, and I go with my cerebrum, I lose the immunity; but the human vegetable left behind retains the immunity—for all the good that does it). Then the biological property of the human animal and the corresponding biological property of the person would be realizers$_2$ of one another.

VIII

My aim in this chapter was to give an account of the relation philosophers most commonly have in mind when they speak of the realization of properties, namely the realization of an instance of one property by an instance of a different property. Two sorts of such "property-realizaton" were distinguished—realization$_1$ (same subject property-realization), where the realized property instance and the instance of its realizer occur in the same object, and realization$_2$, where they occur in different but coincident objects. Property realization is not the only sort of realization—in Chapter 3 I will present an account of a kind of realization in which the realizer of a property instance is not another property instance but is instead a microphysical state of affairs.

My account of realization$_1$ is the subset account. As a first pass, this says that an instance of P is realized in an instance of Q if the instances occur in the same thing and the forward-looking causal features of P are a subset of those of Q, while the backward-looking causal features of Q are a subset of those of P. In Section VI this is qualified so as to block the consequence that all conjunctive properties are realizers of their conjuncts. The account can be viewed as a version of the second-order property view of realized properties, but one that, unlike other versions, takes realized properties to be causally efficacious. Realization$_2$ is defined in terms of realization$_1$.

3

Microrealization

The accounts of property-realization discussed in the preceding chapter, both the subset view and the standard higher-order property account, have been held to be unsatisfactory because they limit property-realizers to properties of macroscopic objects, and normally to properties of the very macroscopic object that has the realized property, and make no room for realizers that are properties of constituents of the things having the realized properties. One writer stigmatizes such accounts as "flat" accounts of realization, and recommends their replacement by a "dimensioned" account which allows for realizers that do not belong to the thing having the realized property (that much is allowed for by my realization$_2$) and, in particular, realizers that are properties of parts of or constituents of the things whose properties they realize.[1]

Such views are right in holding that we need an account of realization that gives a role to the properties of micro-entities and other parts of macroscopic objects, and that we do not get this in the sort of account presented so far. But the cure for this is not to count properties of parts of macroscopic objects as realizers of properties of the macroscopic objects. The instantiation of a realizer of a property should be sufficient for the instantiation of that property, and no property of a micro-entity that is a part of a thing is such that its instantiation is sufficient for the instantiation of any of the properties of that thing. What is true is that the instantiation of a property of a micro-entity can be part of a state of affairs that is sufficient for the instantiation of a property of a macroscopic entity. What we have here is the realization of a property instantiation, not by another property instantiation, but by a microphysical state of affairs involving the instantiation of micro-properties in micro-entities. Such a state of affairs "makes real," constitutes, the occurrence of a property instance. It is this sort of realization that is the topic of the present chapter.

[1] See Gillett 2003.

As I conceive of states of affairs, the existence of a state of affairs simply consists in some proposition's being true. It can consist in particular items in the world having certain properties and standing in certain relations, or in the truth of some quantified proposition about how things are, or in some negative truth about how things are, or in some combination of these. Understood in this way, states of affairs include property instances as a special case—particular things having certain properties at certain times. So what I have been calling property-realization is a special case of state-of-affairs-realization. But my concern in the present chapter is with realization by states of affairs that are not themselves property instances, although they will include property instances as parts.[2]

I

I assume here a physicalist view according to which all of the facts about the world are constitutively determined by the microphysical facts—facts about the properties of basic physical entities and how they are distributed in the world. If God wants to create a world like ours, there is nothing he need do beyond creating the sorts of micro-entities there are in our world, giving them the properties they have in our world, distributing them as they are distributed in our world, and laying down the laws that in our world govern the interaction of these entities.[3]

It is part of this view that all instantiations of properties in macroscopic entities are realized in what I will call microphysical states of affairs. Such states of affairs are ways things are with respect to micro-entities—ways some of them are, as I will say, "propertied and related." The microphysical states of affairs that primarily concern me will have particular micro-entities as constituents. But the specification of such a microphysical state of affairs can also include positive and negative existential propositions, to the effect that there are, or are not, basic physical entities of certain sorts related in certain ways to the constituents of the state of affairs. So, e.g. a microphysical state of affairs might

[2] I could have used "fact" rather than "state of affairs"; but there is a usage of "fact" on which "Hesperus is a planet" and "Phosphorus is a planet" express different facts, and it seems natural to say, and accords with my intended usage, that their truth consists in a single state of affairs.

[3] On my own view, laying down the laws would not be an additional step.

consist in three particular hydrogen atoms standing in certain spatial relations to each other, there being two or more oxygen atoms within a certain distance of them, and there being no other micro-entities within a certain larger distance from them. Let's say that such a state of affairs consists of a "concrete" state of affairs—particular micro-entities having certain properties being configured in a certain way—together with an "existential" state of affairs, which can be positive, negative, or both. There are also states of affairs that are purely existential, i.e. whose specification does not refer to any particular micro-entities. When such an existential state of affairs is positive, it will of course exist in virtue of there existing a concrete state of affairs of a certain description: letting Tom, Dick, and Harry be our three hydrogen atoms, the existential state of affairs of there being three hydrogen atoms in a certain locality related in a certain way may exist in virtue of Tom, Dick, and Harry being in that locality and related in that way. Negative existential states of affairs, of course, do not exist in virtue of there existing concrete states of affairs.

It is trivially true, on the physicalist assumption I am making, that all property instantiations are realized by a single state of affairs, namely the state of affairs that consists in the existence of all of the micro-entities there are (and their being all the micro-entities there are, which is a negative existential state of affairs), and these micro-entities having all of the properties they do and standing to one another in all of the relations they stand in. But it seems a reasonable assumption that every property instantiation is realized in microphysical states of affairs less global than this, and that, indeed, each is realized in a microphysical state of affairs that does not contain as a proper part any state of affairs that realizes it. This will be true of instantiations of physical properties of macroscopic objects. And assuming physicalism it will be true of instantiations of mental properties. We can put this by saying that each such property instantiation has a microphysical state of affairs that "minimally" realizes it.[4] This microphysical state of affairs will be one that occurs at the time

[4] Will there be a unique minimal realizer? Perhaps there will if we limit the microphysical states of affairs to ones whose constituent micro-entities are the most basic microphysical entities, those whose existence does not consist in configurations of more basic entities. But what if there are no most basic micro-entities—what if each sort of micro-entity is composed of more basic entities, which are composed of still more basic entities, and so on ad infinitum? (See Block 2003a.) In any case, there seems to be no need for the constituent micro-entities to be maximally basic. Suppose they are molecules. This won't prevent the properties of atoms, electrons, quarks, etc. from playing a role

at which the realized property instantiation occurs, which means that its occurrence consists in its constituent micro-entities being propertied and related in a certain way at that time, and in certain existential propositions about micro-entities being true at that time.

Realization of property instantiations by microphysical states of affairs is of course different from the realization of property instantiations by instantiations of other properties that was discussed in Chapter 2. But obviously these two sorts of realization are intimately related. If the instantiation of one property P realizes the instantiation of another property Q, it must be the case that the existence of the state of affairs that realized P's instantiation constitutively determines the existence of the state of affairs that realized Q's instantiation—either because it is identical with it or because it contains it as a part. Moreover, every case of microphysical realization is also a case of property-realization. To every kind of microphysical state of affairs there will correspond a property, namely the property something has at a time just in case a state of affairs of that sort occurs in its career at that time—so whenever an instance of a property is realized by a microphysical state of affairs of a given kind, it will be realized by an instance of the property corresponding to that kind of state of affairs. The properties corresponding in this way to microphysical states of affairs are what in section VI I call MSE properties

II

It seems obvious that a microphysical state of affairs that minimally realizes the instantiation of a property at a time must realize the existence at that time of an object that is the subject of the property. I take realizers to be sufficient for what they realize, and plainly the instantiation of

in the realization of a macro-property. For the properties of molecules will include their being composed of atoms, electrons, quarks, etc. having certain properties. But now it seems that a property instance might be realized in more than one microphysical states of affairs—perhaps one in which the microphysical constituents are neurons, one in which they are molecules, one in which they are atoms, and so on. There would no doubt be intimate relations between the different realizers—those whose constituents are more basic would constitute those whose constituents are less basic. But if we individuate microphysical states of affairs by (in part) what their microphysical constituents are, they will be different states of affairs—and so there may be no unique minimal realizer. In Chapter 5, section V, I discuss a different way in which realized properties might have multiple property realizers.

a property entails the existence of something in which it is instantiated. It also seems obvious that if a microphysical state of affairs realizes the existence of an object, some or all of the micro-entities that are constituents of the state of affairs must be among those of which the object is composed.[5]

We should not assume that all of the constituents of the state of affairs must be among the micro-entities of which the object is composed, and we should not assume that all of the micro-entities of which the object is composed are constituents of the state of affairs. Assuming externalism about mental content, it can happen that the instantiation of a mental property in a person constitutively involves the existence of things composed of micro-entities that are not among those of which the person is composed—e.g. the realization of a thought about the Eiffel Tower might involve the Eiffel Tower and its constituent micro-entities, and the realization of the belief that there is water in the glass may involve there being H_2O molecules in the believer's environment. So here the state of affairs that is the realizer of the property instance may have as constituents micro-entities that are not among those of which the subject is composed.[6] As for the second assumption we should not make, it is obvious that a microphysical state of affairs can be sufficient for the existence of a thing at a time without involving every micro-entity that is a part of the thing at that time. Still, it is reasonable to assume that the constituents of the microphysical state of affairs that realizes a property instance will always include micro-entities that are among those of which the subject of the property instance is composed, and that the ways these are propertied and related will be central to its role as a realizer.

But of course there are vast numbers of microphysical states of affairs that do not realize property instances or the existence of subjects of property instances. The question now is, in virtue of what is a microphysical state of affairs a realizer of a property instance?

[5] Realizing the existence of something is constitutively determining its existence. This, I am saying, is a component of realizing a property instance.

[6] Such external constituents of realizer states of affairs are not limited to cases where the realized property is a mental content property. If being an artifact of a certain kind requires having been created with certain intentions, or if being an organism of a certain kind requires having a certain sort of ancestry, then these are properties whose microphysical realizers include entities that lie outside the boundary of the subject, and perhaps ones whose existence precedes that of the subject.

One approach to answering this question would be to begin with the question of what makes a microphysical state of affairs a realizer of the existence of an object—for short, what makes it an "existence-constituting" state of affairs. It might be thought that every state of affairs that realizes a property instance is existence-constituting because it embeds an existence-constituting state of affairs as a proper part. And then it might be thought that the first thing we must do is determine what makes states of affairs existence-constituting. Having done that, we can go on to investigate what must be added to an existence-constituting state of affairs in order to make it a realizer of a property instance.

But I think that this approach is misguided. Different kinds of objects are distinguished by the different kinds of properties they are capable of having. So an existence-constituting state of affairs will have to be a state of affairs that constitutes the existence of some particular sort of object, an object having certain sorts of properties. And an account of how microphysical facts can constitute the existence of such a kind of object cannot be independent of, or prior to, an account of how the microphysical facts can constitute the instantiation of properties of the relevant sorts.

A kind of things is normally associated with a number of kinds of properties such that a thing of that kind must have some property of each of those kinds. A house must have some height, some width, some mass, etc.. A person must have some beliefs or other, some desires or other, etc. as well as some height and girth and some DNA. So if a microphysical state of affairs realizes the existence of a thing of a certain kind, it must guarantee the instantiation of a number of properties. Will this have the consequence that the realizer of any one of a thing's property instances will at the same time be the realizer of a number of its other property instances, and that distinct property instances will not have distinct realizers?

That would be a disturbing consequence. It would imply that where P and Q are distinct properties, neither of which is such that its instantiation requires the instantiation of the other, it can be the case that what constitutes the instantiation of P is the same as what constitutes the instantiation of Q. It is difficult to see how, if this were the case, the instances of P and Q could be distinct.

But we can avoid this consequence by drawing on the point that the realizer will consist in part of a concrete state of affairs, in part of an existential state of affairs. The concrete state of affairs will be specific to the particular property whose instance is realized, and can be

viewed as the "core" of the realization of the instance. The positive part of the existential state of affairs will consist in its being the case that there are, appropriately related to that concrete state of affairs, other microphysical states of affairs that are realizers of instances of a number of other properties, each of these properties being of one of the kinds that a thing of the relevant sort must exemplify. This positive existential state of affairs will exist in virtue of there existing a number of states of affairs that are partly concrete, each of which will be a total realizer of one of the properties coinstantiated with the one in question.[7] Each of these will have a different concrete core, and the concrete cores of all of these property instances will make up the concrete part of a state of affairs that realizes the entire set of property instances. So, to illustrate, a house's having the height it has will be realized in a microphysical state of affairs having a concrete core; the existential part of this microphysical state of affairs will be such as to guarantee that the house has a particular width, a particular mass, etc.; and this will obtain in virtue of there being states of affairs, each having its own concrete core, that are realizers of its having the width it has, the mass it has, and so on.

It is apparent from this that the microphysical realizers of the different property instances in a thing at a time are, as it were, interlocked; each has a concrete core which is part of what constitutes the existential part of each of the others. But more needs to be said about the way in which other concrete microphysical states of affairs must be related to a given one in order to constitute the existential part of the property instantiation realizer of which the given one is the core. (I speak of a concrete state of affairs as "constituting" an existential state of affairs if the latter exists in virtue of the former existing—as the state of affairs someone's being wise exists in virtue of Socrates being wise.) This is related to the problem of material constitution, and will be discussed in Chapter 5. And the account briefly sketched here will be developed further later in this chapter, in section IV.

[7] Here the distinction between core and total realizers is different from that which figured in Chapter 2. That applied to property-realization rather than to realization by states of affairs. On that account, it might be that a core realizer of pain is C-fiber stimulation, and that the associated total realizer is C-fiber firing plus the subject's brain being wired in such a way as to enable C-fiber firing to have the standard causes and effects of pain. But on the present account, states of affairs involving the wiring of brain that enable the implementation of the causal role of pain would count as parts of the core of the pain realizer—the non-core parts of the total realizer would be the existential states of affairs that guarantee the instantiation of other properties required by the existence of the subject. The two distinctions are different and serve different purposes.

III

Let us turn now to the question of what makes a microphysical state of affairs a realizer of an instance of some particular property, one on whose identity we have some sort of handle. I think there is no hope for an answer to this question that does not appeal to the idea that properties are individuated by causal profiles. If we can assign causal profiles to microphysical states of affairs, or rather to types of microphysical states of affairs, this should provide a way of saying when a microphysical state of affairs is a realizer of an instance of a particular property. It will be such a realizer if it is of a type of microphysical states of affairs having a causal profile that corresponds in an appropriate way to the causal profile of the property. To fill out the account, we need to say what it is for a type of microphysical states of affairs to have a causal profile that "corresponds in an appropriate way" to the causal profile of a property. But we also need to say more about what goes into the causal profile of a property and the causal profiles of the microphysical states of affairs that realize its instantiation.

Central to the causal profile of a property is the effect that the instantiation of that property will have on the subsequent career of the thing in which it is instantiated. There is an intimate relation between the role of causality in the individuation of properties and the role of causality in constituting the persistence of objects over time.[8] Successive states in the career of a thing are related by what W.E. Johnson called "immanent causation," causation that works within the thing's career.[9] And important among the forward-looking causal features of properties are those that are manifested in immanent causation, the production in the object's future career of property instances that are appropriate successor states of properties instantiated previously. Central to the causal profiles of properties is their role in bestowing causal powers on their possessors, and such powers are characterized in part by their effects on the future careers of their possessors—as something's being elastic is a matter of its being such that if subjected to certain forces it, that same thing, will change shape and then, when the forces are removed, revert to its original shape. Ordinarily it is only in combination with instantiations of other properties in the same thing that a property

[8] See my 1979. [9] See Johnson 1964.

instance will bestow a power to produce particular successor states in its possessor. So both the synchronic unity relation between property instances and the diachronic unity relation between them enter into the specification of the causal profile of the property; many of the forward-looking causal features of a property can be specified by saying that when an instance of it stands in the synchronic unity relation to instances of certain other properties, this will cause later property instances to which they stand in the diachronic unity relation.

As mentioned earlier, different sorts of things are characterized by the different sorts of properties they are capable of having. And this is intimately related to the fact that different sorts of things are characterized by different persistence conditions. Owing to the points just made about the causal profiles of properties, the nature of some properties will be internally related to persistence conditions that define sorts of objects. As we might put it, they imply sortal properties, where having a sortal property involves having certain persistence conditions. These are what I call "thick" properties, to distinguish them from the "thin" properties that can belong to things of different sorts. The difference between these will figure prominently in Chapter 5.

One can think of the career of a persisting thing as a series—presumably a continuous series—of collections of property instances. Given our physicalist assumption, this means that the career of a persisting thing consists in a series of collections of microphysical states of affairs or, what comes to the same thing, a series of complex microphysical states of affairs made up of the realizers of these instances. These microphysical states of affairs will stand to one another in a complex set of causal relations, and will belong to types having causal profiles consisting in facts about what other states of affairs they are apt for causing or contributing to causing, and what sorts of states of affairs they can be caused by. And in order for a series of collections of microphysical states of affairs to constitute the career of a persisting object, the microphysical states of affairs must belong to types such that there is an isomorphism between the causal profiles common to members of these types and the causal profiles of properties instantiated in the career of the object. This gives us the "appropriate way," spoken of earlier, in which the causal profile of a type of microphysical states of affairs can correspond to the causal profile of a property. Such an isomorphism will pair types of microphysical states of affairs with properties; and a particular microphysical state of affairs will realize a particular property instantiation just in case the state of affairs belongs

to a type that is paired with that property. When this is so the existence of the microphysical state of affairs will realize the property instance.

It will be recalled that a microphysical state of affairs that realizes a property instance also realizes, at the same time, the existence of the thing in which the property is instantiated. This means that when a number of different properties are instantiated in something, the different microphysical states of affairs that realize their instances will each realize the existence of the thing at that time. Because of this there will be a good deal of overlap between these states of affairs; they will overlap in what micro-entities they involve, and may overlap as well in the ways these micro-entities are propertied and related. The overlap will not of course be complete. In particular, while all of them will involve micro-entities that are among those of which the object is composed at the time, and while collectively they will involve all of these micro-entities, they may differ somewhat as to which of these micro-entities they involve. Those involved in my having the height I have will be somewhat different from those involved in my having the complexion I have.

The claim that the career of a thing is a series of collections of property instances may look like a bundle theory of objects. And it may look like a "perdurance" theory that construes objects as having temporal parts. But the account I am offering is neither of these.

It is not a bundle theory because it takes a property instantiation as involving, constitutively, the existence of something in which the property is instantiated, and makes no attempt to construe that "something" as a collection or bundle of properties or tropes. On one picture, God's creating a persisting thing would have two stages, perhaps occurring simultaneously: his creating a bare particular, and his sticking on to it various properties. It might seem that rejecting this picture (as of course we should) involves accepting the alternative picture that goes with the bundle theory: his creating the persisting thing consists in his placing in a certain location a number of different and independent property instances, or tropes. But I reject that picture too. To create even a single property instance God must create a microphysical state of affairs that realizes the existence of the subject of that property instance, and realizes whatever other properties an object of that kind must have in order to exist. There is no way in which God can create just one instance, then add another to it, then add another, and so on, and in so doing build up to the existence of a thing having a plurality of properties.

I will discuss later, in Chapter 5, why the account is not a perdurance account. And in section VII of this chapter I will call attention to one consequence of my account that bears on this.

IV

We can now develop in more detail the account, sketched in section II, of how property instances are realized in microphysical states of affairs. Corresponding to a property P there will be a microphysical state of affairs type that is a disjunction, perhaps infinite, of more specific types of microphysical states of affairs. What unites these more specific state of affairs types is the fact that the forward-looking causal features in their causal profiles match those of property P, and each of them has backward-looking causal features that match some of those of property P and the disjunction of them has backward-looking causal features that match all of those of property P. Any state of affairs that is of one of these types will realize property P. But as noted earlier, P cannot be instantiated without other properties being co-instantiated with it—the other properties will be determinates of the various determinables that must be instantiated in any subject of P. So each of the more specific states of affairs types will have a causal profile that is related in the way just indicated not only to the causal profile of P but also to the causal profiles of a number of other properties. Thus, any instance of one of these states of affairs types will realize not only property P but a number of other properties—different ones in different cases e.g. if P is the property of having a certain height, instances of the different states of affairs types corresponding to it will realize not only that height but also some width or other, some mass or other, and so on. The instances will be what I have called existential states of affairs. If the type is: *there being particles of such and such types propertied and related in such and such ways*, then a particular instance of it might be: *there being at spacetime locus L particles of such and such types propertied and related in such and such ways*. But such an existential state of affairs will exist partly in virtue of there being a concrete state of affairs, consisting of particular micro-entities being propertied and related in certain ways. (I say "partly" because the existential state of affairs will be in part a negative one, consisting in there *not* being micro-entities of which certain things are true, and this will not exist in virtue of a concrete state of affairs.) This concrete state of affairs together with the negative existential state of affairs will realize

an instance of P, but at the same time will realize instances of a number of other properties. Call this an N-realizer ("N" for non-specific) of the P instance, and call this sort of realizing N-realizing.

In section II I suggested a way of factoring this state of affairs into states of affairs that are specific realizers of particular ones of these properties instances, including one that is a specific realizer of an instance of P. This involved dividing the concrete state of affairs into parts that are "concrete cores" of realizers of the different property instances. This notion of a concrete core can be explained as follows. The concrete state of affairs will be made up of a number of smaller states of affairs. Suppose that the property instances include instances of Q, R and S in addition to the instance of P. Some of these smaller states of affairs will contribute directly to the instantiation of P, some will contribute directly to the instantiation of Q, and so on. In many cases, perhaps in all, their contributing directly will be a matter of their contributing directly to the implementation of the causal profile of the realized property. But we can see without bringing in causal profiles that some parts of the larger state of affairs will be relevant to the instantiation of a particular property in a way other parts of it are not. Suppose that state of affairs S1 consists in micro-entities being distributed in a certain way on a vertical plane that intersects my body from head to toe, and that state of affairs S2 consists in micro-entities being distributed in a certain way on a horizontal plane that intersects my body at the level of my navel. S1 might be relevant to my height in a way S2 is not, and S2 might be relevant to my girth in a way S1 is not. I can't have a height without having a girth, or a girth without a height, and there will be a single microphysical state of affairs that realizes (N-realizes) my having properties of both kinds. But as S1 and S2 illustrate, different parts of this state of affairs will contribute directly to the instantiation of these different properties. Putting together the parts that contribute directly to the instantiation of a property, we get what I call the concrete core of the realizer of the instance of that property. So one part of the concrete state of affairs will be the concrete core of the realizer of the instance of P, another will be the concrete core of the realizer of the instance of Q, and so on. We can speak of these as P-cores, Q-cores, etc..

Although I have spoken of the core as "concrete," it will probably have to include (as the N-realizer does) negative existential states of affairs. E.g., the states of affairs contributing to the instantiation of my height will have to include its *not* being the case that below my feet and

above my head there are micro-entities of certain sorts related to those inside my body in the way the latter are related to one another.

What we want for the total realizer of the instantiation of P is a state of affairs that includes the concrete core of the realizer of P but also guarantees that the subject of P has whatever other properties it must have in order to exist, and is different from the total realizer of those other properties.

Suppose that in a particular case the N-realizer of an instance of P includes a microphysical state of affairs C_P that qualifies as a P-core. We can suppose that the possessor of P also has property Q, where Q is of a kind such that any possessor of P must have some property of that kind (as, for example, any possessor of a particular shape must have some mass or other). Let C_Q be the Q-core that is also a part of the N-realizer of the P-instance and the Q-instance. Now it seems that the P-instance could have occurred without the instance of Q occurring, and so without C_Q occurring. For example, if P is the property of having a certain shape and Q is the property of having a certain mass, then while the instance of P must be accompanied by the instantiation of *some* mass property, it does not seem necessary that it should have been accompanied by an instance of the particular mass property Q. (For example, if some of the matter inside a thing had leaked out, it might have had the same shape but a lesser mass.) And if the instances have different modal properties, so should their specific realizers. We can achieve this as follows.

Consider the set of possible N-realizers that have C_P as a part. This will include the actual N-realizer that also has C_Q as a part, but it will include possible N-realizers that do not have C_Q as a part (in our example, these will be N-realizers that realize the instance of shape P but realize instances of slightly different mass properties). The members of this set will represent the different ways in which the particular instance of P could be, or could have been, realized. We can think of the disjunctive state of affairs whose disjuncts are members of that set as the realizer of that instance of P. Call this the S-realizer ("S" for specific) of the instance of P.

These states of affairs are disjunctive only in the sense that there is a disjunctive specification of them. Another, and vaguer, specification says that, in our case where C_P is the core of the realizer of a P-instantiation, the total realizer consists of C_P together with micro-entities being propertied and related in such a way that together with C_P they constitute a P-state-of-affairs.

V

One would think that property instances are identical just in case their specific realizers are identical. One would also think that if properties P and Q are different properties, any instance of the one should be different from any instance of the other. From these views it follows that if P is a higher-order property, a determinable or a functional property, of which Q is a determinate or a property-realizer, then when P is instantiated in virtue of Q's being instantiated the realizers of the instances of P and Q will be different.

But it might seem that the account sketched above works only for the realization of maximally determinate properties. Indeed, it might seem that it works only for the realization of instances of maximally specific micro-structural properties.[10] Only in the case of these, it might be thought, can we factor out from the N-realizer of the total set of properties instantiated in a thing at a time a state of affairs that is specifically the realizer of the instantiation of a particular property. If that were so, the only state of affairs that could be the realizer of an instance of a higher-order property would be the state of affairs that is the realizer of the instance of the maximally determinate property which property-realizes the instance of the higher-order property. Supposing scarlet to be a maximally determinate property, an instance of scarlet will of course be sufficient for an instantiation of red; but there will be (on this view) nothing in the particular case that is the realizer of the instance of red but not the realizer of the instance of scarlet. And supposing that pain is realized in a particular case by C-fiber stimulation, nothing in that case will be a realizer of an instance of pain and not a realizer of an instance of C-fiber stimulation.

As noted in Chapter 2, this is the view that Jaegwon Kim has advanced in several places about instances of second-order properties and instances of their first-order realizers—the properties are different but the instances are the same. In Kim this goes with the version of the "causal inheritance principle" that says that the causal powers of an instance of a property are identical with the causal powers of the instance of its realizer. But Kim's formulation of this principle sometimes says "identical with (*or are a subset of*)" (my emphasis), and we can preserve

[10] I said as much in my 2003b.

a difference between the instance of the realized property and the instance of its realizer by choosing the subset option.

If, in cases of property-realization, realized property instances are non-identical with instances of their property-realizers, then the microphysical realizers of these instances should be non-identical as well. We can make sense of the idea of an instance of a higher-order property having a microphysical realizer different from the microphysical realizer of the instance of its determinate or physical property-realizer if we can make sense of the realizers of the higher-order property instances having "cores" that are distinct from the cores of the realizers of the instances of their determinates or physical property-realizers. And I think that we can do this.

Take our case in which something is red in virtue of being scarlet. We can suppose that the core of the realizers of the scarlet instance is made up of states of affairs that contribute to reflecting light of certain wavelengths and absorbing light of other wavelengths. The core of the realizer of the red instance will consist of some but not all of these states of affairs; it will include those that contribute to the absorbing of light of wavelengths associated with colors other than red, but not those that contribute to absorbing light of wavelengths associated with shades of red other than scarlet. Or take the case in which the surface of something is rectangular in virtue of being square. The core of the realizer of the squareness instance will include both states of affairs that contribute to there being four right angle corners and ones that contribute to there being sides of equal length. The cores of the realizer of the rectangularity instance will include states of affairs of the first sort but not those of the second.

It is not immediately obvious how to apply this in the case of an instance of pain and an instance of C-fiber stimulation, where pain is property-realized by C-fiber stimulation. The states of affairs that make up the core of the realizer of the pain instance should include ones that contribute directly to implementing the causal profile of pain, but should not include, for example, ones that contribute to the activation of a C-fiber stimulation detector. But of course the case at hand is one in which it is through the instantiation of C-fiber stimulation that the causal profile of pain is implemented. It might be questioned whether any proper part of the microphysical state of affairs that is the core of the realizer of the C-fiber stimulation instance can be a state of affairs that is the core of the realizer of the pain instance.

But states of affairs are extremely plentiful. When a number of micro-entities are arranged in a certain way, this will constitute the existence

of not just one but of a vast number of concrete states of affairs that are individuated not only by what micro-entities are involved in them, and how these are spatially related, but also by these micro-entities possessing certain properties and their standing in certain relations other than spatial ones. There will be one rich state of affairs encompassing all of the properties and relations instantiated in this set of micro-entities. But this can be factored into a vast number of less rich states of affairs, each consisting in the micro-entities having some subset of these properties and standing in some subset of the relations. And the properties that can be constituents of such states of affairs will include ones that can be property-realized by more determinate ones.

Suppose there could be prosthetic C-fibers, perhaps made of silicon, and that the stimulation of these can realize pain in essentially the same way, whatever it is, that the stimulation of C-fibers can (going along with the philosophical fiction that the stimulation of C-fibers can realize pain). Stimulation of these would not activate an accurate C-fiber stimulation detector, though it would activate some other sort of detection device. We can suppose that in a case where pain is realized in C-fiber stimulation and in a case where pain is realized in prosthetic C-fiber stimulation, the cores of the pain instances are states of affairs of the same sort. The properties involved in these states of affairs will be functional ones shared by natural C-fibers and prosthetic ones. This is not, of course, to say that the cores of *all* pain instance realizers are states of affairs of the same sort. If, as David Lewis imagined, Martian pain is realized in the inflation of tiny cavities in the feet, the cores of Martian pain instance realizers will be very different from the cores of human pain instance realizers. But it is compatible with this that in any particular case of pain instantiation, the instance of pain has a realizer whose core is different from, though part of, the core of the instance of the physical property that is the property-realizer of the pain. In our case, the core of the realizer of the pain instance is different from, though part of, the core of the realizer of the C-fiber-stimulation instance.

I have just spoken of the core of a property instance realizer being "part of" the core of a realizer of an instance of another property, where the latter property is a property-realizer of the former. It is not part of it in the way the state of affairs P is part of the conjunctive state of affairs P-and-Q, for the properties that are constituents of it will include ones that are not constituents of the state of affairs of which it is a part. Rather, it is part of it in the sense that it is entailed by it, in virtue of the fact that its constituent micro-entities are among those that are

constituents of the other state of affairs, and the properties and relations it assigns to these are either the same as those assigned to them by the other or are property-realized by them.

An advantage of this account is that it holds instances of mental properties to be physically realized in a way that allows them be causally efficacious, and removes the threat that their causal efficacy is preempted by the instantiation of their physical property-realizers. In the case where pain is property-realized by C-fiber stimulation, it will not be true to say that the causal work we would like to ascribe to the pain instance is really done *instead* by the C-fiber stimulation instance. Nor will it be true, as it is on Kim's instance-identity thesis, that while this work is done by the pain instance, this is only because it is identical with the C-fiber stimulation instance. The work is indeed done by the C-fiber stimulation instance, but this is because the core of the C-fiber stimulation instance realizer has the core of the pain instance realizer as a part. It is only because the C-fiber stimulation instance realizer contains the pain instance realizer that it has the relevant effects. Recall that the core of a property instance realizer consists in the states of affairs that contribute directly to the implemention of the causal profile of the property. The core of the C-fiber stimulation instance realizer contains states of affairs that contribute to the implementation of the causal profile of pain, but these make this contribution only because they realize states of affairs contained in the state of affairs that is the core of the pain instance realizer.

It might seem (and I at first thought) that this is a psychophysical identity theory that identifies mental property instances with micro-physical states of affairs. But there are at least two obstacles to such an identification.

First, a property instance would seem to be itself a concrete state of affairs having just one constituent object, namely the subject of the property, and just one constituent property, namely the property instantiated. The realizer of the property instance will be partly a concrete state of affairs having a vast number of micro-entities as constituent objects and a vast number of properties of these as constituent properties, and it will contain in addition positive and negative existential states of affairs. If states of affairs are individuated by what their constituent objects are and how these are propertied and related, the property instance and the realizer cannot be the same state of affairs.

Second, the modal properties of property instances and their micro-physical realizers appear to be different. If a property instance occurs in

thing A, it is not possible that it, that very property instance, should have occurred in a different thing—i.e. should have had a different subject. But the very microphysical state of affairs that realized that property instance might have occurred in something other than A, and so might have realized a different instance of the same property e.g. there is a possible world in which the very same micro-entities that make up my coffee cup make up a different coffee cup (one made at a different time, and in a different factory) of the same shape, color, etc., and where states of affairs involving these micro-entities realize different instances of those properties. If it is sufficient for the existence of a particular microphysical state of affairs that particular micro-entities should be propertied and related in a certain way at a certain time, then we have here a case in which the same state of affairs occurs in two different possible worlds but the property-instances realized by it in those worlds are different. (I owe this point to Geoffrey Lee.)

So the relation between a property instance and its microphysical realizer is constitution, not identity. And constitution should be enough to satisfy a physicalist.

VI

I have been assuming that mental properties are property-realized in physical properties of their possessors. But someone might ask why this need be so, on a physicalist view, given that instances of such properties (like instances of all other properties of macroscopic things) are realized in microphysical states of affairs. If the latter is the only sort of physical realization a physicalist needs, we have an easy way of avoiding the threat, posed by Kim and others, that the causal efficacy of mental properties is preempted by their physical property-realizers. Mental properties will be "first-order" properties, and will have the same causal status as other properties of macroscopic things.

But there is one sort of property-realizer that mental properties will have to have if their instances are realized in microphysical states of affairs. For any type of microphysical state of affairs that can realize an instance of a particular macrophysical property, there is a property something has just in case its career includes a microphysical state of affairs of that type that realizes an instance of that property. Let's speak of these as properties of macroscopic entities that embed microphysical states of affairs that are property instance realizers—call

them microphysical-state-of-affairs-embedding properties, or MSE-properties. If a property is such that an instance of it can be realized in a microphysical state of affairs of a certain type, then the corresponding MSE-property will be among its possible property-realizers. Assuming physicalism, mental properties will have such properties as realizers. But so will all other properties of macroscopic things—or rather, all other properties that are not themselves MSE-properties. Properties like shape, mass, electrical charge, etc. are all ones whose different instances are realized in microphysical states of affairs of different sorts, and so ones that are realized in a variety of MSE-properties.[11]

It is, of course, not properties of this sort that philosophers usually have in mind when they speak of the first-order properties of persons that realize their mental properties. Having C-fiber stimulation occurring in one is not an MSE-property; it is rather a property that is realized in different MSE-properties on different occasions. In all likelihood, the MSE-properties are mostly ones that things have only very briefly, and are seldom shared by different things that are alike in all respects we can detect. Because of the enormous complexity of the microphysical states of affairs they embed, there seems little prospect of our being able to

[11] The notion of microphysical realization, and the notion of an MSE property, help with the problem raised in Chapter 2, note 6, of how a property like that of having the function of circulating blood can be individuated by a causal profile, given that the property can be possessed by a defective heart at a time when it cannot circulate blood and has no causal powers that bestow that function on it. The answer to this lies in the fact that while an instance of this property can be said to occur at a particular time, the instance will not be "temporally local"—it will occur at a time partly in virtue of what is true at other times. The microphysical state of affairs realizer of that instance will be a temporally extended state of affairs, one that encompasses an evolutionary history. In general, instances of historical and partly historical properties will have such temporally extended states of affairs as realizers. The different temporal parts of such a state of affairs will of course have causal consequences, and the state of affairs as a whole will have causal consequences that are themselves temporally extended states of affairs made up of causal consequences of its temporal parts. Such temporally extended states of affairs will likewise have other temporally extended states of affairs as causes. These states of affairs will fall into types individuated by forward-looking and backward-looking causal features—being apt to contribute to the causing of states of affairs of certain sorts, and being apt to be caused by states of affairs of certain sorts. Corresponding to each of these types there will be an MSE property that something has in virtue of its career embedding a state of affairs of that type. The property of having the property of circulating blood will have such MSE-properties as realizers, and will have a causal profile whose forward-looking causal features are a subset of those of each of the realizers and whose backward looking causal features include as subsets those of the different realizers. (I was alerted to the need to deal with this problem by a paper, "Adaptation and Realization," delivered by John Post at a conference on realization at Lafayette College in October 2006).

refer to particular properties of this sort (other than by descriptions of the form "the MSE-property that realized O's instantiation of P at t") and so little prospect of their figuring in the taxonomy of any science.

So the question raised at the beginning of this section, whether a physicalist need hold that mental properties are property-realized by physical properties of their possessors, might be restated as follows: need a physicalist hold that mental properties are property-realized by physical properties of their possessors that are not MSE-properties?

This still doesn't get us the possibility of a negative answer. For if a property has MSE-properties as realizers, it will also have disjunctions of these as realizers, and so will have realizers that are not MSE-properties. While mental properties will thus have property realizers that are not MSE-properties, this will not distinguish them from other properties of macroscopic objects—all such properties that are not MSE-properties will have as realizers disjunctions of MSE-properties as well as individual MSE-properties.

But some disjunctions of MSE-properties will be better candidates than others for being genuine properties—the better candidates will be those that are "unified" in the sense that their disjuncts share significant causal features of certain sorts. (The question of what it is for disjunctive properties to be genuine properties is addressed in Chapter 4, section V.) It may be true in the case of properties generally regarded as "first-order" that none of the disjunctions of MSE-property realizers are sufficiently unified to count as genuine properties. And it may be true in the case of mental properties, and other properties that have been classified as "second-order," that the disjunctions of MSE-property realizers include some that are sufficiently unified to count as genuine properties. For example, having C-fiber stimulation occurring in one might be equivalent to such a unified disjunction. But whether this is so is an empirical question. For all we know a priori, mental properties may have no "genuine" property-realizers other than MSE-properties. And it is compatible with physicalism and functionalism that this should be so.

If by a first-order property we mean one the possession of which by a thing does not consist in the possession by that thing of some other property (a "self-constituted property" in the sense of Chapter 2), and if by a second-order property we mean one the possession of which by a thing always does consist in the possession by that thing of some other property, then the only first-order properties of macroscopic things will be MSE-properties, and all of their other properties will be second-order. On this understanding of the first-order/second-order

distinction, mental properties will be second-order—but so too will all of the other properties of macroscopic things we can refer to. To preserve a distinction, among properties we can refer to, between first-order and second-order properties, we must count as first-order properties some that are realized by properties other than themselves, the realizers being MSE-properties and disjunctions of these. Presumably then the first-order properties will be those whose disjunctive realizers are not sufficiently unified to count as genuine properties. This seems likely to make the first-order/second-order distinction a fuzzy one—for the line between disjunctions of properties that are "sufficiently unified" and those that are not would seem to be a fuzzy one.

On the first of these understandings of the first-order/second-order distinction, that on which only MSE-properties can be first-order, the view that it is only first-order properties that can be causally efficacious and figure in causal laws about macroscopic objects will hardly be an attractive one. For one thing, it will make such causal laws unknowable by the likes of us. And I think it is no more attractive on the second understanding. If the causal efficacy of what it counts as first-order properties is not pre-empted by their MSE-property realizers, it is unclear why we should think that the causal efficacy of what it counts as second order-properties *is* preempted by the disjunctions of their MSE-property realizers that are sufficiently unified to count as genuine properties—especially given that there is no sharp line between cases in which the disjunctions are sufficiently unified and cases in which they aren't.

What I just said is part of my response to the causal exclusion problem. The idea that only self-constituted properties, properties that are not realized by other properties, do causal work, and that these preempt any causal efficacy we might be inclined to attribute to properties they realize, becomes unattractive when it is seen that the only self-constituted properties are MSE-properties, and so properties that there is no hope of our being able to refer to. But my main response is what I said in the preceding section. If the seeming causal efficacy of certain properties is preempted by their realizers, this must in the end amount to its being only the instances of the realizers that do causal work. Suppose that P is a realized property and R is its property realizer on a particular occasion. Proponents of causal exclusion claim (in accordance with one version of the Causal Inheritance Principle) that the causal powers of the instance of P are identical with those of the instance of R, that the instances

themselves are identical, and that the causal efficacy of the instance of P is a manifestation of the causal profile of R. This leaves P with no independent role to play. I hold against this that the causal powers of the P instance are a proper subset of those of the R instance, that this makes the former instance a part of, rather than identical with, the latter, and that this allows the causing of an effect by the P instance to be a manifestation of the causal profile of P. In such a case both instances can be said to cause the effect; but the R instance will cause it because it contains the P instance as a part. This is not overdetermination of an objectionable sort; it can be compared with the case in which we can say both that Smith's death was caused by the salvo of shots fired by the firing squad and that it was caused by the shot fired by Jones, where Jones' shot was the only member of that salvo that hit Smith.

VII

To summarize, I have given an account of how instantiations of properties, both mental and non-mental, can be realized in microphysical states of affairs. This account allows instances of functional properties (or I should say, anticipating the discussion in the following chapter, properties picked out by functional concepts) and determinables to have microphysical realizers that are different from, although embedded in, the microphysical realizers of the instances of the physical properties (the determinates) that are their property-realizers. This allows instances of mental properties to cause the things we take them to cause, compatibly with these instances being physically realized.

The account links microphysical realization with the property-realization discussed in the preceding chapter through the notion of an MSE-property. There perhaps could be a world in which there is property realization but no microphysical state of affairs realization (and so no MSE-properties). In such a world properties like being a braking system would be realized in mechanical, hydraulic, etc., properties, but instances of the latter would not have microphysical realizers. But this would be a world in which physicalism as I understand it would be false. Assuming physicalism, every case in which a property instance is realized by a different property instance is also a case in which the property instance is realized in a microphysical state of affairs; and, perhaps more surprisingly, every case of the latter sort is also a case of the

former, because microphysical realization entails realization by instances of MSE-properties. The fact that every case of property realization is also a case of microphysical realization does not of course involve any sort of overdetermination, for in a physicalist world a property instance's having a property realizer and its having a microphysical state of affairs realizer are one and the same thing.

4

Functional Properties, Emergent Properties, and Phony Properties

In both of the kinds of realization I have discussed, property realization and state of affairs realization, what are realized are instances of properties. The present chapter will be concerned with three of the many issues can be raised about the nature of the properties whose instantiation is realized.

One issue has to do with the relation between the notion of realization and that of a functional property. A common assumption is that properties whose instantiation is always realized in the instantiation of other properties are always functional properties. Sometimes this goes with the view that multiply realized properties, understood as functional properties, lack causal efficacy, cannot figure in causal laws, and are not inductively projectible. One part of this view, the view that realized properties lack causal efficacy, was rejected in Chapter 2. Here I will argue that unless we count all properties as functional properties, it is far from being the case that only functional properties are multiply realizable, that it is in fact questionable whether there is a well-defined ontological category of functional properties, and that functionalism in the philosophy of mind is better construed as the view that our concepts of mental properties are functional concepts than as the view that the properties themselves are functional..

A second issue concerns the status of emergent properties, supposing such properties to exist. Mental properties are held by some to be emergent, and this is often held to be a non-physicalist view. The emergent properties of a thing are held to supervene on its physical properties, but they are thought not to be realized in them. I will argue that there is a good sense in which emergent properties could be physically realized, and that their existence is compatible with physicalism.

The third issue has to do with what it is for something to be a genuine property. Multiply realizable properties are necessarily coextensive with

disjunctions of their possible realizers, and are arguably identical to them. But we do not think that there is a genuine property corresponding to every arbitrary disjunction of properties. So when does a disjunction of properties count as a genuine property? Although the discussion here will focus on disjunctive properties, the same question can be raised in terms of the notion of a higher-order property: under what conditions does a well defined predicate of the form "has some property satisfying condition C" pick out a genuine property? Clearly there are predicates of this form that we don't count as standing for genuine properties—e.g. ones where satisfying condition C is just a matter of being on an arbitrary list.

I

On the account in Chapter 2, all that is required for a property to be such that its instantiation can be realized in the instantiation of another property is that its forward-looking causal features are a subset of those of the other property and its backward looking causal features include as a subset those of the other property. This will be true of all properties except what I earlier called "self-constituted properties"—properties so determinate that no other properties are determinate relative to them. As was argued in Chapter 3, the only self-constituted properties of macroscopic things are MSE-properties, which are properties so fine-grained that we lack the ability to identify and refer to particular ones of them. If only functional properties are realizable in other properties, all properties except MSE-properties will be functional properties. This is not the usual understanding of "functional property." Which leaves us with the question of what distinguishes functional properties from other physically realizable properties.

Various claims have been made about functional properties that would not be made about all properties that can be physically realized. One is Jaegwon Kim's claim that functional properties are not inductively projectible. I will have something to say about this later on. Another is the claim, also made by Kim, that functional properties of things are not intrinsic properties of them. I will start by discussing the latter claim.

A bad reason for thinking that functional properties are not intrinsic stems from the idea that since causation is a relation, properties individuated by causal roles are relational properties and therefore non-intrinsic. I think that this would make all properties of concrete things

non-intrinsic, since I think that all such properties are individuated by causal profiles. But the move from a property's being individuated by a causal profile to its being non-intrinsic involves a confusion. While being the cause of a certain effect is a relational property, being apt to cause certain effects is not—and neither is being apt to have its instantiation caused in certain ways. So a property's being individuated by a causal profile is no bar to its being intrinsic.

But there is another reason for thinking that functional properties are not intrinsic that would be accepted by many philosophers. It is commonly held that functional properties are defined by causal roles in such a way that they have those roles essentially—i.e. so that either they have them in worlds in which the causal laws are different from those in the actual world, or they cannot be instantiated in such worlds. This is usually combined with the view that other properties, including ones that are paradigmatically intrinsic, have all of their causal features contingently, and so have different causal features in worlds in which the laws are different. This combination of views—I will call it the "mixed view"—leads naturally to the conclusion that functional properties cannot be intrinsic. It implies that properties that are realizers of a functional property in the actual world will not be realizers of it in worlds in which the laws are different because in those worlds those properties will have different causal features. Assuming that properties that can be realizers are intrinsic properties, and that things alike with respect to such properties are duplicates, this implies that duplicates occupying nomologically different worlds, i.e. worlds governed by different physical laws, can differ in their functional properties. Which means that functional properties cannot be intrinsic.

I should point out that the claim about the functional properties that figures in this argument cannot be that their *total* causal profiles are essentially to them—not if functional properties can have different realizers in nomologically different worlds. The total causal profile of a functional property in the actual world will include causal features it has in virtue of the nature of its actual world realizers. It will include its being such that its instantiation can be caused by things that cause instantiations of such realizers, and its being such that its instantiation results in things caused by instantiations of such realizers. For example, the causal profile of the property of being in pain will include its being caused by things that cause C-fiber stimulation and its causing things that C-fiber stimulation causes. And according to the mixed view it will lack some such features in worlds in which its realizers are different

because of differences in the laws. What will be true, on the mixed view, is that a part of the causal profile of the functional property—call this part its functional profile—is essential to it, and that in any world this functional profile, in conjunction with the causal laws obtaining in that world, determine what the rest of its causal profile is. It determines this by determining, in conjunction with those laws, what properties are realizers of it in that world. By contrast, none of the causal features of the non-functional properties are essential to them.[1]

This view provides a simple answer to the question of what distinguishes functional properties from other properties—what distinguishes them is just the fact that the functional properties have causal profiles having essential parts of the sort just characterized, while other properties do not. But as I shall now show, this view is not acceptable. If one thinks that some properties have their causal features contingently, one can have no reason to think concerning what are said to be functional properties that they have certain of their causal features essentially. My argument won't show that there can't be properties of this sort. What it shows is that, assuming that properties can have their causal features contingently, we can have no reason to believe of any particular property that it has it has some of its causal features essentially, and cannot be in a position to stipulate concerning any term that it refers to a property of that sort.

Let's first see how things go if we combine this view with psychofunctionalism—the view that the reference of mental terms is fixed to functional properties that figure in the best psychological theory, where that theory is something to be discovered empirically.[2]

Using the methods of empirical psychology we arrive at a psychological theory that postulates the existence of a set of properties with certain

[1] It should be noted that while the backward-looking causal features of a realizer are a subset of those of the property it realizes, in the case of the causal features that make up the functional profile we have a subset relation that runs in the opposite direction—the backward-looking causal features belonging to a property's functional profile will be a subset of the causal features of each of its realizers. For example, while each of the realizers of pain will have backward looking causal features, i.e. possible causes, not shared by the other realizers, each of them will have the backward-looking causal feature of being such that its instantiation is caused by bodily damage. This will be true on the mixed view, but it will also be true on the view that all properties have their causal profiles essentially—even on that view there will be a distinction between the total set of backward causal features of a property and a subset of these, call them the primary ones, which in conjunction with the causal laws determine the rest by determining what count as realizers of the property.

[2] See Block 1978.

causal features, and provides, in terms of these, the best explanation of our behavior and introspective judgments. Let us suppose that we are justified in believing that there are these properties, and that they are the referents of our mental terms. If we think that most properties have their causal features contingently, are we also justified in holding that the properties invoked by this theory have certain of their causal features essentially, namely, those constituting the functional profile ascribed to them by the theory?

Is there empirical evidence that justifies us in believing this? That seems impossible. Our empirical evidence tells us how things are in this world and in worlds nomologically like it; it cannot tell us how things are in worlds (supposing there to be such) in which the causal laws are different.

Perhaps, then, it is a matter of stipulation, not empirical discovery, that these properties have these causal features essentially. We stipulate that the terms of our theory refer to properties that in every possible world, or every possible world in which they can be instantiated, have the functional profile assigned by our theory. Or, alternatively, we stipulate that these terms refer only in worlds that are nomologically like the actual world—that might seem a different way of guaranteeing that the properties have these functional profiles essentially.

But there is only so much that can be achieved by stipulation. If there are properties that have their causal features contingently, and if most properties are of this sort, it seems at least a possibility, with respect to the causal features assigned by our theory to the referents of mental terms, that there are properties that have these causal features contingently, and have different causal features in other possible worlds. We can't have empirical evidence that there are no such properties. And the nonexistence of such properties is not the sort of thing we can stipulate. We can stipulate, perhaps, that if there are such properties then it is not to them that our mental terms refer. But then the terms won't refer at all unless there are properties that have these causal features essentially—either by having them in all worlds nomologically different from ours in which they can be instantiated, or by being incapable of being instantiated in worlds nomologically different from ours. But surely, that there are such properties is not the sort of thing we can stipulate. We can stipulate, perhaps, that in any world our terms refer only to properties having in that world the requisite causal features. But it is obviously not in our power to make it true by stipulation that properties that have these causal features in other, nomologically

different, worlds are the same as the properties that have them in the actual world—we cannot stipulate this if we can't stipulate that the actual world properties do not have different causal features in those other possible worlds.

This view does not fare any better if instead of combining it with psychofunctionalism we combine it with analytic functionalism, i.e. with the view that the meanings of mental terms are such as to make it analytically or conceptually true that the properties they stand for are such as to play certain functional roles (such as to have certain causal features). We can certainly define a psychological predicate, say "is in pain," in such a way as to make analytic a bunch of causal statements containing that predicate. But does this make the predicate stand for a property having those causal features essentially, either because it has them in other possible worlds in which the causal laws are different, or because it is instantiable only in nomologically possible worlds? Whether it does depends on what properties there are, and that isn't up to us. If properties can have different causal features in different possible worlds, then for all we know the only property having the causal features that our functional definition tried to make essential to pain is one that lacks those causal features in other metaphysically possible worlds, ones in which the causal laws are different. For all we know the only property that has these causal features is one that does not have them essentially.

The view that properties can have different causal features in different possible worlds is compatible with the view that there are some properties that have the same functional profiles in all possible worlds. But assuming that there cannot be in any world two different properties having the same causal profile in that world, it is excluded that there should be two properties having all of the same causal features in the actual world, one of them having all of these features, or some significant subset of them, in all other worlds, and the other having altogether different causal features in other worlds. So, given this assumption and the assumption that properties can have their causal features contingently, then whether we are psychofunctionalists or analytic functionalists, if we stipulate that the properties referred to by our psychological terms refer only to properties having certain causal features essentially, there is the risk that this stipulation will result in the terms failing to refer. This will happen if the properties having these causal features in the actual world have different causal features in some other possible world. And this is a risk that neither empirical evidence nor stipulation can remove.

This argument depends on the assumption that there cannot be in any world two different properties having the same causal profile. And this might be questioned.[3] My argument for this assumption in Chapter 1 was that if we allow that more than one property can have a given causal profile, we face what is at least an epistemological embarrassment: given that it is aspects of the causal profiles of properties that enable us to pick them out, we will have no way of picking out, and referring to, a single property, as opposed to an equivalence class of properties (namely the class of properties having that causal profile). But let us suppose with the mixed view that there are two sorts of properties—those that have all of their causal features contingently, call these C-properties, and those that have some of their causal features (their functional profiles) essentially, call these E-properties. It does seem that the supposition that two or more C-properties can share their causal profiles in the same world gives rise to the epistemological embarrassment. And the same holds for the supposition that two or more E-properties can share the same causal profile in the same world. But it doesn't follow that we face such an embarrassment if we suppose that a C-property and an E-property could share the same causal profile in a given world. In such a case, it might be suggested, the properties could be discriminated by their status as C-properties or E-properties. If this is possible, why can't we just stipulate that a term refers to the C-property with that profile, or to the E-property with that profile? Functional properties will be E-properties. And so, on this suggestion, we can know that a term refers to a functional property because we have stipulated that it refers to the (one and only) E property having a certain causal profile.

But notice, first of all, that if two different properties shared the same causal profile in the same world we would have overdetermination whenever an instance of either property was involved in causing some effect.[4]

[3] Here I am indebted to Comments by Chris Hill.

[4] I can think of one way in which someone might think that two properties can share a causal profile without this resulting in overdetermination. One might think that functional properties are, strictly speaking, epiphenomenal, their apparent causal efficacy being preempted by their realizers, but that each functional property can be said to have a causal profile which specifies what the causal profiles of its realizers must have in common. On such a view, if P is a functional property and Q is a non-functional property coextensive with it, something could be caused by an instance of Q without being caused by the corresponding instance of P. Of course, this won't work if the instances of P have realizers that are other than instances of Q (or one of its realizers); if that is true the effect will be over-determined by the instance of Q and the instance

Because they would share the same backward-looking causal features, each would be instantiated wherever the other is instantiated; and because of this, and because they would share the same forward-looking causal features, whatever effects are caused by the instantiation of the one would be caused by the instantiation of the other. This would be true if both were C-properties, or if both were E-properties, but it would also be true if one were a C-property and the other were an E-property. Now it is perhaps not an insuperable objection to the view that such sharing of causal profiles is possible that it allows for some cases of overdetermination. Occasional overdetermination may be tolerable. But now consider the idea that *every* C-property shares its causal profile with an E-property, and vice versa. This would have the consequence that every case of causation involves overdetermination. And that does seem a highly objectionable consequence. It was suggested above, in response to my argument, that given a causal profile that could be the causal profile of some property, we can stipulate that a term refers to the one and only C-property having that profile, or to the one and only E-property that has it. But it would seem that we would be in a position to make such a stipulation only if we were entitled to assume that for each such causal profile there is both a C-property that has it and an E-property that has it. For the stipulation requires that we be entitled to think that there is such a pair of properties, and it is hard to see how we could be entitled to think this in some cases and not in others. And if we were entitled to think this in all cases, we would be entitled to think something that entails that there is massive overdetermination.

But a more serious difficulty is that it seems impossible that we could be entitled to think that for every causal profile that could be the causal profile of some property, there is both a C-property and an E-property that has that profile. And, as before, we would have to be entitled to think this in order to be in a position to stipulate that a property term refers to a property of the one sort or the other. Earlier I argued that on the assumption of the mixed view—that there are both C-properties and E-properties—we can't be entitled to regard any of our terms as referring to functional properties, taking these to be E-properties. But now it seems questionable, on the same assumption, not only that we can be entitled to regard any of our terms as referring to E-properties

of P's realizer. In any case, if P really is epiphenomenal, it will have a causal profile only in a Pickwickean sense, and we won't have a case in which two properties share a causal profile in the same sense of "causal profile."

but also that we can be entitled to regard any of our terms as referring to C-properties.

Consider the case of theoretical properties. Our observational data give us grounds for thinking that there is a set of properties having interrelated causal profiles. (Our knowledge of these profiles will normally be partial; obviously one can refer to a property without knowing all of the causal features that go into its causal profile.) Perhaps using the Ramsey–Lewis technique, we introduce terms for different members of the set. Is there anything in the process by which these properties are picked out that would tell us that they are C-properties? It is hard to see what it could be. And assuming that there are C-properties as well as E-properties, and that so far as we know a priori any causal profile could belong to a property of either of these sorts, it is also hard to see how anything in the process by which these properties are picked out could tell us that they are E-properties. And it is not open to us to just stipulate that they are C-properties, or that they are E-properties. We are supposing that we know that there are properties having certain causal profiles, and that each of these must be a C-property or an E-property. But this doesn't tell us that there are C-properties with these causal profiles or that there are E-properties with these causal profiles, and we would have to know that in order to make the required sort of stipulation.

What these last reflections suggest is that if there are (or can be) both C-properties and E-properties, and if in principle a property of the one kind can share its causal profile with a property of the other kind, we cannot be in a position to know concerning any property to which kind it belongs. So not only is it true, as my original argument tried to show, that we cannot be in a position to know that certain properties are E-properties (understanding functional properties to be E-properties); it is also true that we cannot be in a position to know that certain properties are "categorical" properties (understanding categorical properties to be C-properties).

My own view rejects the mixed view and holds that all properties are E-properties. It is not my purpose here to support that view, although I think that the considerations just raised could be used to support it.[5] What I will do in the following section is consider whether this view—the view that rejects the mixed view and holds that all properties are E-properties—can make room for a distinction between functional and non-functional properties.

[5] See Appendix, this volume.

II

If one holds that all properties have their causal profiles essentially, then of course one can hold concerning what are alleged to be functional properties that they have some of their causal features, indeed all of them, essentially. And on this view there is no reason to deny that these properties are intrinsic. But now we are left with the question of how to distinguish functional properties from other properties. One could hold—and I did once claim[6]—that there is no such distinction because all properties are functional. But I will assume here that we want the notion of being functional to have a narrower application than this.

There is a difference between some properties that would be regarded as paradigmatically functional, e.g. the property of being a braking system, and properties, like being an acid, that are multiply realizable but would not be regarded as functional properties. The property of being a braking system can be realized in a variety of different ways—mechanically, hydraulically, electronically, etc. The property of being an acid also can be realized in a variety of ways—by being sulfuric acid, being hydrochloric acid, being citric acid, and so on. The realization of being a braking system must of course conform to Ned Block's "Disney Principle"—the possible realizers are constrained by the basic laws of nature.[7] But besides their being compatible with the basic laws of nature, there need be nothing more in common to the realizers of being a braking system than there being the appropriate subset relations between their causal features and those of the property of being a braking system. But in the case of the property of being an acid there is something more in common. There is a commonality among the different realizers having to do with the way in which they realize the causal profile of being an acid. This has to do with their being proton donors. Let's use the term "acidish" as a name for the property of having all and only the causal features by which the property of being an acid was initially picked out, and let's call these acidish causal features. These will include corrosiveness, and the disposition to turn litmus paper red. We can think of "acidish" as a functional predicate. If, perhaps *per impossibile*, there were something that was acidish but whose having this property were not realized by a property that is a

[6] In my 1981b. [7] See Block 1997.

proton donor, it would not be an acid. So let's say that the property of being a braking system has realizers that are causally diverse, and that this is potentially true of the property of being acidish, but that it is not true of the property of being an acid. This suggests that we might distinguish functional properties from others by saying that they are properties whose realizers can be causally diverse.

But how are we to understand the "can be" in this formulation? For all I know it is nomologically impossible for something to be acidish without being an acid; it may be that in this case conformance to Block's Disney principle requires that the realizers not be causally diverse—that there be a commonality among the realizers with respect to how they realize the property. And we can't bring in the idea that in other possible worlds there are acidish things that are not acids—that is not compatible with our current assumption that all properties are E-properties. What we can say is that the *concept* of being acidish doesn't rule out there being acidish things that are not acids, and doesn't prevent the property acidish from having realizers that are causally diverse. And it is plausible that it is a feature of functional concepts that they do not rule out the possibility that the properties they pick out have realizers that are causally diverse, while it is a feature of concepts of non-functional properties, in particular natural kind concepts, that they do rule out this possibility. But while this may be the key to the distinction between functional *concepts* and non-functional *concepts*, or between functional *predicates* and non-functional *predicates*, it doesn't provide a basis for an ontological distinction between functional and non-functional *properties*. If, in fact, it is nomologically impossible for there to be acidish things that are not acids, then on our present assumption, that all properties are E-properties, there seems good reason to think that being an acid and being acidish are one and the same property. So if being picked out by a functional concept makes a property functional and being picked out by a non-functional concept makes a property non-functional, we get the uncomfortable conclusion that the same property can be both functional and non-functional.

Functionalism is often put as the view that mental concepts are functional concepts. It is clear enough how mental concepts are functional concepts on an analytic functionalist conception of them; on such a conception it is built into the concept that it applies to anything having certain causal features, without any restriction on how the having of these causal features is realized, and so without its being a conceptual requirement that the different realizers are not causally diverse. A

parochialist view of mental properties might use the same set of causal features as a "reference fixer" for the concept of a mental property, but will incorporate the requirement that the realizers of the property must be the same as, or in some fundamental way similar to, those whose instantiations realize these properties in us—in other words, it will incorporate the requirement that there be a commonality amongst the realizers with respect to how the causal features are implemented, and that the realiers not be causally diverse.

It is not so obvious how psychofunctionalism makes mental concepts functional concepts, since it doesn't hold that we directly define these concepts in terms of causal roles. The idea must be that we do so indirectly, via a stipulation that the terms of a theory arrived at empirically, and satisfying certain constraints having to do with what sorts of things the theory explains, are to be understood as referring to properties having sets of causal features assigned by the theory to the properties it posits, in such a way that the properties having these sets of causal features are referents of the terms whether or not the realizers of the properties are causally diverse. Again there will be a parochialist counterpart to such a view, which says that the empirically discovered psychological theory can be used to fix the reference of the mental terms, but that the applicability of the terms is limited to properties whose realizers are the same as, or in a fundamental way similar to, those that realize the instantiation in us of properties having the requisite causal features, and so are not causally diverse.

It is important to see that neither the analytical functionalist conception nor the psychofunctionalist conception rules out the possibility that in fact the laws of nature are such that all ways of realizing the functional roles they assign to mental properties exhibit the kind of commonality required by the parochialist. One may think this unlikely, but it cannot be ruled out a priori. So on both views it is a conceptual and epistemic possibility that the properties that satisfy the requirements for being the mental properties are the same as those that satisfy the parochialist requirements for being those properties.

All of this suggests that the prospects are not good for our being able to make a purely ontological distinction between functional and non-functional properties. There is an ontological distinction between properties whose realizers are causally diverse and those whose realizers are not causally diverse. And some of the properties that would be classed as functional properties are ones whose realizers are causally diverse—e.g. the property of being a braking system, or that of being

an adding machine. But in other cases it is an empirical question, and one to which we do not presently know the answer, whether properties classified as functional are ones whose realizers are causally diverse. We can say that it is possible that they are if by "possible" we mean conceptually possible or epistemically possible. But that is to say something about the concepts of these properties, not about the properties themselves. It would appear, then, that the functional/non-functional distinction is best seen as a distinction between different sorts of concepts, not one between different sorts of properties. I will sometimes allow myself to speak of functional properties. But when I do, I should be understood as referring to properties picked out, or presumed to be picked out, by functional concepts.

I have not offered a general account of what it is for the realizers of a property to be, or not to be, causally diverse—or what it is for there to be, or not to be, a relevant commonality among the different realizers with respect to how the causal profile of the realized property is implemented. I have nothing better to offer than the intuitive contrast between properties like that of being a braking system and properties like that of being an acid. It will of course be true in all cases of multiple realization that the different realizers have *something* in common causally; it follows from their being realizers that they share the forward-looking causal features of the realized property. If the concept of the property is a non-functional one, it must require something additional to this—something that constrains what properties can be realizers of the property, and in that way contributes to the specification of its causal profile.

III

I turn now to the matter of projectibility. Jaegwon Kim has suggested that functional properties are unprojectible, and are for that reason unsuited for figuring in causal laws.[8] He compares pain, as construed by functionalists, with the property of being jade. Jade is a "disjunctive kind" rather than a natural kind. The two kinds of jade, nephrite and jadeite, are different minerals that are alike only in their superficial properties (and properties common to all minerals). And according to

[8] See Kim 1993a.

Kim, the property of being jade is not inductively projectible. This is supposedly shown by the fact that if our inductive sample consisted solely of pieces of jadeite, or solely of pieces of nephrite, the fact that all members of the sample are F would not give inductive support to the generalization that all pieces of jade are F. Kim suggests that if being in pain is a functional property, realizable in a variety of different physical properties, it fails to be projectible in the same way. For Kim this makes it questionable whether, assuming functionalism, there is a genuine property common to all of the things the predicate "is in pain" is true of, and so whether this predicate can figure in causal laws.

But compare the property of being jade with the property of being an acid, which I assume Kim would count as a genuine property and as projectible. Being an acid is a multiply realizable property. As noted earlier, there are as many different ways of being an acid as there are different kinds of acid. And just as we will go wrong in our inductions about jade if we rely on a sample consisting only of pieces of jadeite, so we will go wrong in our inductions about acids if we rely on a sample consisting only of bits of sulfuric acid. For example, we may conclude, falsely, that all acids contain sulfur. Louise Antony and Joe Levine give the example of the property of being a half inch long, pointing out that the projectibility of this is not called into question by the illegitimacy of an induction about things of this length based on a sample of half inch long *insects*.[9]

But if, as I have suggested, the functional/non-functional distinction should be regarded as a distinction between kinds of concepts, or kinds of predicates, not one between kinds of properties, then the question of whether functional properties are projectible is moot. There is no kind *functional properties*, so there can be no question whether properties of this kind are projectible, or whether properties of this kind can figure in causal laws. There are of course functional predicates, and the question can be raised whether these can be inductively projectible. But, as I shall now argue, it is beyond question that they can be.

A property like being a braking system does not seem a suitable property for doing induction on. It is picked out as the property that has certain causal features, and since we already know that it has these causal features if we can refer to it at all, there is no room for the use of induction to discover that it has them. And because it is a property whose realizers are causally diverse, we shouldn't expect to discover

[9] Antony and Levine 1997.

by induction that it has causal features in addition to these. We can discover new ways of making a braking system; but this won't be by way of extrapolating inductively from braking systems we already know about. It seems approximately right to say that properties *known* to be such that their realizers are causally diverse are not suitable properties for doing induction on, and that the predicates that designate them are not inductively projectible.

But as we have seen, mental properties are not like this. Assuming mental predicates are functional predicates, the senses of these predicates—the concepts they express—leave it open whether, or to what extent, the realizers of these properties are causally diverse. They imply that *if* certain causal features of these mental properties can be realized in ways totally different from those in which they are realized in us—e.g. if they can be realized as in David Lewis's Martians, where the causal role of pain is realized in the inflation of tiny cavities in the feet—then the properties in which these features are realized will be realizers of these mental properties.[10] But of course they do not imply that the antecedent of this conditional is true. It is compatible with the senses of these predicates, and the concepts they express, that the ontological status of mental properties is precisely what it is held to be by parochial views of the mental. So there is nothing in these functional concepts to preclude there being causal laws governing these properties, and there is nothing to block the use of induction in an attempt to discover such laws.

On a parochial view about mental concepts it is a priori that the realizers of mental properties are not causally diverse—that they exhibit a significant commonality beyond sharing the causal features associated with the realized properties. But if mental concepts are functional, the question of whether the realizers of mental properties are causally diverse is an empirical question. It is one that can only be settled by theoretical considerations about what sorts of realizations of the causal features of mental properties are possible, given the physical laws. It is unlikely that simple induction from instantiations of mental properties will play much of a role in settling this. But this is not because mental predicates, or the properties they designate, are not inductively projectible; it is because such induction as is involved here is concerned with properties at a lower level—those involved in the operation of mechanisms that are candidates for being realizers of the mental properties.

[10] Lewis 1880.

It may be thought that if the realizers of mental properties are causally diverse, mental properties cannot figure in genuine explanations. It is generally assumed that the realizers of such dispositional properties as dormitivity are causally diverse, and it is widely thought that it is absurd to offer as an explanation of someone's falling asleep that the pill he took was dormitive. Here it is customary to cite Moliere's *Le Malade Imaginaire*. It is certainly true that such an explanation strikes us as superficial. But this does not mean that such properties are not causally efficacious. Saying that the pill caused sleep because it was dormitive can be true even though it fails as an explanation because it fails to give causal information we did not previously possess, or causal information of the sort we were after. In any case, what is distinctive about mental properties, on a functionalist understanding of them, is that their functional roles, unlike that of dormitivity, are extremely rich, and make possible illuminating explanations that are far from obvious. Arguably there are no properties whose causal and explanatory roles are richer. And this is true whether or not their physical realizers are causally diverse—for it is the causal features these realizers have in common, not those that make them different to whatever extent they are, that give them their explanatory and causal efficacy.

To sum up, I have suggested that we should deny that the functional/non-functional distinction is a distinction between ontologically different kinds of properties, and should say instead that it is a distinction between kinds of concepts and, correlatively, kinds of predicates. This removes any reason for thinking that properties picked out by functional concepts and predicates fail to be intrinsic, and it removes any reason for thinking that these properties are not inductively projectible or that they are unfit for figuring in explanations and causal laws. This is superficially similar to a view advanced some time ago by David Lewis, and defended more recently by Jaegwon Kim, which holds that what is common to the various creatures, possible as well as actual, of which the predicate "is in pain" is true is not that they share a functional property but rather that they satisfy a functional concept.[11] Like mine, the Lewis-Kim view could be said to replace the notion of a functional property with the notion of a functional concept. But the views are importantly different. On their view, a functional concept does not designate any single property that is possessed by all things that satisfy the concept. It picks out different properties when applied to creatures

[11] See Lewis 1980 and 1994; and Kim 1998.

of different kinds—human pain, octopus pain, Martian pain, etc. For Kim it might even be that it picks out different properties when applied to different persons, or the same person at different times, because of structural differences. On the view I am proposing, a functional concept does designate such a single property. It is just that this single property should not be called a functional property, unless by a functional property we simply mean one picked out by a functional concept.

IV

The view that mental properties are "emergent" is often taken to be a non-physicalist view. Emergentists are taken to deny that mental properties are realized in physical properties. The emergent properties bestow "novel causal powers" that cannot be predicted on the basis of the physical properties, so they would appear to have causal features that are not possessed by any of the physical properties of the things that have them, which means that those physical properties could not be property-realizers of them. They are causally autonomous, and not reducible to the physical properties on which they are in some sense based. I will start by taking emergentism to hold that emergent properties supervene on physical properties despite not being realized in them; this distinguishes emergentism from versions of property dualism that allow the mental properties of a subject to float free from its physical properties. But later I will question whether we can distinguish emergent properties, supposing such to exist, from the physical properties on which they supervene.

No doubt there are different understandings of what it is for properties to be emergent. But I will argue, drawing on the discussion of emergence in C. D. Broad's *Mind and Its Place in Nature*, that there is a good understanding of it on which the claim that there are emergent properties is compatible with physicalism, and on which it is possible for instantiations of emergent properties to be realized in microphysical states of affairs in the way described in Chapter 3.

Broad offers as a case of emergence the properties of silver-chloride relative to those of its chemical elements, silver and chlorine. And he offers two descriptions of this which, he says, "may be theoretically different, but in practice they are equivalent."[12] On the first, the "properties" of chemical elements are "very largely propositions about the

[12] Broad 1925: 25.

compounds which they form with other elements under suitable conditions." These properties cannot be "deduced" from any combination of other properties of the elements. So we don't know all of the properties until these elements have been put in the presence of each other. Later he puts this by saying that certain of the properties remain "latent" until the substances have been combined in certain ways. On the other way of describing the case, we confine the word "property" to those characteristics that manifest themselves when the substances don't interact chemically with others, i.e. "the physical characteristics of the isolated elements." Here we can know all the properties, but we can't know all of the laws about the results of combining elements having these properties until we have actually combined such elements in what I will call "emergent engendering" ways. Of course, it is true generally that we cannot know the laws governing properties without observing the behavior of things having those properties. But while in other cases we can extrapolate from the behavior of things having certain properties in a variety of situations to how things having those properties will behave in a novel situation, the emergentist holds that there are novel situations, those in which things are combined in emergence engendering ways, to which we cannot extrapolate. Induction from other situations won't tell us what will happen in such novel situations—we have to find or create cases in which the elements are combined in such ways and see what happens.

Broad's first description involves saying that the elements have "latent" properties, ones we can learn about only by seeing the results of combining those things in certain ways. And I think that the second description implies that the elements have, if not latent properties, at least latent causal powers. Corresponding to any law saying that things of a certain sort make a certain contribution to causing a certain effect in certain circumstances there will be a "power" of things of that sort to contribute to producing such an effect in such circumstances. And such powers will be grounded in properties of the things that have them. In the case of the powers of the elements in Broad's example, one possibility is that the properties that ground them are ones that we can know about without combining the elements in the particular ways in question; we know about these properties because of other powers they bestow, but only learn of the latent powers when the elements having these properties are combined in the relevant sorts of combinations. Another possibility is that they are bestowed by properties of which we can have no inkling at all until the elements have been so combined. In

this case there will be latent properties as well as latent powers—we can take a latent property to be one that bestows only latent powers. But in either case, the elements will have latent powers that are bestowed by their properties, and it will be in virtue of these properties and the powers bestowed by them that the complexes built out of them will have their emergent properties.

Although Broad is here discussing the alleged emergence of properties of chemical compounds from those of chemical elements (something no longer scientifically plausible), I think something analogous to what he says here has to apply to all cases of emergence, if such cases there be. I am taking it that the emegentist holds that the subjects of emergent properties are composed entirely of physical components; ultimately the micro-entities of which all physical things are composed. And I am taking it that the emergent properties supervene on the properties of the physical components, and on the ways these are related to one another. This requires that the components be such, in virtue of their intrinsic properties, that when they are so combined the complex objects they constitute have emergent properties and have the powers that these emergent properties bestow on the macro-entities they belong to. That is to say that the component entities have powers that, collectively, determine the instantiation of the emergent property when they are combined in an emergence engendering way. But, these being cases of emergence, these cannot all be powers that manifest themselves when the components are not combined in emergence-engendering ways. Some of them must be "latent" powers. Or, since these powers do not remain latent when their possessors are combined in emergence-engendering ways, let us speak of them as "micro-latent" powers. We can contrast these with the "micro-manifest" powers which these same entities manifest when they are not combined with other entities at all, or are configured in ways that are not emergence engendering. It is the micro-manifest powers of the micro-entities making up an object, together with the ways these micro-entities are related, that realize the microphysical states of affairs that realize instantiations in the object of the non-emergent physical properties by which the object is identified and classified. Unlike the micro-latent powers, these always contribute to grounding the properties and powers of the object, no matter how the micro-entities are related to one another (as long, of course, as they are related in such a way as to be parts of the same object). And they contribute to this in systematic ways, which make possible predictions about what properties and powers will result from novel arrangements of

the micro-entities that have them. By contrast, the micro-latent powers contribute to grounding the properties and powers of the object only when the micro-entities are arranged in emergence engendering ways, and there is no way of predicting in advance what arrangements are emergence engendering or what properties and powers will result from such arrangements.

When micro-entities are combined in an emergence engendering way, the resulting object will apparently have two sorts of micro-structural properties. One sort, call these provisionally Type-1 micro-structural properties, will consist of properties that can be specified entirely in terms of the micro-manifest powers of the constituent micro-entities together with how these micro-entities are related—i.e. in terms of what could be known about them prior to their entering into emergence engendering combinations. Such a property will be the property of being composed of particles with such and such micro-manifest causal powers and related in such and such a way. The other sort, which I will provisionally call Type-2 micro-structural properties, will be properties specified in terms of all of the powers, micro-latent as well as micro-manifest, of the constituent micro-entities. Such a property will be the property of being composed of particles that have certain micro-latent and micro-manifest powers and are related in certain ways.

Type-2 micro-structural properties, although they are micro-structural, will be emergent properties. For they are specified partly in terms of the micro-latent powers of the constituent micro-entities that account for the emergence. Whatever other emergent properties that macro-objects have will be realized in these, in just the way physicalists take mental properties to be realized in micro-structural properties. (Given the possibility of coincident entities, this will be realization$_2$ rather than realization$_1$.) Assuming that emergent properties supervene on physical micro-structural properties, they supervene on Type-1 micro-structural properties. So let's re-label the latter as "physical micro-structural properties," and let's re-label the Type-2 micro-structural properties as "emergent micro-structural properties."

If emergentism is false, micro-manifest causal powers are the only ones the micro-entities have, and physical micro-structural properties are the only micro-structural properties that macro-objects have—and the other properties of macro-objects are realized in their physical micro-structural properties. In that case the other properties of the macro-entities are "predictable" on the basis of, and "resultant" relative to, the properties and relations of their micro-constituents, which

collectively determine (constitutively) their physical micro-structural properties.

How do things stand if emergentism is true? Certainly the other properties of macro-entities will not be predictable on the basis of, and resultant relative to, the micro-facts that constitute the instantiation of the physical micro-structural properties. But they will be realized in, and resultant relative to, the micro-facts that constitute the instantiation of the emergent micro-structural properties, these including, of course, the possession by the micro-entities of what I have been calling micro-latent powers. They will not be *predictable* on the basis of these micro-facts, prior to the micro-entities being combined in emergence engendering ways, simply because these facts cannot be known prior to our observing the effects of combining the micro-entities in such ways. But it is as much true on the emergentist view as it is on the view of an anti-emergentist physicalist that the micro-facts fix the macro-facts; the only difference is that on the emergentist view the micro-facts include the instantiation of micro-latent powers.

To relate this to the account of microrealization in Chapter 3, it is apparent from what I have said that emergent micro-structural properties will be realized in microphysical states of affairs, these being microphysical states of affairs that include the instantiation in the constituent micro-entities of micro-latent causal powers. Other emergent properties will be property-realized (realized$_2$) in emergent micro-structural properties, and in virtue of this their instantiations will also be realized in microphysical states of affairs. If physical micro-structural properties are distinct from the emergent micro-structural properties that supervene on them, the microphysical states of affairs that realize instantiations of the former will be partly the same as those that realize instantiations of the latter—they will differ only in that the microphysical realizer of the physical microstructural property will not include the possession by the micro-entities of the micro-latent causal powers. So if P is a physical micro-structural property, and E is an emergent micro-structural property that supervenes on and so is determined by P, the instantiation of both will consist of micro-entities being related in certain ways and having properties that bestow on them certain micro-manifest powers. But the instantiation of E will involve in addition the possession by these micro-entities of certain micro-latent powers. Let's say that P's instantiation is realized in a purely manifest (PM) state of affairs, and that E's instantiation is realized in a partly latent (PL) state of affairs—bearing in mind that strictly speaking it is

the powers involved in these states of affairs, not the states of affairs themselves, that can be called manifest or latent.

If, indeed, the instantiation of E is determined by the instantiation of P, it must be that the existence of the PL state of affairs that includes the instantiation of these micro-latent powers (those involved in the realization of the instantiation of E) is necessitated by the existence of the PM state of affairs that does not include the instantiation of them. Perhaps this would be a consequence of laws saying that whatever micro-entity has certain micro-manifest powers also has certain micro-latent powers—these being, of course, laws that we could discover only by considering cases in which the micro-entities are combined in emergence-engendering ways.

If, as I have assumed so far, the emergent micro-structural properties and the physical micro-structural properties on which they supervene are distinct properties, we face a choice between holding that the former are epiphenomenal with respect to the latter and holding that there is "downward causation," in which instantiations of emergent micro-structural properties cause instantiations of physical micro-structural properties. Jaegwon Kim has argued against the possibility of such downward causation.[13] Consider a case in which the instantiation at t1 of E1, an emergent micro-structural property, is followed by the instantiation at t2 of P2, a physical micro-structural property. Could E1's instantiation be the cause of P2's instantiation? Given the supervenience of emergent micro-structural properties on physical micro-structural properties, the instantiation of E1 at t1 must be determined (constitutively) by the instantiation at t1 of some physical micro-structural property, call it P1. If P2's instantiation is necessitated by E1's instantiation, it is also necessitated by P1's instantiation—and Kim thinks that the P1 instantiation "preempts" the E1 instantiation as the cause of the P2 instantiation. And he thinks that for the same reason instantiations of physical properties preempt instantiations of emergent properties even as causes of other emergent property instantiations—as a special case of this, instantiations of physical micro-structural properties preempt instantiations of emergent micro-structural properties even as causes of other emergent micro-structural property instantiations. Suppose E1's instantiation is thought to cause the later instantiation of E2, another emergent micro-structural property. E1's instantiation is determined by its supervenience base, P1, and E2's instantiation is

[13] Kim 1999.

determined by its supervenience base, let it be P2. If E1's instantiation causes E2's instantiation, it must do so (he thinks) by causing P2's instantiation. But by the earlier argument, it cannot do this; it is preempted by P1's instantiation as the cause of P2's instantiation. So it seems that the correct account is that P1's instantiation causes the E2 instantiation by causing the P2 instantiation that determines it. So not only is downward causation by emergent property instantiations ruled out; same level causation by them is ruled out as well. Such properties would be completely epiphenomenal.

I think, however, that this argument is flawed. We can see this by considering the microphysical states of affairs that realized these various property instantiations. This being a case of emergence, the micro-manifest causal powers involved in the PM microstructural state of affairs that realizes the instantiation of P1 are insufficient to bring about the PL microphysical state of affairs that realizes the instantiation of P2. These have to be supplemented by the micro-latent causal powers involved in the PL microphysical realizer of E1. Of course, given the supervenience of the emergent on the physical, the P1 realizer determines the E1 realizer. But it is the E1 realizer that actually includes the causal powers involved in bringing about the P2 realizer, and that seems a sufficient reason for saying that it is the cause. And in causing the P2 realizer it also causes the E2 realizer, given that the P2 realizer is a state of affairs that is part of the E2 realizer and is nomically sufficient for the rest of it (because the micro-manifest powers involved in both necessitate the micro-latent powers involved in the E2 realizer). The proper description of the causing of the instantiation of E2 seems to be this: The P1 instantiation determines the E1 instantiation in virtue of the determination of the micro-latent powers involved in the realization of the latter by the micro-manifest powers involved in the realization of both. The E1 instantiation causes the E2 instantiation, which it does by causing an instantiation of P2 that is part of the instantiation of E2 and nomically sufficient for the rest of it.

I have assumed so far that the emergent micro-structural properties and the physical micro-structural properties on which they supervene are distinct properties. But this can be questioned. On an alternative view, which I favor, the P1 and E1 in my example are one and the same property despite a difference in how they are described. This is supported by the fact that P1 and E1 will be necessarily coextensive. Although there is only one property, on this view, one description of it mentions only the micro-manifest causal powers of the micro-entities

involved in its instantiation, while the other mentions both these and the micro-latent powers of those micro-entities. If P1 and E1 are identical, and likewise P2 and E2, there is of course no question of P1 preempting E1 as the cause P2 and E2, and no problem about downward causation. On this view there will be the different microphysical states of affairs I earlier took to be the realizers of the P1 and P2 instantiations—the PM state of affairs constitutively involving only micro-manifest powers and the PL state of affairs constitutively involving both micro-manifest powers and micro-latent powers. But only the latter will be a realizer of a property instantiation; the former will be a part of such an instantiation which nomically necessitates the remainder of it.

But to take this line means abandoning the view that emergent properties are supervenient on physical properties that are not emergent. Unless being emergent is a feature properties have only relative to ways of describing them, E1's being emergent makes P1 emergent. This means that the supervenience claim can be retained only if it is reformulated so as not to be a claim about the dependence of emergent properties on physical properties that are not emergent. But this reformulation is not hard to come by: what we have here is the supervenience of micro-latent powers on micro-manifest powers. This is what accounts for the supervenience of emergent micro-structural properties on physical micro-structural properties, supposing these to be distinct. But it holds whether these properties are distinct or not. Emergentism is just the view that some properties of macroscopic physical things are such that their instantiations are realized in PL microphysical states of affairs. There is, I think, no good reason for regarding this view as incompatible with physicalism.

I have been supposing that emergent properties are in some sense supervenient on the physical, and the version of this I have just arrived at says that the micro-latent causal powers of micro-entities that underlie emergence supervene on micro-manifest causal powers of those entities. But if there can be micro-latent powers, why shouldn't there be some that don't supervene on the micro-manifest powers or anything else?[14] Supposing that the micro-manifest powers of the constituents of things collectively are responsible for the macro-properties by which we identify such things, this would have the consequence that we could not formulate laws expressing emergent facts—laws saying that things having certain macro-properties have certain novel powers. We

[14] I am grateful to Carl Ginet for raising this question.

would lack any way of specifying emergence-engendering states of affairs. Among the properties of macroscopic things would be some that they have in virtue of having constituents having certain micro-latent powers, but we would have no way of recognizing instantiations of these properties. All that we would know is that things sometimes behave in unpredictable ways. This is, I think, compatible with physicalism. I do not know whether it should count as a kind of emergence.

V

I turn now to the issue of what it takes for something to be a genuine property. It was mentioned earlier that if a multiply realized property can be thought of as a higher-order property, which something has just in case it has some lower order property satisfying a certain condition, it can equally be thought of as a disjunctive property, the disjuncts being all of the properties satisfying that condition. But we do not want to regard just any disjunction of properties as a genuine property having a causal profile of its own. When is it appropriate to regard a disjunction of properties in this way? Equivalently, when does a class of properties count as the possible realizers of a genuine property?

The question can be sharpened by considering an example Louise Antony gives in discussing Jerry Fodor's claims about the non-nomic status of disjunctive properties.

> Let us choose some *arbitrary* set of physical predicate pairs, (*Ci*, *Ei*) such that "$(x)(C_ix \rightarrow E_ix)$" is a law. Now let us define "higher-order" predicates **C** and **E** in the following way: $(x)[\mathbf{C}x \leftrightarrow (C_1x \vee C_2x \vee \ldots C_jx)]$ and $(x)[\mathbf{E}x \leftrightarrow (E_1x \vee E_2x \vee \ldots E_jx)]$. We now have, it seems, a "higher-order law" not expressible by primitive proprietary terms of the lower level: "$(x)\mathbf{C}x \rightarrow \mathbf{E}x)$." But this is ridiculous. "**C**" and "**E**" don't express real, autonomous properties, and "$(x)(\mathbf{C}x \rightarrow \mathbf{E}x)$" doesn't express an autonomous regularity. Yet Fodor cannot disqualify either the predicates or the generalization on the grounds that the *kinds* involved are not nomic. Certainly, we could retort, these groupings are not nomic—*not as characterized at the lower level*; that's precisely why we need the higher-level vocabulary—the regularities are only visible at the next level up. (Antony 1999: 8).

The question now is, on what grounds can we disqualify "**C**" and "**E**" as expressions of "real, autonomous" properties, and "$(x)(\mathbf{C}x \rightarrow \mathbf{E}x)$" as an expression of an autonomous regularity?

Later in her paper Antony points out that the confirmation of "bogus generalizations" like "(x)(**C**x → **E**x)" is "realization-dependent"; the ascription of "**C**" must depend on a prior identification of the instance as possessing one of the first-order properties used to define this predicate. The confirmation of generalizations involving genuinely projectible predicates is not realization-dependent in this way—one can confirm generalizations about pain without having any knowledge of what its physical realizers are. She ties this point to the observation that there is nothing the **C**s have in common besides causing **E**s, so we can't generalize from the observed properties of one **C** to those of another.

But is it true that the **C**s have nothing in common besides causing **E**s? If we have these phony properties, we will have others. We can suppose that each of the first-order properties in terms of which "**C**" and "**E**" are defined will figure in more than one causal law and will be involved in the causing of more than one sort of effect. Disjoining the predicates involved in these laws with those involved in others, in the way the C_is and E_is were disjoined to get **C** and **E**, we get other pseudo-laws of the same sort as "(x)(**C**x → **E**x)." So there will be other predicates "**D**," "**F**," "**G**," and "**H**" (to name just a few) defined as equivalent to disjunctions of first-order predicates, such that we have the additional laws "(x)(**C**x → **D**x)," "(x)(**C**x → **F**x)," "(x)(**G**x → **C**x)," and "(x)(**H**x → **C**x)." So the **C**s will have it in common that they cause **D**s and **F**s, and are caused by **G**s and **H**s. We can do something similar with **E**. It would seem that we can embed our phony properties **C** and **E** in a system of phony properties and phony causal regularities that is as rich as we want. We still need to see why these properties and regularities are phony.[15]

[15] In his 2001 Lenny Clapp offers the following account of what it is for a predicate to designate a legitimate property:

A predicate π designates a legitimate property P if and only if there is some nonempty set of causal powers p such that (a) if a particular o satisfies π, then o possesses every power in p, and the converse, (b) if a particular o possesses every power in p then o satisfies π (p. 131)

Unfortunately, this fails to rule out such properties as **C** and **E**. Consider the set of powers p_c something has if it satisfies any of the disjuncts of "**C**". This will be nonempty, for it will include powers to produce instantiations of **E**, **D**, **F**, etc.; in Clapp's terminology, the disjuncts will "overlap on" 'powers' of this sort. Something satisfying "**C**" will have every power in p_c. And if something possesses every power in p_c, it will satisfy "**C**". We could disqualify the likes of "**C**" from satisfying Clapp's test for designating a legitimate property if we could find reasons for denying that expressions like "the power to produce an instantiation of **E**" refer to legitimate powers. But it is

There are complications here. It was unrealistic to suppose that the genuine laws governing the first-order *C*s and *E*s are of the simple form "(x)(C_ix → E_ix)." Normally it is only under certain conditions that the instantiation of one property causes the instantiation of another, and those conditions will have to figure in the laws governing these causal transactions. So let the genuine laws be of the form "(x)(C_ix & $cond_i$ → E_ix)." The phony law governing **C** and**E** will have to have a condition in its antecedent that is some function of the conditions that figure in the first-order laws. And now there is a problem about what this condition can be. It won't do, it would seem, to make it the disjunction of those conditions. It won't be true that each of the C_is is followed by the corresponding E_i if *any* of the $cond_i$s is satisfied—for one of the C_is to be followed by the corresponding E_i it must be accompanied by its own associated condition. And if we make it the conjunction of these conditions, we will get our phony regularity only if these conditions are jointly satisfiable, which they very well might not be. Let **cond** be the conjunction of the $cond_i$s. Our law will be "(x)(**C**x & **cond** → **E**x)." If the different $cond_i$s are not jointly satisfiable, all instances of "**C**x & **cond**" will be false, and the "law" will be only vacuously true and will not express any regularity.

These considerations show that phony properties and phony regularities will not be as plentiful as at first appears. But they will still be plentiful enough to pose a problem. What are required are cases in which the condition $cond_i$ involved in the laws governing each of the disjuncts cannot be satisfied in cases where any of the other disjuncts are instantiated. And such cases are easy to find. Suppose that mental states are realized differently in creatures with different physical makeups—as it might be, humans, dolphins, and octopi. And suppose that when a human is in condition $cond_1$ the instantiation of a certain realizer (call this C_1) of a certain belief causes the instantiation of a certain realizer (call this E_1) of mental state M_1; that when a dolphin is in condition $cond_2$ the instantiation of a certain realizer (C_2) of a certain desire causes the instantiation of a certain realizer (E_2) of mental state M_2; and that when an octopus is in condition $cond_3$ the instantiation of a certain realizer (C_3) of acute pain causes the instantiation of a certain realizer (E_3) of mental state M_3. As before, let **C** be defined as the disjunction of C_1, C_2 and C_3, and **E** as the disjunction of E_1, E_2 and E_3. Letting

hard to see how we could do this without already having reasons for denying that the likes of "**E**" designate genuine properties.

cond be the disjunction of $cond_1$, $cond_2$ and $cond_3$, we now have the law "(x)(**C**x & **cond** → **E**x)." And because $cond_1$ can be satisfied only in humans, $cond_2$ only in dolphins, and $cond_3$ only in octopi, we don't face the problem raised above—there is no risk of our law being falsified by a case in which we have C_1 and $cond_2$ but not **E**, because such a case is impossible. Such phony properties and phony regularities will be easy to come by. And again we face the question, what makes them phony?

The problem can be posed in terms of my account of realization. If we take there to be genuine causal connections between **C**, **B**, **E**, and the like, these properties will have causal profiles that will make their disjuncts realizers of them in the sense I have defined. For example, the C_is will be realizers of **C**. It should then be the case, according to what I claimed in Chapter 2, that when something has **C** in virtue of having, say, C_{27}, the instance of **C** is non-identical with the instance of C_{27}, and it causal powers are different from (are a proper subset of) those of C_{27}. But this seems clearly wrong. Given that **C** is an arbitrary disjunction, it seems that an instance of it will just be an instance of one or another of its disjuncts, and that the causal powers of an instance of it will just be those of whatever disjunct is instantiated on that occasion. The task of distinguishing phony properties like **C** from genuine ones is, I think, equivalent to the task of distinguishing cases in which instances of a disjunctive property are identical with instances of one or another of its disjuncts and cases where this is not so. Only in the latter cases will the disjunctive property have a causal profile in its own right. Given the network of lawlike connections that properties like **C**, **B**, **E**, and the like stand in to one another, what makes it the case that they do not have causal profiles in their own right, and are phony rather than genuine?

It might seem that the answer lies in Antony's point that the confirmation of generalizations like "(x)(**C**x & **cond** → **E**x)" is realization-dependent—the only way to establish them is to establish the generalizations involving the first-order realizers of the (supposed) properties involved in them, i.e. the disjuncts of the disjunctions that define them. If this were constitutive of the distinction between genuine properties and phony ones, it would make the distinction an epistemic one, and would make the genuineness or otherwise of properties an anthropocentric matter—a matter of their relation to our perceptual and cognitive capacities.

But while it is clear that as things actually are the confirmation of such generalizations is realization-dependent, it doesn't appear that this

is necessarily true. There could be detectors of the properties C_1-C_3 and E_1-E_3 in our example, and if these were appropriately combined, and connected by an "or"-gate, they could collectively constitute a detector of the properties **C** and **E**. Likewise for the other properties of the same sort. Of course, if these detectors were constructed by us, and we realized how they work, the use of them to confirm generalizations like "**C** & **cond** → **E**" would be realization-dependent. But what if the detectors were not constructed by us? Perhaps they came into being as the result of some cosmic accident. Or perhaps they were constructed by an earlier race of intelligent creatures who are no longer with us. Knowing nothing of this we could, by observing regularities in the input and output of these detectors in various circumstances, become aware of what are in fact the properties **C** and **E**, and other properties of the same sort, and of various generalizations governing their instantiation, without having any inkling of how they are realized—i.e. without having any inkling that they have disjunctive definitions of the sort I have envisaged. The verification of these generalizations would not be realization-dependent.

Could it be that in our actual situation these properties are phony but that in the imagined situation they are genuine? Could it be that inserting disjunctive detection mechanisms into a world converts what were phony properties into genuine ones? This could be so on a view that makes the genuineness of properties an anthropocentric matter, but I think the natural view of this case is that even in the imagined situation the properties would be phony.

Here is a consideration that supports this. I have emphasized that there is no limit to the complexity of the lawlike connections that phony properties of this sort could enter into. And in envisioning the possibility of detectors of them we have allowed that they could enter into lawlike connections with paradigmatically genuine properties—those whose instantiations are outputs of the detectors. But notice first of all that we had to imagine that the detectors are mechanisms that are decomposable into sub-mechanisms (for detecting the properties that are disjuncts of the phony properties) connected by an or-gate—only so can we imagine the instantiation of the phony properties causing instantiations of paradigmatically genuine properties. And notice further that there is one sort of lawlike connection of the phony properties with paradigmatically genuine properties that we have not envisioned. We have envisioned that their instantiation might cause, or quasi-cause, instantiations of paradigmatically genuine properties (albeit, as just

noted, with the help of an or-gate), but not that their instantiation might be *caused by* the instantiation of such properties, where this is not just a matter of the instantiation of one of the realizers (one of the disjuncts) of the phony property being so caused. The sort of causing that is missing is this: under certain conditions, the instantiation of G (a paradigmatically genuine property) causes the instantiation of **C**, but in different cases in which this happens **C** is realized by different first-order properties (sometimes by C_1, sometimes by C_2, sometimes by C_3). We do think that this sort of causing can occur in the case of multiply realizable properties. A perceived object's being square causes the belief that it is square, though in different cases that belief may be differently realized. No doubt the causing of the belief involves the causing of a realizer of it, but what is important here is that the cause is such as to cause whatever realizer is, at the time in question, in the repertoire of the believer. We don't have anything analogous to this in the case of **C**, **E**, and their ilk. And I suggest that if we did, that would remove the main reason for thinking that these properties are phony.

But how much does this tell us about what it is for a property to be genuine rather than phony? It tells us that if we already have a set of "paradigmatically genuine" properties, then a property that is a disjunction of certain of these counts as genuine only if it has backward-looking causal features of a certain sort—ones that make its possible causes include instantiations of certain of the paradigmatically genuine properties. And perhaps its forward-looking causal features must include its being such that its instantiation can contribute to the instantiation of paradigmatically genuine properties in a way that does not involve the operation of an or-gate. But of course this does not tell us what makes the paradigmatically genuine properties genuine. It might be thought that the genuineness of the paradigmatically genuine properties is unproblematic because they are properties that are not multiply realizable, i.e. not equivalent to disjunctive properties. But that does not square with my insistence in Chapter 3 that all properties that figure in our ordinary thought and talk are multiply realizable. We have seen that the involvement of the paradigmatically genuine properties in a network of lawlike generalizations is not enough to account for their genuineness, for this can be true of the likes of **C** and **E**. And it is no help to add that their backward-looking causal features include their being such that their instantiation can be caused by instantiations of paradigmatically genuine properties, or that their instantiation can

cause instantiations of paradigmatically genuine properties without the aid of an or-gate, since what we are after is an account of what makes a property paradigmatically genuine.

It is of course true of what we count as paradigmatically genuine properties that we can detect their instantiation, and verify generalizations involving them, in ways that are not realization-dependent. But to count this as an account of what genuineness consists in amounts to holding genuineness to be anthropocentric, or what may come to the same thing, to holding that it is an epistemic matter.

On one understanding of the claim that genuineness of properties is anthropocentric it amounts to the claim that it is relative—that a property is genuine relative to creatures having a certain sort of cognitive and perceptual system, one that permits them to detect instantiations of a property in a way that is not realization dependent, i.e., in a way that makes them directly detectable. This would allow for the possibility that the same property can be genuine relative to one sort of creature and phony relative to another. And this raises the question of whether there could be creatures relative to which properties like **C** and **E**, ones we regard as phony, are directly detectable, and relative to which properties that we regard as genuine are not directly detectable and phony. If, as suggested above, there could be detectors of the likes of **C** and **E**, perhaps it is not out of the question that there should be creatures whose visual systems were such detectors. But these creatures should also be such that it is instantiations of such properties that bring about and sustain their existence, and satisfy their wants and needs, and such that instantiations of what we regard as genuine properties do not play this role. I think it is questionable whether the supposition that there could be such creatures is coherent. So I think it is questionable whether genuineness of property is anthropocentric in a way that makes it relative—though I admit to having no argument to show that it isn't.

However this may be, we have found no reason to question our entitlement to regard as genuine those properties we can detect directly. Given this, it would seem that we are entitled to regard a property as genuine just in case its backward-looking causal features are such that its possible causes include instantiations of properties that are genuine and its forward-looking causal features are such that its instantiation can cause instantiations of genuine properties without the aid of an or-gate. This will rule out the likes of **C** and **E** (hopefully it rules them out altogether, but it at least rules them out as genuine relative

to us). We can avoid circularity by construing this as a recursive definition—the base clause says that properties directly detectable by us count as genuine, and the rest of the definition expands the class of genuine properties to include all properties related in a certain way to those in the base. But talk of "definition" is problematic here; I lack any account of why the properties directly detectable by us count as genuine (although it seems beyond question that they do), and it seems implausible that this is just a consequence of a stipulation about the meaning of "genuine."

VI

The first part of this chapter was about what difference there might be between functional properties and other properties, and the last part was about the difference between genuine properties and "phony" properties. On one view these topics are closely related—for according to it, functional properties are a kind of phony properties. But that is not my view. What are called functional properties—properties picked out by functional concepts—I regard as perfectly genuine properties. What I have questioned is whether the term "functional property" picks out a distinct ontological category. I have taken it that functional properties must have their functional profiles essentially, and so must be E-properties. I have argued that on the "mixed view," the view that there can be properties that have their causal profiles contingently as well as properties that have some of their causal features essentially, we cannot be in a position to identify any property as an E-property, and so cannot be in a position to identify any property as functional. And I have argued that on the view (which I favor) that all properties have all of their causal features essentially, there is no distinct ontological category of functional properties. That a property is picked out by a functional concept does not rule out the possibility that it can also be picked out by a non-functional concept, e.g. by what I have called a parochial concept. And where a property is standardly picked out by a nonfunctional concept, it is not excluded that it may also be picked out by a functional concept—e.g. the property of being an acid may be picked out by the functional concept acidish. A property's being picked out by a functional concept is compatible with, indeed requires, that it be "genuine" as opposed to "phony." The only positive conclusion about the genuine/phony distinction I have reached is that

genuine properties must stand in a certain sort of lawlike connection to properties that are directly detectable by us, i.e. detectable in a way that is not "realization dependent" in Louise Antony's sense. A question I leave open concerns just how it is that being directly detectable by us makes a property paradigmatically genuine.

5

Metaphysical Applications

In this chapter I want to fill out the account presented so far by discussing its bearing on a number of metaphysical issues. One is the issue of whether there can be "coincident" entities, and in particular whether persons and their bodies (or persons and biologically individuated animals) can be coincident entities. This is of course relevant to the topic of personal identity, Another is the issue between "endurantist" ("three-dimensionalist") and "perdurance" ("four-dimensionalist") accounts of the persistence of objects through time. Another is the topic of material constitution—the question of what it is for a set of micro-entities to make up a macroscopic object.

I

If property instances are realized in microphysical states of affairs, and the career of an object is a series of collections of these, it is to be expected that it should be possible for there to be coincident objects—numerically different objects that occupy the same place and are composed of the same matter. And the coincidence allowed for will be of a different sort than that allowed for by perdurance theories. Perdurance theories allow objects to coincide in virtue of sharing temporal parts. If during an interval the statue coincides with the piece of clay, this will mean, on such an account, that during that interval the momentary stages of the statue are identical with the momentary stages of the piece of clay, and that during that interval the statue and the clay will share their properties (it really being the stages, on such a view, that are the subjects of the properties). On my account, however, coincident objects can, indeed must, differ in their properties. I allow that there are momentary stages that are parts of the career of the object, though I deny that these stages are parts of the object itself. These stages, on my view, will be collections, or perhaps I should say composites, of property instances.

The stages will of course not *have* the properties whose instances occur in them. And in a case of coincidence, the stages of the coincident objects will be made up of different property instances.

Why is it that the account allows for this possibility? Well, recall that the property instances are realized in microphysical states of affairs whose constituents include, and in many cases consist solely of, micro-entities that are among those of which the subject of the property is composed. The same micro-entities can at the same time enter into a variety of different microphysical states of affairs, in virtue of different ways they are propertied and related. And there is nothing to exclude there being two series of collections of microphysical states of affairs, each having the same micro-entities as constituents and each exhibiting the sort of causal continuity that constitutes it as the career of a persisting object, where the properties realized are to some extent different and where the careers exhibit different persistence conditions. This allows for things that coincide for a time and then part company, or that come to coincide after having existed separately. But it also allows for things that coincide throughout their careers.

I believe that this is the situation that obtains with persons and their bodies—and with persons and human animals, if the latter have purely biological persistence conditions. Anyone who holds a neo-Lockean account of personal identity, a psychological continuity account that allows for the possibility that a person might "change bodies" as the result of a brain transplant (or cerebrum transplant), is committed to holding that persons are not identical with their bodies. And on the conception of animal identity favored by "animalists" about personal identity, the neo-Lockean is also committed to holding that persons are not identical with human animals.[1] Yet the neo-Lockean is committed to persons being coincident with bodies and human animals. Since the neo-Lockean denies that the body and the (biologically individuated) animal are persons, she must presumably deny that they have the psychological properties that are distinctive of persons.[2] So the coincident entities will differ in their properties in at least this way: the person will have psychological properties the coincident body and biological animal do not have. But assuming that the psychological properties of a person are realized in physical properties of that person, and that having a physical

[1] See Olson 1997.

[2] Lynn Rudder Baker, in her 2000, holds that the body and biological animal have mental properties "derivatively."

realizer of a property entails having that property (i.e. assuming that the realization is the realization$_1$ of Chapter 2), the neo-Lockean must also hold that the coincident body and the human animal lack the physical properties of the person that are property-realizers of her mental properties.

Since brain-transfers do not in fact occur, by and large the careers of persons and those of the coincident bodies and animals coincide throughout. I say "by and large" because the body may outlast the person (when it exists as a corpse), and may come into existence before it does (if there is no person yet in the fetal stage).

I have defended the neo-Lockean view in several places and will not further defend it here.[3] My aim here is to explore its implications for the status of mental properties.

II

The neo-Lockean view is of course perfectly compatible with physicalism. It is compatible with it that every mental property instance is realized in a microphysical state of affairs. The series of collections of microphysical states of affairs that constitutes the career of a person will by and large coincide with that which constitutes the career of the body, and by and large will involve the same micro-entities. But the states of affairs in the series are different because they consist in different facts about how these micro-entities are propertied and related; and because of the difference in the states of affairs constituting the two careers, the careers are careers of different continuants.

Yet this view is incompatible with a natural understanding of a claim that is often put forward as an indispensable commitment of physicalism, namely that the mental properties of a person strongly supervene on the physical properties of the person. Among the physical properties of persons are micro-structural properties, where the having of such a property by a thing consists in having as components micro-entities that are propertied and related in certain ways. The micro-entities involved in the instantiation of such a property can include all of its component micro-entities or only some portion of them. The specification of such a property can include not only the positive information that the thing

[3] See my 1984, 1997, and 2005.

contains micro-entities of such and such sorts related in such and such ways, but also the negative information that it contains no micro-entities other than these, or that it contains no micro-entities of certain sorts. The micro-structural properties of an object will determine its shape, size, mass, and electrical charge. And it might be thought that they will determine all of the intrinsic properties of the object.[4] But this cannot be so if there can be coincident objects. The micro-structural properties and the properties determined by them (realized by them) are "thin" properties; they are properties that are necessarily shared by coincident objects. Such properties cannot determine the "thick" properties with respect to which the coincident objects can differ. And so the latter cannot supervene on them. Persons and their bodies share the same thin physical properties, and so share the same micro-structural properties; but persons have mental properties while their bodies do not. So mental properties do not supervene on the thin properties of persons, and do not supervene on micro-structural properties.[5]

It has often been objected to the neo-Lockean view that if persons are coincident with but not identical with their bodies, or with biologically individuated human animals, then since they share their physical properties with these they should, assuming physicalism, share their mental properties with them.[6] I have called this the "too many minds" problem.[7] The way out of this is to hold that the physical properties shared by persons and their bodies are ones on which mental properties do not supervene.

This does not mean that the instantiations of the physical properties shared by persons and their bodies do not determine the instantiation of mental properties. My body's having the physical properties it has determines that there is *something* there having certain mental properties—but that something is the person, not the body. What we do not have there is "same subject" supervenience of mental properties on thin physical properties. And we do not have "same subject" realization; in the terminology of Chapter 2, we have realization$_2$ but not realization$_1$.

[4] Thus Jaegwon Kim, in his 2003, appears to endorse the principle that "wholes made up of the same (qualitatively identical) constituents configured in the same structural relationships will exhibit an identical set of intrinsic properties" (p. 169).

[5] It is of course a consequence of externalism about mental content that content properties do not supervene on micro-structural properties. But the claim here is stronger than that—it is that they do not supervene on micro-structural properties together with physically specified relational properties.

[6] See Olson 1997. [7] See my 1999 and 2003.

This also does not mean that there are no physical properties on which mental properties "same subject" supervene. If there are physical properties that are property-realizers$_1$ of mental properties, mental properties supervene on properties of this sort. These properties, like the mental properties themselves, will be thick properties. Here the thickness is thickness of causal role. The causal roles of mental properties are thick in the sense that they involve substantial implications for the future careers of the things that have them. These are properties that can belong only to entities—persons or other mental subjects—that have psychological persistence conditions, where something's having such persistence conditions means that its career will exhibit a certain sort of psychological continuity. I have elsewhere characterized this continuity as the playing out over time of the causal or functional roles of mental states—the laying down of memories, the execution of intentions, the generation of new beliefs and intentions as the result of reasoning, and so on.[8] As was suggested earlier, we can say that a thick property implies a "sortal" property, and is internally related to the persistence conditions that go with having that sortal property. Here the sortal is *person*, or perhaps *mental subject*. And it will be true of the thick physical properties that are realizers$_1$ of mental properties, as much as it is of the mental properties themselves, that their causal profiles are such that they can only be instantiated in creatures with psychological persistence conditions.

What would be an example of a thick physical property that is a property-realizer$_1$ of a mental property? I have been speaking of micro-physical states of affairs as realizers—and microphysical states of affairs are not properties. It can of course be a property of something, a micro-structural property of it, that among the micro-entities that make it up there are some that are so propertied and related as to constitute the existence of a certain sort of state of affairs. But this will be a thin property, even if states of affairs of that sort are realizers of a certain sort of mental property instance; if a person has such a property, so will his body.[9]

Let us suppose, however, that the cores of states of affairs that realize mental property instances involve only the micro-entities located in the cerebrum, and let's allow ourselves to speak of the states of

[8] See my 1984 and 1997.

[9] This means that the instantiation of this property in this body guarantees that there is something there, made of these micro-entities, that has the mental property in question, but not that the body has it. Such micro-structural properties should not be confused with what in Chapter 3 I called MSE-properties—the latter are thick properties.

affairs themselves as located in the cerebrum. And consider the property (belonging to a person) of having a cerebrum in which is located a state of affairs of a certain sort, where states of affairs of that sort are core realizers of a certain sort of mental property instantiation. Even this will not get us the thick property we want on one way of understanding what it is to "have" a cerebrum—for one might say that the body (as well as the person) "has" such a cerebrum in virtue of the fact that such a cerebrum is attached inside its skull. But there is a different sense in which a person can be said to "have" a certain cerebrum and a body cannot—that in which a creature "has" a certain cerebrum just in case that cerebrum is the locus of that creature's mental property realizers (or the cores of these). The property of having, in this sense, a cerebrum in which is located a certain microphysical state of affairs will be a thick property that can, if the state of affairs is of the right sort, be a realizer of a mental property. Mental properties will supervene on thick physical properties of this sort, and such thick properties will be instantiable only in subjects of mental states.[10]

Another way to specify a thick property that is a realizer$_1$ of a mental property is by invoking the idea that the career of a thing is a series of collections of property instances, and ultimately a series of collections of microphysical states of affairs. If at time *t* a person has a mental state realized in a microphysical state of affairs of kind K, then the person has at *t* the property of having as the current stage of its career one that includes a microphysical state of affairs of kind K—this will be what I earlier called an MSE property. This property will realize$_1$ the mental property and so will be a thick property. Having such a property requires having a career of the sort that can include such a stage, and so a career that conforms to the persistence conditions of mental subjects. The career of the person's body will involve the same thin property instances as the career of the person, and so will involve the same microphysical realizers of these, but none of the stages of the body's career will include the microphysical states of affairs of kind K—and so the body will not have the property of having as its current stage one that includes such a microphysical states of affairs. (The thin properties of the body will of course realize$_2$ the mental property and the thick property that realize$_1$ it. They will guarantee the

[10] One can perhaps make sense of the idea that a person might control, by some sort of radio transmission, and receive sensory input from, a body in which his cerebrum is not located. If we allow that that body would count as the person's body, this would be a case in which the person has a cerebrum that is not attached inside its skull. See my 1976 and Dennett 1978.

existence of a microphysical states of affairs of kind K. But that doesn't give the body's career a stage that includes that state of affairs.)

What should be striking here is that (assuming a neo-Lockean view of personal identity) the physical properties that are realizers of mental properties, and the physical properties on which mental properties supervene, are properties whose specification is ineluctably psychological in nature. This means that one sort of reduction of the mental to the physical is out of the question; we cannot say that mental properties are identical with, or even that they are realized in or supervene on, properties that can be specified without the use of psychological concepts.[11] I think it is commonly assumed that physicalism implies that the basic macroscopic physical objects are things whose persistence conditions can be specified in physical terms, and that all properties of macroscopic objects must supervene on, and be realized in, properties of these. If I am right, this is mistaken. The subjects of psychological properties are things with psychological persistence conditions, and these persistence conditions enter constitutively into the nature of the properties. And this means that these properties do not supervene on, and are not realized$_1$ in, "thin" physical properties, those that can be instantiated in things with physical persistence conditions.[12] The same is true of the "thick" physical properties in which these mental properties are realized. The claim that the mental is grounded in the physical does not have its best expression in the claim that mental properties are realized in, or supervene on, physical properties of the things that have them—for the thick properties that realize them, and on which they supervene, are ones whose specification is partly psychological. It has a better expression in the claim that instances of mental properties have microphysical states of affairs as realizers.[13]

[11] They can be realized$_2$ in such properties, but cannot be realized$_1$ in them.

[12] More precisely, the relation of these properties to thin physical properties is not one of "same subject" supervenience or realization. Something's having certain thin properties can necessitate that there is something there having certain mental properties, but not that the subject of the thin properties has them e.g. a body's having the thin properties it does can necessitate that the coincident person has certain mental properties.

[13] Of course, there is a sense in which the specification of the microphysical realizers is psychological—for these will be specified as states of affairs belonging to types whose causal profiles are isomorphic with those of the mental properties whose instances are realized by members of these types (see Chapter 3, section III). This is just the sense in which any realizer is specified by its relation to what it realizes. But in principle the microphysical states of affairs, and their causal profiles, can be described in purely physical terms. And the claim that all property instances are realized in microphysical states of affairs that are of this sort is clearly a physicalist claim.

III

Philosophers who allow the possibility of coincident objects usually hold that members of pairs of coincident objects must be things of different types. Kit Fine has offered one convincing counterexample to this view—a case in which two different notes are coincident.[14] I think that we can also have a case in which two different persons are coincident.

Some people, including me, think that it is possible in principle that two persons should simultaneously share the same body. Some have held that this actually happens in split brain cases, and some think it happens in cases of what used to be called multiple personality (now called dissociation of the personality). I hold no brief for the view that it actually happens in either of these sorts of cases, and will content myself with a purely hypothetical example. The case I will consider is one in which two persons alternate in controlling a body, somewhat in the manner of Dr. Jekyll and Mr. Hyde.[15] Let it be that one of the two people, E (for "even") is conscious and in control of the body on the even days of the week, and the other O (for "odd") is conscious and in control of the body on the odd days. The mental states manifested by E on the even days include memories only of what was done and experienced by E on the even days, and no memories of what was done by O on the odd days; and likewise, mutatis mutandis, for the states manifested by O on the odd days. There is continuity between the interests, tastes, skills, beliefs, desires, and character traits manifested on successive even days, and likewise between those manifested on successive odd days, but no significant continuity between those manifested on even days and those manifested on odd days. Nevertheless, we can suppose that even on odd days E has memories and other psychological states in the way a sleeping person does, and that these states are realized in states of the brain; likewise for O on the even days. So two series of mental states, each exhibiting the psychological continuity characteristic of diachronic personal identity, are realized in successive states of the shared body. Obviously they will be realized in different states of the body.

[14] See Fine 2000.

[15] This example is based on one that Eric Olson presented, with a very different purpose, at a conference on The Self at the University of Arkansas in September 1999. Olson's view is that in such a case what I claim to be coincident persons have to be one and the same person with a very unusual mental history.

One possibility would be that E's mental states are realized in one hemisphere of the brain, say the right one, and that O's mental states are realized in the other—and that these are insulated from each other in a way that prevents any psychologically significant interaction between them. Even if this were so, it would seem that the particles that make up the left hemisphere are among those that make up E, and those that make up the right hemisphere are among those that make up O. Suppose that a certain configuration of right hemisphere particles constitutes a microphysical state of affairs that realizes one of E's mental states. Let P be the micro-structural property something has just in case the particles that make it up include ones that are propertied and related in such a way as to be constituents of such a state of affairs. This will be a property shared by E and O. But it will not be the property that realizes (in the sense of realizes$_1$) E's mental state, since O does not have that state.

Someone might suggest that what we have here is overlap rather than coincidence—that strictly speaking the left hemisphere is not part of E and the right hemisphere is not part of O. I do not find this the most natural description of the case. But in any case, we can have a version of the case in which the very same particles that are involved in the realization of E's mental states at a time are also involved in the realization of O's mental states at that same time. The same particles can be involved in different states of affairs in virtue of the various properties they have and the various ways in which they are related. Even if the very same particles are constituents of two states of affairs, the states of affairs may differ—for one of them may hold in virtue of one way these particles are propertied and related, and the other may hold in virtue of a different way these same particles are propertied and related. If the case is like this, there is no possibility of maintaining that it is a case of overlap rather than one of coincidence.

IV

I have suggested that we can think of the career of a persisting thing as consisting in a series of microphysical states of affairs, each of the microphysical states of affairs in the series being made up of microphysical states of affairs that are realizers of property instantiations. This much of my view could be accepted by partisans of perdurance accounts of persisting things. Perhaps some of them would say that the

persisting thing is just such a series of microphysical states of affairs. But I believe that there are good reasons for rejecting such a view.

What I find problematic about perdurance accounts is not so much the claim that persisting things have temporal parts as the claim that it is, in the first instance, the temporal parts (more specifically, momentary stages) that have the properties we ascribe to persisting things. I believe that it is difficult, if not impossible, to reconcile this claim with a reasonable account of what the having of such properties amounts to. This is especially difficult when the properties are mental ones.

Mental properties include states with intentional contents that refer to the past or future of the subject of the properties. If at a certain time I remember doing something, the content of the memory is that the remembered action was done by the subject now doing the remembering. If I intend to do something tomorrow, the content of my intention is that a certain thing will be done tomorrow by the subject of my present intention. Hopes and desires, and attitudes of regret, remorse, fear, etc., likewise involve reference to the past or future of the subject of such states. But it is not only the intentional contents of mental states that relate mental states occurring at a time to other times in the career of the subject. As was emphasized earlier, it is essential to the causal profiles of mental properties that the having of these properties will contribute in certain ways, via "immanent causation," to causing successor states in the subject. And this is true not only of mental properties. All properties that can be instantiated in things at times have causal profiles, and in many cases an important part of the causal profile of a property has to do with how the instantiation of the property will influence the future career of the thing that has it. This is true of dispositional properties, like being elastic, and is true generally of thick properties.

Suppose, now, that only momentary stages can be subjects of the properties we seem to ascribe to persisting objects. On the face of it, this seems to imply that if I intend to do something tomorrow, I intend something impossible—for there is no way in which my current momentary stage can do something tomorrow. Likewise, my memory of having done something last week will have to be mistaken, for there is nothing that my current stage did last week. And of course, properties that can only be instantiated in momentary stages cannot have causal profiles of the sort described above—they cannot be such that their instantiation carries implications for the future careers of the things that have them, for the things that have them of course lack future careers.

It might seem that there is an easy way out of these difficulties. Start with the point about intentions and memories. The difficulty there stemmed from taking the referent of the word "I," or of its mentalistic counterpart in the content of the intention or memory, to be the subject of the intention or memory. We can avoid the difficulty by taking the referent of the first-person pronoun to be, not the momentary subject of the state in whose intentional content it figures, but the person of which that momentary subject is a temporal part. We continue to have the stage as the subject of the state (memory or intention), but have the content of the state concern not the past or future career of the stage itself (it has none) but rather the past or future career of the person whose stage it is. The difficulty about causal profiles can be handled in a similar way. We continue to hold that properties are individuated by causal profiles. But instead of saying that the causal profile has to do, in part, with the impact of the property instance on the future career of the thing in which it is instantiated, we say that it has to do, in part, with the impact of the property instance on the future career of the thing of which the subject of the instantiation is a temporal part.

But on most versions of the perdurance view, the definite description in this last formulation, viz. "the thing of which the subject of the instance is a momentary part," is an improper description. A given momentary stage will be a temporal part of any number of different temporal wholes (infinitely many, in fact), so nothing will be *the* thing of which it is a momentary part. So we must amend the description to read "the thing *of a certain sort* of which the subject of the instantiation is a temporal part," and must take ourselves as entitled to assume that each of the "certain sorts" in question is such that a given momentary stage can be part of only one entity of that sort. And now it will be the case that the property instance, although its subject is a momentary stage, must be such that its existence entails the existence of an entity of a kind—person, tree, or whatever—that perdurance theory regards as a kind of four-dimensional entity.

This, of course, is what I have held to be true generally of instances of what I call thick properties—that their existence entails the existence of a persisting entity of some sort. Indeed, something similar is true even of instances of thin properties, the only difference being that in the latter case knowing what the thin property is doesn't tell us to what sort the persisting thing belongs. This is true of property instances whether (as I hold) their subjects are the persisting things in whose careers they occur or (as perdurance theorists hold) their subjects are momentary

stages of those persisting things. And the implications of this point are at odds with something perdurance theories often say in expounding their view. We are invited to compare continuants (things that can persist through time) with roads, and momentary stages of continuants with cross sections of roads.[16] The way different continuants can coincide (at certain times) in virtue of sharing temporal parts is held to be analogous to the way different roads can coincide (at certain places) in virtue of sharing spatial parts—e.g. Taughannock Boulevard coincides for some miles with NY Route 89. Now there being a road at a particular place is not a *spatially local* state of affairs—it is not a state of affairs whose existence has no implications for what is true of places other than the place where the state of affairs is said to occur. This is because the intrinsic properties of a cross section of a road, whatever these might be, do not guarantee that there is a road there; for it to count as a cross section of a road, properties (like being asphalt) must be distributed in a certain way over some substantial portion of space that includes the location of the cross section as a proper part. The analogy would suggest that there being a continuant of a certain sort at a particular time is not a *temporally local* state of affairs, and that in order for a momentary stage to count as a stage of a continuant, properties must be distributed in a certain way over some substantial portion of time. But this is not true if property instances are themselves temporally local states of affairs. If they are, it follows from the point that property instances must be such that their existence entails the existence of states of affairs of certain kinds that the existence at a certain time of a continuant of a particular sort is temporally local in a way the existence of a road at a particular place is not spatially local. And a perdurance theorist who accepts this point is accepting something very close to, if not identical with, what proponents of endurantist (three dimensionalist) views of continuants express by saying that such a thing is "wholly present" at each moment of its existence. For that could be a way of saying that what is intrinsically true of a thing at each moment of its existence is sufficient for there existing at that moment a thing of the sort it is.[17]

[16] See, for example, Lewis 1986: 202, and Sider 2001: 6.

[17] Admittedly. it is not true of every sort of persisting thing that something's being of that sort is fixed by the intrinsic properties of the thing at each moment of its existence. This is not true of artifact kinds—something's being a chair requires that it have a past history in which it was created with certain intentions. And on most views it is not true of biological species—it does not appear that a "swamp tiger" (a physical duplicate of a tiger that is not the progeny of tigers) would be a tiger. But even if the intrinsic

Does the perdurance theorist have the option of saying that property instances, having momentary stages as their subjects, are not temporally local? To hold that would rob perdurance theorists of what I take to be their main reason for insisting that it is temporary stages rather than continuants that are subjects of ordinary property instances, namely that this is required if the properties in question are to have the status of being intrinsic. It has been argued, by David Lewis and others, that if one holds that properties like shape, mass, color, etc. belong to continuants rather than momentary stages, then the only way to avoid the consequence that change with respect to such properties violates Leibniz's Law is to take these properties to be relations to times, and so non-intrinsic.[18] To use Lewis's example, if Lewis is bent (sitting) at one time and straight (standing) at another, and the bentness and straightness are both intrinsic properties of him, we get a violation of Leibniz's law. And holding that these properties are not intrinsic, and are instead relations to times, is held to be unacceptably counterintuitive. This is the "problem of temporary intrinsics," and the solution offered is that we have no violation of Leibniz's law because the different intrinsic properties instantiated at different times belong to different subjects (different stages of Lewis). But the solution does not work if property instances having momentary things as subjects are not temporally local. For in that case these are relational states of affairs, involving relations to what is true at other times, and the properties will not be intrinsic.

To sum up, if the perdurance theorist concedes the intuitive view that ordinary property instances are temporally local, where these include instances of thick properties that entail sortal properties, she is in danger of being committed to the endurantist view that continuants are wholly present at each moment of their existence. If to avoid this she holds that the property instances are temporally non-local, she undermines the status of the properties as intrinsic, and so undermines the perdurantist solution to the problem of temporal intrinsics.

properties of the swamp tiger at a time are not sufficient to make it true that there is a tiger there at that time, it seems plausible that they are sufficient to make it true that there is there something having the persistence conditions of a tiger. It is less clear that a "swamp chair" (a physical duplicate of a chair whose parts came together by chance) would have the persistence conditions of a chair—artifact kinds are special, for reasons I briefly discuss in section VII. But if the claim that a persisting thing is "wholly present" at each moment of its existence is glossed in the way suggested above, it seems at least a close approximation to the truth.

[18] See Lewis 1986.

V

Earlier I mentioned the "too many minds problem" apparently posed by the view that persons are numerically different from, but coincident with, their bodies—or with biologically individuated human animals. My introduction of the distinction between thin and thick properties was partly a response to this. There is another too many minds problem that might seem to threaten physicalist views about the mind.[19] Consider the part of a person that consists of all of him except the pinky of his left hand—following Trenton Merricks, call it the "pinky complement."[20] If I should lose my pinky, my pinky complement would be all that is left of me. Would it *be* me? If so, it would have whatever mental states I would then have. But it would seem that the detachment of my pinky need not involve any physical change in my pinky complement—if this seems questionable, change the example (again following Merricks) so that the body parts in question are a single molecule on my skin and the "molecule complement" consisting of all of me except that one molecule. But then it seems that before the detachment the pinky complement—or the molecule complement—should have the mental states it has, and I have, immediately after the detachment. Too many minds! The same reasoning leads to the conclusion that every part of my body that is large enough that I could survive with only it constituting my body has the mental states I have.

There is an obvious defect in this way of presenting the problem. One thing cannot come to be a numerically different thing; so if my pinky complement is not identical with me now, it will not be identical with me after my pinky is detached. So what we should say is that if my pinky is detached, I and my pinky complement will become coincident objects. This still may seem to get us too many minds. My pinky complement after the detachment will share my physical properties, and so, it may be thought, must share my mental properties if physicalism is true. And given that it now has the same physical properties as I would have then, it must share my mental properties now. Similarly for each of my other proper part complements that is such that I could survive with it as the entirety of my body.

[19] This is a version of Peter Unger's "problem of the many"—see Unger 1980.
[20] See Merricks 2001.

But the first step of this argument, the claim that after detachment my pinky complement will share all of my mental properties because it shares all of my physical properties, is essentially the same as the too many minds argument I rejected earlier—the one that says that if I and my body are coincident entities then in sharing all of my physical properties it must share all of my mental properties. And the response I made to that argument will serve here. It is only thin physical properties that I will share with my pinky complement after detachment, and thin physical properties do not by themselves determine mental properties.

The case here is similar to the case of Tib and Tibbles, so let's reflect briefly on that.[21] Tibbles is a cat, and Tib, so we are told, is the part of Tibbles that includes all of him except his tail. If Tibbles tail is removed, Tibbles and Tib will coincide. Given that now Tibbles and Tib are non-identical, it seems out of the question that after the detachment they will be identical. So they must then be coincident entities composed of exactly the same matter. Those who find coincident entities problematic naturally see this as a problem, and try in various ways to resist the conclusion. One is to deny that there is any such entity as Tib—i.e. to deny that there are such things as tail-complements. But without denying the existence of Tib, we can ask just what sort of entity it is supposed to be. One possibility is that it is just an aggregate of molecules—all of those that compose Tibbles, except for those in his tail. (This of course is an option only for those who allow that there are such things as aggregates.) If that is what Tib is, it is no more problematic to hold that after detachment Tibbles will be coincident with but non-identical with Tib than it is to hold that right now Tibbles is coincident with but non-identical with the aggregate of all of his molecules, those in his tail as well as those in Tib. For the case to be problematic, we need to construe Tib, after the detachment, as an entity more like Tibbles than a mere aggregate of molecules could be; we need to construe it as something that has a claim to be a cat, something that would be a cat except for its unfortunate history of having once been only part of one. This ought to mean that if Tibbles can survive the loss of a whisker, Tib also can survive that—although the aggregate of molecules could not. More generally, it seems that Tib should share Tibbles' persistence conditions. But surely Tibbles could survive the reattachment of his tail—we can imagine him being rushed to the vet

[21] See Wiggins 1968. For a more recent treatment of the problem very different from my own, see Lewis 1993.

after the unfortunate accident, and having the tail successfully sewed back on. Could Tib survive this? If such a repair happened, would Tib then have a tail as a part? The persistence conditions for a sort of thing are not independent of the principles that determine what count as parts of a thing at a particular time. And if those principles count a reattached tail as part of Tib, they should also count as part of him an attached tail that has not yet been detached. But that of course contradicts our original description of Tib as not including Tibbles' tail. Making Tib's persistence conditions the same as those of Tibbles undermines the basis for distinguishing them prior to the tail detachment.

Applying this to the case of my pinky complement, and the like, we see that no proper part of me can share my mental properties; to share them it would have to have my persistence conditions, and this would require that it have all of my parts.

Of course, it can be indeterminate what "all of my parts" include. When a molecule is in the process of entering my body or leaving it, there may be no fact of the matter whether it is part of me or not. So at any given time there will be a number of overlapping collections of molecules such that for each of them there is no fact of the matter whether all of its members are molecules of which I am at that moment composed. If we take it that for each of these collections there is an object, an aggregate, that is made up of all and only its members, and exists only as long as those members are aggregated, then it will be indeterminate which of these aggregates I am coincident with. But it is not indeterminate which of these aggregates I am, for I am not any of them.[22] And neither is it indeterminate what has the mental states I have.

What I just said is my response to the "problem of the many" for objects. What there are many of at a place and time are not clouds, stones, trees, etc. but collections of micro-entities that are candidates for being the collection whose members make up an object of one of these sorts at that time, or (supposing there are such things as aggregates) aggregates of micro-entities that are candidates for being the aggregate that constitutes the existence of such an object at that time.

[22] Discussing a version of the Tibbles problem, in his 1993, David Lewis says that if one holds that the cat is something different from each of the cat-constituters (each with a different number of hairs), one makes it a vague object—something he thinks is unacceptable. I assume he would say that my view that I am not identical with any of the aggregates of molecules commits me to holding that I am a vague object. But the vagueness here is vagueness of the constitution relation, and I see nothing mysterious about that..

The plurality of such collections or aggregates is due to the fact that it can be indeterminate whether a given micro-entity is at a time a part of an object existing at that time. The fact that there is such a plurality does not pose a problem unless we insist, falsely, that objects are such collections or aggregates, or have temporal parts that are such collections or aggregates.

But this is not quite the end of the matter. For there is also a problem of the many concerning the microphysical states of affairs that are realizers of property instances. If a microphysical state of affairs has a claim to be a minimal realizer of a particular property instance, it seems there will be other states of affairs, largely overlapping it, that also have such a claim. These might be states of affairs that differ from it in having one more or one less micro-entities as constituents of their cores, or in differing slightly in the spatial relations of their core constituents to one another. It might seem that if these different states of affairs are all minimal realizers of instances of the same property, we will have many instances of that property where we should have only one. And this would seem to generate a problem of the many for the objects that have the properties. If we have different instances of the same property at a place and time, it seems that the objects in which the instances occur must be different—so we have many objects where we should have only one.

One way to block this argument is to deny that a numerical difference between two microphysical states of affairs entails a numerical difference in what property instances they realize—i.e. to allow that a single property instance can be (minimally) realized by different states of affairs. We already have multiple minimal realizers of property instances if microphysical states of affairs are individuated in part by what micro-entities are constitutents of their concrete cores—for it seems that a property instance might be realized by a state of affairs having molecules as its constituent micro-entities, and also by one having atoms as its constituent micro-entities, and also by one having subatomic particles as its constituent micro-entities. (See note 4 Chapter 3). In that case the more fine grained-states of affairs constitute the more coarse-grained ones, and none of them could occur without the others occurring—the different states of affairs would have the same existence conditions. What we would have in the present case are states of affairs realizers that substantially overlap but have different existence conditions—each of them could occur have occurred without the others. I see no reason

why this should not be allowed—and if it is allowed, we don't get the unwanted plurality of property instances.

Allowing that a property instance can have a plurality of minimal realizers does not preclude holding that for each property instance there is one microphysical state of affairs that has a privileged status as its realizer. This can't be the sum of the overlapping realizers, because the sum would have the overlapping realizers as proper parts and so would not be a minimal realizer. But it could be the disjunction of the overlapping realizers—the state of affairs that exists just in case one or more of them exists.

Suppose, however, that it is insisted that for every property instance there is a unique state of affairs that minimally realizes it (or, to allow for the possibility of minimal realizers that differ in fineness of grain, that for every property instance there is a unique set of minimal realizers having the same existence conditions). If this is accepted then the only way to avoid having too many property instances is to disqualify the overlapping states of affairs from being realizers, despite the fact that each of them is such that its existence is sufficient for the existence of the property instance. We can disqualify them by incorporating a "no-competitors clause" into our account of what it is for a state of affairs to realize a property instance. Roughly, the account will say that a state of affairs realizes the instantiation of a property at a time only if its occurrence is sufficient for the instantiation of that property at that time (in the way spelled out in Chapter 3, section III) *and* there is, in the case at hand, no other state of affairs of the same sort that is also sufficient for it. This rules out each of the overlapping states of affairs as a realizer of the instantiation of the property, leaving only the disjunction of all of them as a realizer. (Any disjunction of less than all of them would be ruled out, since it would have as competitors different disjunctions having the same number of disjuncts.) On this account the privileged status of the disjunction of the overlapping states of affairs would amount to its being the only realizer of the property instance. I favor the earlier response to the problem, that which allows there to be multiple overlapping minimal realizers, but I offer this alternative response to anyone who insists that there must be a unique minimal realizer.

The overlapping states of affairs here are each supposed to be sufficient for the existence of the property instance. If it can be indeterminate whether a state of affair has this status, it may be questioned whether we can sensibly speak of the disjunction of the states of affairs that have it.

Perhaps the set of states of affairs that are sufficient for a given property instance is a fuzzy set, a set having a fuzzy boundary. If so, the privileged realizer of a property instance, and on the view just sketched the only realizer of it, would be the state of affairs consisting in the existence of one or more of the states of affairs belonging to this fuzzy set.

VI

I noted earlier that while the microphysical state of affairs that is the realizer of a property instance will realize the existence, at the time of the instantiation, of a subject of the property, the micro-entities involved in such a state of affairs will typically not include all of the micro-entities that make up that subject at that time. So what determines what other micro-entities are included in the subject?

One might suppose that the answer to this is that micro-entities are parts of the same object if they belong to a collection of micro-entities that are so related, causally, that they move about the world together, preserving, normally, approximately the same spatial relations to one another, and forming a relatively rigid whole. (This would have to be formulated in such a way as to allow the composition of a thing to change over time.) This implies that the micro-entities that make up the luggage rack and those that make up the car are parts of a single object. And it implies the same thing about the micro-entities that make up the barnacles on a ship and the micro-entities that make up the ship; and about the micro-entities that make up the bodies of Siamese twins joined at the waist. But even if we allow such entities as the car + luggage rack, the ship + barnacles, and the sum of the Siamese twins, the principle that gets us these does not give us what we want. What we want is a way of filling out the set of micro-entities involved in the realization of a property instance so as to get the set of all of the micro-entities that make up the subject of the property realized. But that isn't what the proposed principle gets us. It gets us, at best, the *largest* object of which these micro-entities are a part, and this may not be something that is the subject of the realized property. This is most evident when the properties are mental. There may be one thing that is made up of all of the micro-entities that make up the Siamese twins, but this won't be the subject of the mental properties of either twin, let alone of both.

On one understanding of it the proposal before us gets us too many minds, and on another it gets us too few. If we say that any set of micro-entities that move about the world together, etc., constitute an object, and that a property instantiation has as subject any such object composed of a set to which the constituent micro-entities of its realizer belong, then we will have many too many minds. For many subsets of the micro-entities that make up a person will, on this understanding, constitute an object having as components the micro-entities that are constituents of the states of affairs that are realizers of the person's mental state instantiations, and each of these will count (on the proposal) as a subject of these instantiations e.g. my left pinky complement will count, and so will my right ear complement. Suppose, then, we say that only the *maximal* set of micro-entities that move about the word together (etc.) and include the constituents of a property instance count as making up the object that is the subject of that instance. Then consider the case of Siamese twins joined at the waist. All of the mental property instances whose realizers include micro-entities that are among those that make up the twins will have just one subject, on this understanding; so there will be only one mind where there should be two.

Plainly, our account of how to fill out the composition of the subject of a property instantiation will have to be sensitive to what sort of object that subject is, and what its synchronic unity relations are. Knowing what is involved in being a ship, we know that barnacles lie outside the boundaries of ships. Knowing what persons are, we know something of what constitutes the boundaries of a person; we may not be able to say precisely where the boundary is that divides the Siamese twins, but by and large we will know what parts belong to the one and what parts belong to the other. The key to the solution of our problem lies in two facts: first, that the causal profiles of properties determine synchronic unity relations for the things that have them, and second that, to a first approximation, the micro-entities that make up a thing at a time will be the sum of those that are constituents of the states of affairs that realize the properties instantiated in the thing at that time.

The reason the second fact holds only to a first approximation is the point, mentioned earlier, that because of content externalism the realizer of a mental property instance may include micro-entities that lie outside the boundary of the subject of the instance. The realizers of my water thoughts and Eiffel Tower thoughts lie partly outside my body. But we can deal with this by taking a leaf from the account just rejected.

The micro-entities that make up a thing at a time will be a subset of the micro-entities that are constituents of states of affairs that are realizers of instances of properties instantiated in the thing at that time, namely those micro-entities in that set that are causally related in such a way that they form a relatively rigid whole and move together in a way that conforms to the persistence conditions for things of the relevant sort.

So how is it that the causal profiles of the properties determine synchronic unity relations? I said earlier that the specification of the causal features that make up these causal profiles involve synchronic unity relations, along with diachronic unity relations—a forward-looking causal feature of a property will consist in its being such that when its instantiation is coinstantiated with (stands in the synchronic unity relation to) instantiations of certain other properties, this will result in its subject later having certain properties (will result in later property instantiations to which they stand in the diachronic unity relation). But it goes with this that when property instances are so related that certain counterfactuals are true about what causal effects they will jointly contribute to, they will stand in the synchronic unity relation. This is how it will be if a belief and a desire are so related that under certain circumstances they will contribute to the causing of behavior that they jointly rationalize; beliefs and desires that are related in this way will belong to the same subject. The only available way of stating these counterfactuals will involve the use of the notions of synchronic and diachronic unity; such a counterfactual will say that if the property instances in question were synchronically unified with certain other property instances, they would together with these other instances produce effects to which they stand in the diachronic unity relation. So circularity may seem to threaten. But collectively the counterfactuals governing the various properties will make possible a "package deal" definition that simultaneously specifies the causal profiles of the properties and the relations of synchronic and diachronic unity for subjects of properties of these sorts. The package deal definition might employ the Ramsey–Lewis method for giving functional definitions.[23] Elsewhere I have developed an account along these lines to explain how the psychological continuity constitutive of personal identity (on a neo-Lockean account) can without circularity be characterized as the playing out of the functional roles of the various sorts of mental states, despite the fact that the characterization of these functional roles seems

[23] See Lewis 1972.

to require reference to synchronic and diachronic unity relations holding amongst mental states.[24]

Here is another way of making the same point. In Chapter 3 I pointed out that the realizers of instances of different properties instantiated in the same thing at a given time are "interlocked" in a certain way; each consists of a concrete core plus an existential state of affairs, and the concrete core of each is part of what constitutes the existential states of affairs belonging to the others. What was left unspecified there was the "appropriate way" in which microphysical states of affairs must be related in order for the core of each of them to be part of what constitutes the existential state of affairs involved in the others. And this can be specified by saying that they must be so related that collectively they have the effects which, according to the causal profiles of the realized properties, the coinstantiation of these properties should have. It is this that constitutes the synchronic unity of the property instantiations. And it is this that determines what micro-entities make up the entity that is the subject of these property instances. These will be a subset of the micro-entities that make up the cores of the realizers of the synchronically unified property instances, namely those that move about together as a relatively rigid whole in a way that conforms to the persistence conditions for things of the sort in question.

I initially framed my question as one about how to fill out the set of micro-entities that are constituents of a property instance realizer so as to get a set containing all of the micro-entities that compose the object at the time in question. But it is easy to turn my answer to this into an account of what it is for a set of micro-entities to make up a macroscopic object at a time. This is true of a set of micro-entities if there exists a maximal set of synchronically unified property instances such that the micro-entities in the set are a certain subset of the set of all of the micro-entities that are constituents of the states of affairs that are realizers of any of these property instances—namely the subset that consists of those that move about the world together as a relatively rigid whole in a way that conforms to the perisistence conditions for things in which the properties in question can be instantiated.

If we can take it that the micro-constituents of the cores of property instances cannot lie outside the boundaries of the things in which the instances occur (although other micro-constituents of the instance can lie outside these boundaries, in the case of contentful mental states), and

[24] See my 1984 and 1997.

that every micro-entity that is part of a thing at a time is a constituent of the core of one of the property instances in the thing at that time, then we can simplify the account by leaving out the part about "moving about the world": a set of micro-entities constitutes the existence of a macroscopic object at a time just in case there is a maximal set of synchronically unified property instances such that every micro-entity in the set is a constituent of the core of the realizer of one of the property instances in that set, and every micro-entity that is a constituent of the core of any realizer of a property instance in that set is a member of the set of micro-entities.

VII

Thin properties are not related to persistence conditions in the way thick properties are, and the thin properties of a thing at a time do not have the sorts of implications for its future that its thick properties do. The mass of a thing is a thin property of it. And the implications of a thing's mass at a time for what will happen to it in the future depends on what sortal properties (and so what thick properties) it has; a tree struck by lightning can survive the loss of a more than half its mass, while a car struck by lightning cannot.

It is not that thin properties do not have causal profiles. The causal profile of a thin property will have a causal profile that includes various counterfactuals about the effect of its instantiation in things of various sorts, i.e., things having certain persistence conditions—so, e.g., the causal profile of a certain mass will include both the provision that in the lightning case a tree with that mass will survive with a much smaller mass and the provision that a car with that mass will not survive at all. But the causal profile will also include causal features whose specification does not refer to particular sorts of things. There are, of course, laws about mass, such as $F = ma$, and these can be seen as ascribing causal features to mass properties. And these laws say nothing about particular sorts of things. It is a feature of a given mass that if something has it over a certain interval, and if throughout that interval a certain force is applied to the thing, then during that interval the thing will accelerate at a certain rate. This will be true whether the thing is a person or the person's body, and whether it is a statue or the piece of clay that constitutes the statue. So it says nothing about the persistence conditions

of the thing having the mass.[25] Thin properties like size and shape will also have causal features whose specification makes no mention of sorts of things and persistence conditions. Having a certain size or shape will have effects, most notably perceptual ones, that are independent of the kind of thing in which the size or shape is instantiated. Persons and their bodies, and statues and their constituting pieces of clay, look the same and feel the same, and so have the same perceptual effects.

But there are delicate issues about how to count the instances of thin properties. And these issues arise especially when the subjects of the instances are artifacts, and are related to issues about artifact identity. Suppose that the luggage rack is not part of the car, and that there is an entity—call it the car-plus—composed of the car and the luggage rack. The mass of the car-plus is slightly greater than the mass of the car, but it could be the mass of a slightly larger car. What is it that makes a particular instance of that mass stand in the synchronic unity relation to instances of other car-plus properties? The thing to notice here is that while a thin property like having a certain mass does not imply any particular sortal property, since it could be instantiated in things of a variety of different sorts, it will nevertheless be the case that any instantiation of the thin property will at the same time include the instantiation of some sortal property or other. The microphysical state of affairs that realizes the instance must realize the existence of the subject of that instantiation, and that subject will have to be a thing of some particular sort, one having a particular set of persistence conditions. So there might be two instances of the same mass property, one of which is tied up with an instance of the sortal *car* and the other of which is tied up with an instance of the sortal *car-plus*—the first of these could stand in the synchronic unity relation only to instances of other car properties, while the second could stand in the synchronic unity relation only to

[25] But it arguably constrains what the persistence conditions can be. Suppose objects A and B have the same mass through the interval t_1-t_3 and at time t_1 are right next to each other, and that during interval t_1-t_2 A has a force applied to it and B does not, and that during t_2-t_3 both A and B have that force applied to them. And suppose one thinks that there is an entity C whose career consists of A's career from t_1-t_2 and B's career from t_2-t_3. The law says that if C has the mass A and B have, then throughout that interval it was accelerating at the same rate A was. But of course A and B will end up at very different places at t_3, so A and C will end up at different places at t_3. C's path involves an instantaneous jump at t_2 which conflicts with the claim that it was accelerating uniformly throughout t_1-t_3. I think we must conclude that if there is such a thing at C, it will not have properties like mass.

instances of other car-plus properties. While having mass M is a thin property, the properties *is a car with mass M* and *is a car-plus with mass M* are thick properties.

But there might be one linguistic community in which "car" is used in such a way that luggage racks are not parts of cars and another in which it is used in such a way that luggage racks are parts of cars. This won't be a matter of the one community using "car" to mean what the other means by "car-plus"—for when the luggage rack is removed the one group will say that the car still exists, though it is somewhat damaged, while the other will say that the car-plus ceases to exist. Now consider what might seem to be a single instance of mass M that the first of these communities would count as an instance of the mass of the car-plus and the second would count as an instance of the mass of the car. Would this be a single instantiation of M, somehow including instances of two different sortal properties (*car* and *car-plus*)? Or do we have here two different instantiations of M? Let "car1" and "car2" be the car terms in our two communities. And consider the careers of a coincident car1-plus and car2. These could come apart (if the luggage rack is removed), but suppose they don't. My question is: do these careers contain the same momentary stages? If they do, each stage includes the instantiation of two different sortal properties. If not, how do we distinguish them?

I am inclined to think that in this case the careers of the coincident car1-plus and car2 do not share a stage, and that the mass realizers (which in the one case includes a realizer of the property of being a car1-plus and in the other includes a realizer of the property of being a car2) are not the same. I suggest that instances of artifact sortals are like instances of intentional mental states with wide content in going outside the boundary of the subject—i.e. in having realizers having constituents that lie outside that boundary. Part of what constitutes the existence of car2s is a social practice, which embeds a linguistic practice of using "car" in a certain way, along with practices of treating these objects in certain ways. Cars, statues, and other artifacts exist in a social setting, and are what they are partly in virtue of practices that partly constitute that setting—in particular, the beliefs and intentions of those who create them, preserve them in existence, buy and sell them, and so on. One reason a statue of Lincoln is not identical with the piece of clay that constitutes it is that the statue, but not the piece of clay, can survive the replacement of some of its parts. If statues can survive replacement of parts, this reflects the nature of the conventions

governing the concept of a statue. These conventions do not only govern the use of the term "statue"—they also affect people's behavior towards particular statues. E.g., they may result in the object being kept in a museum, its commanding a certain price, and so on. That cars can survive replacement of parts is manifested in legal practices involving car ownership, car registration, etc., and in practices of car maintenance and car repair.

Matters are complicated by the fact that the effects of something's being a car or a statue are mediated by beliefs that it is a car or statue, and by the beliefs about car identity and statue identity that are involved in this. It might seem strange to maintain that the causation that constitutes car identity might consist in part in the effects of *belief* in car identity—this hardly looks like *immanent* causation, since the causal process occurs largely outside the boundary of the car. But maybe this is what is special about the case of artifact identity.

This certainly seems an obstacle to any attempt to give a reductive account of the identity conditions for such things; if our account of car identity involves reference to beliefs about car identity, it makes use of the concept of car identity. The causal processes involved will no doubt have micro-level descriptions in which there is no reference to cars and their identity conditions, even though some of the microphysical states of affairs involved will in fact be realizers of beliefs about this. But even if we could take in these micro-level descriptions, it is unlikely that we could see the relevant series of microphysical states of affairs as the career of a persisting entity except by seeing the states of affairs as realizers of, among other things, instances of car properties and beliefs about cars and car identity.

VIII

The careers of persisting objects are realized at the micro-level in complex patterns of causal influence. There will be vast number of such patterns that do not realize the existence of persisting entities that we recognize. But among the patterns we do recognize will be those that realize persons and their mental states. These are salient to us because it is part of the nature of mental states to reveal their existence, and the patterns of their instantiation over time, to their possessors. They reveal this in introspection and memory, and also because we are genetically primed to recognize other persons as such, and to see their

behavior under psychological descriptions. Other patterns are made salient because of the ways they relate to our perceptual capacities, and to our explanatory concerns—these include the careers of plants and animals, and also those of mountains, rivers and other inanimate items in our environment. Still others are made salient by the concerns responsible for the practices involving the creation and use of artifacts. This gives mental properties a kind of epistemic priority, and a central position in our conceptual scheme. But on the view defended here, the ontological status of mental properties is that of macroscopic physical properties, this despite the fact that they can be instantiated only in entities having psychological persistence conditions.

6

Realization of Qualia

I assume here that there are "qualia," understood as properties of perceptual and sensory states that give them their phenomenal character—where phenomenal character is taken to be internally determined, i.e. to supervene on internal states of the subject. This view is in no way implied by the account of realization presented in previous chapters—someone could accept that account while holding a standard representationalist account of phenomenal character which takes the phenomenal character of an experience to consist in some aspect of its representational content, and gives an externalist account of this content. But those who hold this view, and also accept physicalism, need an account of how qualia are physically realized. It is widely thought that it is at best problematic whether such an account is possible.

I

If qualia are properties, and instantiations of properties are realized in microphysical states of affairs, then instantiations of qualia are realized in microphysical states of affairs. And I will be defending the claim that this is in fact the case. But in my earlier discussions of the microrealization of property instances, the instances were instantiations of properties of macroscopic objects (including persons). Whereas qualia, on the other hand, are supposed to be properties of experiences, or of sensory states. So something needs to be said about what sorts of entities these are, and how the instantiation of properties of them can be realized in microphysical states of affairs.

It may be thought a defect in my earlier discussions of realization that the only mental particulars I have talked about are instances of mental properties—it is only of the micro-realization of these that I have offered an account. Nothing has been said about the realization of events, states and processes. This will not be a serious defect if the

occurrence of events, states and processes can be held to consist in the occurrence of property instances. And that is what I believe. One sort of event just is a property instance—something's having a property at a time. Other events are series of property instances, presumably ones whose successive members are causally related. A state can be thought of as a monotonous event of this second kind—one in which the successive property instances are all instances of the same property, or of similar ones. Processes will also be events of the second kind, typically instances of kinds of series of events that have a certain characteristic outcome.

If experiences are events or states, and events and states are property instances or complexes of property instances, then qualia, understood as properties of experiences, will be properties of property instances or of complexes of property instances. The experience, *qua* complex of property instances, will be realized in a microphysical state of affairs. And presumably the realization of an instance of the quale will be a microphysical state of affairs that is part of the microphysical state of affairs that realizes the experience. It was pointed out in Chapter 2 that the realization of the instantiation of a property must be such as to guarantee the existence of something which is the subject of that property. And that will apply here. The microphysical state of affairs that realizes a quale instance will not by itself determine the full nature of the experience in which that instance occurs, but it must be such as to determine—by including existential states of affairs of appropriate kinds—that there are other states of affairs which together with it do determine this.

Whether or not these suggestions about the ontological status of the subjects of qualia—experiences, or sensory states—are along the right lines, it seems clear that if there are qualia, and if physicalism is true, then in some way the instantiation of qualia must be realized in microphysical states of affairs. I want now to discuss a recent expression of the view that this is impossible.

II

In his *Physicalism, or Something Near Enough* Jaegwon Kim argues that qualia "are the 'mental residue' that cannot be accommodated within the physical domain" (p. 170). It is because they cannot be so accommodated, while the rest of the mental can, that we have to be satisfied with something that is not quite physicalism but only "near

enough" to it. The reason they cannot be accommodated is that they are "not functionalizable and hence physically irreducible" (p. 170). On Kim's conception of reduction, a property is physically reducible just in case it can be "functionalized," i.e. functionally characterized, in such a way as to allow for there being physical realizers of it. And the reason he gives for holding that qualia are not functionalizable is that "qualia inversion," e.g. spectrum inversion, is metaphysically possible—it is possible for there to be functional isomorphs that differ in the qualitative character of some of their sensory states.

The view that qualia are shown not to be functional properties by the possibility of qualia inversion goes back at least as far as the 1972 paper by Ned Block and Jerry Fodor entitled "What Psychological States are Not." I endorsed this view in my "Functionalism and Qualia," published in 1976. But I held there that while individual qualia are not functionally definable, the relations of qualitative similarity and difference between experiences are functionally definable, and that because of this the property of being a quale is functionally definable. Kim appears to endorse this claim about qualitative similarity and difference in his new book: "the intrinsic qualities associated with qualia are, or may be, undetectable, but differences and similarities between qualia, within a single individual, are behaviorally detectable, and this opens a way for their behavioral functionalization" (p. 172). But, he says, the intrinsic qualities of qualia are not functionalizable and therefore are irreducible, and "hence causally impotent" (p. 173). We need qualia as place markers: "without them there can be no qualitative differences or similarities" (p. 173). But it remains a mystery, he says, why there are *these* qualia and not others: "I do not believe that the present approach is capable of answering that question" (p. 173).

I continue to hold that individual qualia are not functionally definable—or as Kim would put it, are not functionalizable. But as noted in Chapter 2, it is not only functional properties that have causal profiles and can be physically realized. Just what it is that distinguishes functionally definable properties from other properties is not easy to say. But we can get a handle on this by considering in what way the possibility of qualia inversion shows qualia to be not functionally definable.

Suppose that I am spectrum inverted, and so qualia inverted, relative to someone who is my functional isomorph. What his being a functional isomorph of me amounts to is there being a mapping of my psychological states onto his (and vice versa) such that corresponding states have causal profiles that are related in the following way. Corresponding to every

forward looking causal feature of a state of mine pertaining to the causing of behavior there will be a causal feature of the corresponding state of his that pertains to the causing of the same behavior, where the states in combination with which my state causes that behavior will correspond, in the isomorphism, with states of his that in combination with his state cause that behavior. Corresponding to every forward looking causal feature of my state pertaining to its effects on other mental states there will be a forward looking causal feature of his state that pertains to causing mental states of the same kind, and, again, the states in combination with which my state causes those mental effects will correspond in the isomorphism to states of his that in combination with his state cause those effects. And corresponding to every backward-looking causal feature of my state pertaining to how it can be caused there will be a backward-looking causal feature of his state pertaining to how it can be caused, where the environmental causes (stimuli) involved in the possible causes of mine are the same as those involved in the possible causes of his and the mental events that are involved in the possible causes of mine correspond, in the isomorphism, to the mental events involved in the possible causes of his. What this amounts to is that in both his case and mine all psychological states are instances of one or another of a set of properties that makes true a certain Ramsey sentence, where the causal relations specified in this Ramsey sentence all have to do with relations of instances of these properties to one another and to environmental causes and behavioral effects. On one reading of the Ramsey sentence (taking the quantifiers to range over realizers), these are different sets of properties, one of them being the realizers in me of the psychological properties of which the psychological states are instances and the other being the realizers in him of those psychological properties. On a different reading (where the quantifiers range over realized properties), they are the same set of properties. Either way, in virtue of the isomorphism the same functionally defined psychological properties are instantiated in both of us.

Now in virtue of the fact that I and my functional isomorph share psychological properties defined by this sort of Ramsey sentence but differ in the phenomenal character of our sensory states, it follows that qualia—the properties that determine this phenomenal character—are not defined by this sort of Ramsey sentence. And this is what their not being functionalizable comes to. There are two sorts of possible cases in which functional isomorphs can differ in the phenomenal character of their mental states. This will happen in cases of *inverted* qualia, where the

same qualia are in the repertoires of both isomorphs but are differently distributed among their states. And it will also happen in what can be called cases of *alien* qualia, where the qualia instantiated in one of the isomorphs are entirely different from those instantiated in the other.[1] The latter will be cases in which the functional isomorphs differ radically in how their shared psychological states are physically realized—for I believe, and will argue later, that certain kinds of physical differences preclude sameness of qualia. But the possibility of such cases does not prevent qualia from having causal profiles and from being physically realizable; it does not prevent them from being property-realized by physical properties, and it does not prevent instantiations of them from being microphysically realized. For all their not being functionalizable properties comes to is their not having causal profiles of a particular sort, ones definable by means of a certain kind of Ramsey sentence.

As I have hinted, I will argue later on that while qualia are multiply realizable, they are so to a lesser extent than other psychological properties. Their identity is tied, in a way that of other psychological properties is not, to the physical nature of the things in which they can be instantiated. This might suggest that the difference between the causal profiles of qualia and that of other psychological properties is, taking the latter to be functional properties, that the causal profiles of qualia include causal relations to specific physical properties while the causal profiles of functional properties do not. But this is not the case. It is true that the Ramsey sentence in terms of which (psychological) functional properties can be defined makes no reference to particular physical properties possessed by subjects of the properties. But it is far from being the case that the Ramsey sentence tells the whole truth about the causal relations holding amongst the psychological states it is used to define. It abstracts from the nature of the physical realizers, and so says nothing about what physical states of an organism cause or are caused by psychological states of the various sorts. Consider again me and the functional isomorph who is qualia-inverted relative to me. The functional property of "being appeared to redly" (having an experience that represents red) is instantiated in both of us, but is physically realized in us in different ways—and here the difference in physical realization goes with a difference in phenomenal character. Suppose that in me the physical realizer is property P1 and in him the physical realizer is property P2. Let P1* be a physical property whose instantiation causes

[1] For the notion of "alien qualia," see van Gulick 1993.

the instantiation of P1, and P2* a physical property whose instantiation causes the instantiation of P2. And let P1** be a physical property whose instantiation is caused by the instantiation of P1, and P2** a physical property whose instantiation is caused by the instantiation of P2. The functional definition (by way of a Ramsey sentence) of the property of being-appeared-to-redly would say nothing about any of these physical properties. But the causal profile of that property would include the backward-looking causal feature of being such that its instantiation is caused by P1* in creatures with my physical makeup and by P2* in creatures with the physical makeup of my functional isomorph, and would include the forward-looking causal features of being such that its instantiation causes the instantiation of P1** in creatures like me and the instantiation of P2** in creatures like my functional isomorph. So there is more to the causal profile of a functional property than is given by its functional definition (whether this is an analytic functional definition or a psychofunctionalist one), and this "more" can include causal relations to specific physical properties.

But of course, the way in which causal relations to particular physical properties enter into the causal profiles of functional properties does not restrict the instantiation of these properties to creatures with particular physical natures. The part of the causal profile of the property of being-appeared-red-to that has to do with its causal relations to the physical properties P2* and P2** does not prevent its instantiation in creatures like me whose instantiations of it cannot stand in the relevant causal relations to these properties. Whereas, so I claim, the causal profiles of qualia do prevent instantiations of them that are not causally related in certain ways to certain physical property instantiations. Instantiations of being-appeared-red-to can have different physical causes in me and in my functional isomorph, but these different physical causes, while producing instantiations of the same functional property, will cause instantiations of different qualia.

What I need to do next is to give an account of qualia which makes it intelligible that they are physically realizable.

III

The basic lines of my account of qualia have already been indicated. It starts from the idea that the relations of qualitative similarity and difference amongst experiences are functionally definable. This in turn

provides a functional account of what it is for a property to be a quale, one that makes qualia physically realizable.

Quine pointed out that in order to be a perceiver a creature must have a "quality space." This will be innate to the creature, part of its genetic endowment. The structure of the space can be mapped by determining what discriminations the creature can make, what sorts of recognitional capacities it has, and what sorts of inductions it is naturally prone to make. What occupy positions in this space in Quine's account are stimuli; relative to a creature with a certain sort of perceptual system, stimuli stand in a similarity ordering that has these functional consequences. But there being such an ordering of stimuli, relative to a creature's perceptual system, would seem to require a corresponding ordering of the perceptual states produced in the creature by these stimuli. And what can be said about the functional nature of the relations of qualitative similarity and difference is pretty much the same as what can be said about what defines the structure of a Quinean quality space. Experiences of a creature that are qualitatively different will contribute to discriminatory behavior on the part of the creature, while those that are qualitatively similar will contribute to recognitional behavior. What inductions a creature is disposed to make on the basis of its experiences will be determined by the similarity and difference relations holding amongst them. Qualitatively similar experiences will tend to give rise to beliefs in objective similarities in the environment, and qualitatively different experiences will tend to give rise to beliefs in objective differences in the environment. The holding of these relations amongst one's experiences will also give rise to introspective beliefs to the effect that one has experiences that are so related, or (in other words) that there are certain similarities and differences in how one is "appeared to."

What has just been characterized is intrasubjective qualitative similarity and difference—similarity and difference between different experiences of the same subject. We will see shortly how the account can be expanded so as to cover the case of intersubjective qualitative similarity and difference.

Qualia are features of experiences that determine their phenomenal character. It goes with this that qualia are features of experiences in virtue of which they stand to one another in relations of qualitative similarity and difference. So we can say in functional terms what it is for a property to be a quale, drawing on the functional account of the qualitative similarity and difference relations. A property will be a quale

if it belongs to a family of properties such that, if the same properties in this family are instantiated in two or more experiences, then those experiences will be qualitatively identical. Experiences that differ in which properties of this family they instantiate will be qualitatively different, and all of the similarity and difference relations amongst experiences are determined by what properties in this family they instantiate.

As noted earlier, Kim says that we need qualia because we need them as "place markers"; without them "there can be no qualia differences or similarities" (p. 173). That I agree with. He thinks this is compatible with his view that qualia, or "intrinsic qualities of qualia," are causally impotent. But I think this cannot be right. It must be in virtue of what qualia experiences have that they stand in the relations of qualitative similarity and difference they stand in, so it must be in virtue of this that the experiences play the causal roles, in discrimination, recognition, belief-fixation, etc., that they play in virtue of their qualitative similarities and differences. And this requires that what qualia an experience has makes a causal difference. If a change in what qualia are instantiated in my experience results in a change in my behavior, and if the change in my behavior is different from what it would have been if the new qualia had been different, then the new qualia are involved in the causation of that behavior. Individual qualia must have causal profiles that have to do with how their instantiation contributes to the production of such effects—and also how their instantiation can be caused.

If qualia are causally efficacious properties that can be instantiated in our world, and if physicalism is true, then qualia must be physically realizable. We can see how they can be physically realized by drawing on what I have just said about them. I just said that a property will be a quale if it belongs to a family of properties such that (1) experiences that are exactly alike with respect to which properties in this family they instantiate will be qualitatively identical, (2) experiences that differ in what properties they instantiate will be qualitatively different, and (3) all of the similarity and difference relations amongst experiences are determined by what properties in this family they instantiate. For a physical property to realize a quale (some quale or other) it must belong to a family of physical properties that satisfies conditions (1) and (3). If qualia are multiply realizable, the family of qualia realizers that satisfies conditions (1) and (3) will not satisfy condition (2), since it will contain different properties whose coinstantiation does not contribute to qualitative difference (these will be properties that are different realizers

of the same quale). What we can require of a quale realizer is that it belong to a subset of the set of physical properties that satisfy (1) and (3) that also satisfies (2). Two different properties will be realizers of the same quale when replacing an instantiation of one of these properties with an instantiation of the other, leaving the experiences otherwise the same with respect to what qualia realizers they instantiate, results in an experience qualitatively identical to the initial experience.

What I have just given is an account of what it is for a physical property to be a quale realizer, a realizer of some quale or other, not of what it is for it to be a realizer of some particular quale. But an account of the latter is now easy to provide. A property of which (1) and (3) are true will have a certain sort of causal profile, and so also will a property of which (1), (2), and (3) are true. And the causal profile of a property of the latter sort can stand to that of a property of the former sort in the relation that makes the one realized by the other—its forward-looking causal features are a subset of those of the other, and the backward-looking causal features of the other are a subset of its backward-looking causal features. When a quale and quale realizer are related in this way, the quale realizer will be a realizer of that particular quale.

Quale realizers, on this account, will be quite complex. The fact that being a quale involves belonging to a "family" of properties related in certain ways means that the "total realization" of a quale instantiation must include a mechanism whereby instantiations of the properties that are core realizers of the qualia in the family are so related as to have the requisite effects on the subject's behavior and other mental states—e.g. the mechanism will be such that if the properties are core realizers of qualia that are qualitatively different, this will result in the subject's having the belief that a change has occurred in her environment. This means there will be considerable overlap between the total realizers of different qualia. The mechanism involved in the overlap will have to include the subject's memory mechanism, or at any rate the part of it involved in the comparison of experiences occurring at different times. And if the same quale can be realized by different properties at different times, the mechanism involved in the overlap will have to be such that if A is a series of instantiations of the same quale realizer, and B is a series that is like it except that at some points in it instantiations of that quale realizer are replaced by instantiations of a different realizer of the same quale, then A and B will be alike in their effects on the subject's behavior and beliefs.

The sort of realization I have just been talking about is property-realization—the realization of one property by a different property. But assuming physicalism, and assuming that qualia instantiations can be causally efficacious, instantiations of qualia will have to be realized in microphysical states of affairs. As I said earlier, since the experiences that have qualia are complexes of property instances (whose subjects are persons having the experiences), the microphysical state of affairs that realizes the quale instance will be a part of the microphysical state of affairs that realizes the complex of property instances that is the quale's subject. What part of this it is will be fixed by the causal profile of the quale.

Given that there are functional criteria that determine what properties are qualia realizers, it is easy to see how there can be intersubjective qualitative similarities and differences, i.e. qualitative similarities and differences between experiences of different subjects. My experience of blue things will be qualitatively like yours just in case yours and mine instantiate the same qualia, which will be true just in case either yours and mine instantiate the same physical quale realizers or they instantiate different physical realizers of the same qualia. Assuming the coherence of the inverted spectrum scenario, there will not be any behavioral test that determines whether this is so; creatures whose behavioral dispositions are the same may differ in the phenomenal character of their experiences. But it is in principle discoverable whether behaviorally indistinguishable creatures are spectrum inverted relative to each other, because it is in principle discoverable what the physical realizers of qualia are, and whether the same or different ones of these are instantiated in the experiences of different creatures; and because of this it is in principle discoverable whether qualia realizers that are instantiated in the experiences of different persons are realizers of the same quale.

But the possibility of multiple realization of qualia raises a question. If physical quale realizers P and Q are such that when instantiated in the same subject this contributes in the appropriate way to qualitative identity, it seems unproblematic to say that when they are instantiated in different subjects this constitutes intersubjective qualitative identity, and they are realizers of the same quale. As noted several paragraphs back, this requires that P and Q, being total realizers of qualia, overlap in a way that involves there being a single mechanism of a certain sort involved in the instantiation of both. So only in the case of creatures similar enough in their physical makeup to share such a mechanism could it be true that their experiences instantiate the same quale in

virtue of one of them instantiating P and the other instantiating Q. Such creatures will be such that both have both P and Q in their repertoires of quale realizers. The question now is: is it only in cases like this that creatures can have qualitatively identical experiences in virtue of different realizers of the same qualia being instantiated in their experiences? Or can it be the case that creatures different enough in their physical makeup that they don't share any such mechanism, and are not capable of instantiating any of the same quale realizers, nevertheless can have qualitatively identical experiences in virtue of their experiences instantiating different realizers of the same qualia?

I do not believe that the latter is a possibility. I cannot see what, in creatures as different as this, could make it true that a quale realizer instantiated in one of them is a realizer of the same quale as one instantiated in the other. It is of course excluded that these are realizers of the same quale because they are such that when instantiated in different experiences of the same person they contribute to making those experiences qualitatively similar—where such qualitative similarity, that which holds intrasubjectively, is something we have an independent handle on. Given the possibility of qualia inversion, it is also excluded that these are realizers of the same quale because the two creatures, despite their physical differences, are functional isomorphs and the two quale realizers are paired in the isomorphism, i.e. play the same functional roles. If I am right in thinking that the notion of qualitative similarity is in the first instance the notion of an intrasubjective relation, the only way of giving it intersubjective application is that exemplified in the case of P and Q; the relation holds intersubjectively because the properties involved in the intersubjective case are ones that bestow intrasubjective qualitative similarity when instantiated in the same subject.

IV

As I said above, the structure of a creature's quality space is part of its genetic endowment, part of the way it is wired. It goes with this that the relations of qualitative similarity and difference amongst its experiences are determined internally; if two states of a creature are qualitatively identical, the corresponding states of a duplicate of that creature will be qualitatively identical. And it goes with this, I think, that the phenomenal character of experiences, and the qualia that constitute it, are determined internally. Physical duplicates will be exactly alike

in the phenomenal character of their experiences—which of course is implied by the account of intersubjective qualitative similarity defended in the preceding section.

The case for internalism about phenomenal character is partly empirical. We know that there are differences amongst normal perceivers as to which shades of color are perceived as pure green, which as bluish green, and which as yellowish green.[2] The differences appear to be due to differences in the peak sensitivities of cones on the retina, and so to physiological differences between different perceivers. There is no good basis for claiming that some of these perceivers are perceiving the shades "correctly" while others are misperceiving them. And the very fact that there is such a thing as perceiving some shades as unique hues and others as binary hues suggests that the phenomenal character of our color experience is at least partly determined by the nature of our perceptual system. For there is nothing in the spectral reflectances of surfaces, or in the light that produces our color experiences, that corresponds to the unique/binary distinction. To get an explanation of that we must go to something like the opponent processing account of color vision—that is, an account of the internal mechanisms underlying our perceptual experiences.

Those who think that the phenomenal character of experiences is not internally determined are those who think that this phenomenal character is determined by, or consists in, a certain kind of representational content. This is the view I call standard representationalism. It holds that the phenomenal character of an experience, what it is like to have it, is determined by what objective properties in the subject's environment—colors, shapes, odors, etc.—it represents. Since it is possible, at least in principle, for physically identical creatures to be embedded in different environments in which different properties are the distal causes of their perceptual experiences, and for this to bestow different representational contents on their experiences (the experiences of each representing properties instantiated in its own environment), it is possible, on this view, for experiences of physically identical creatures to be phenomenally different.

Given what I have said about qualia and phenomenal character, I am committed to rejecting standard representationalism. And I am committed to rejecting it in part because I allow the possibility of spectrum inversion and other sorts of qualia inversion. But this does

[2] See Hardin 1993 and Block 1999.

not mean that I am committed to denying that there is any sense in which the phenomenal character of experiences is determined by representational content. It is compatible with the denial that it is determined by objective representational content that it is determined by an aspect of representational content. There are various ways in which this can be played out. One is to hold that an experience's having a certain phenomenal character is constituted not by its representation of objective properties like colors and shapes but by its representation of properties—"appearance properties"—the having of which by a thing consists in its causing, or being disposed to cause, experiences of certain sorts in observers of certain sorts. Or, alternatively, that it is constituted by representation of aspects of objective properties, where the having of such an aspect by a property consists in its being such as to cause experiences of certain sorts in creatures with a certain sort of perceptual system.[3] It is also possible to hold that while phenomenal character is determined by representational content, it is determined by Fregean representational content—by senses or modes of presentation, rather than by what properties are represented.[4] One could hold that these modes of presentation are internally determined, and that in creatures with differently constituted perceptual systems the same modes of presentation could pick out different properties. These are all views that permit veridical experiences of the same array of objective properties to differ in phenomenal character owing to differences in how the visual systems of the subjects of the experience are constituted, and they are all views that allow one to hold that phenomenal character is internally constituted.

V

Saying that qualia are realized physically, and perhaps multiply realized, leaves open the question of what sorts of creatures they are realized in, and in particular the question of whether they can be instantiated in systems physically very different from us. I have questioned whether the *same* qualia that are instantiated in us can be instantiated in creatures with very different physical makeups. But that isn't the issue here; the issue is whether *any* qualia can be instantiated in creatures physically

[3] See my 2006. [4] See Chalmers 2004.

very different from us. Here we get into the issue of whether there can be "zombies" and cases of "absent qualia."[5]

Consider the case of Commander Data discussed by Ned Block and Brian McLaughlin.[6] Commander Data is a "superficial functional isomorph" of one of us, which I will take to mean that he has states satisfying the best functional definitions of our mental states that can be constructed on the basis of commonsense psychology.[7] But his physiology is very different from ours—for one thing, it is silicon-based rather than carbon-based. And his deep psychology is different from ours—we can suppose with Block that some psychological laws that are true of us but not known to common sense, like the Weber–Fechner law (that just noticeable differences in stimuli increase with increasing intensity of stimuli), do not hold in his case. Block's "harder problem" of consciousness has to do with the question of whether creatures like Commander Data have phenomenal consciousness, the problem being, according to Block, that we have no conception of anything that could settle the question one way or the other.[8] McLaughlin thinks that the question can be settled, and that the answer is that Commander Data and the like are not conscious.

The focus of Block's and McLaughlin's discussion is on whether Commander Data has phenomenal consciousness, not on whether he has beliefs and desires, and engages in mental activities that do not involve phenomenal consciousness. McLaughlin, at least, seems prepared to allow that he does have non-phenomenal mental states. I am going to assume in what follows that he does. And I will assume that he perceives things in his environment. The view that Commander Data has non-phenomenal mental states but lacks phenomenal consciousness would go with the view that non-phenomenal states are functionally definable while phenomenal states—states having phenomenal character, and so qualia—are not. One version of this view, a dualist version, can be found in David Chalmers.[9] And a version of it has been held by

[5] See Block 1980 and Shoemaker 1981a.

[6] See Block 2003b and McLaughlin 2003.

[7] For a relevant sense of "best functional definition," see my 1981a.

[8] As Block presents the problem, there is more to it than this. He sees Commander Data (and the like) as revealing an "epistemic tension" between naturalism and phenomenal realism. Commander Data's consciousness is "inaccessible and metainaccessible" to us, and this seems to imply that physicalism is itself inaccessible and metainaccessible, despite being the "default view," i.e., the only view for which background considerations give grounds for tentative belief. I do not discuss this here.

[9] See Chalmers 1996.

Block—although it is psychofunctionalism, not analytical functionalism or commonsense functionalism, that Block thinks may be true of non-phenomenal states.[10]

The first point I want to make is that *if* Commander Data has perceptual states along with beliefs and the like, and *if* the functional account of qualitative similarity and difference suggested earlier is correct, then it follows right away that Commander Data does have phenomenal consciousness. If he is a superficial functional isomorph of us, then his being in the perceptual states produced by certain stimuli will cause him to have beliefs about similarities in his environment, to represent such similarities and differences perceptually, to be prone to make certain kinds of inductions, and to have introspective beliefs to the effect that certain of his perceptual states have certain contents and resemble and differ from one another in certain ways. This, if the functional account of qualitative similarity and difference is on the right track, should be enough to make it true that qualitative similarity and difference relations hold amongst his perceptual states, and that in turn implies that these states have phenomenal character and have qualia that constitute this phenomenal character. So anyone who holds, as McLaughlin does, that Commander Data lacks phenomenal consciousness must hold that the functionally defined relations that hold amongst his experiences do not constitute genuine phenomenal similarities and differences.

I think that there is at least a tension between the view that the likes of Commander Data do have nonphenomenal mental states like beliefs and desires and the view that they lack pains and other states with phenomenal character. This combination of views may be defended on the grounds that beliefs and the like are functionally definable whereas phenomenal states are shown not to be functionally definable by the possibility of qualia inversion.[11] But as I have pointed out, one can accept, as I do, the claim that individual qualia are not functionally definable (because of the possibility of qualia inversion) and still hold that the relations of qualitative similarity and difference are functionally definable, and that the notion of a quale, and with it the notion of phenomenal character, are functionally definable. And the latter is all we need to get the conclusion that Commander Data is conscious. If individual qualia are not functionally definable, then the fact that Commander Data is a functional isomorph of us does not imply that he

[10] See Block 1978. [11] See Block and Fodor 1972.

has states having *our* qualia. But this is compatible with the claim that it follows from the isomorphism that he has states having qualia, which may be different from ours. I return to this point in section VII.

As I understand McLaughlin, he thinks that phenomenal consciousness is a natural kind, and that the reference of our concept of it is fixed from the "first-person perspective." He does not use the term "qualia," and I do not know whether he would allow that qualia and the phenomenal character they constitute are multiply realizable. But I am sure that if he did allow this, he would insist that the possible realizers of them are limited to physical properties that are instantiated, or can be instantiated, in creatures like us. He holds what I have called a "parochial" view about phenomenal consciousness.

Block's and McLaughlin's discussions of this issue are both enormously complex, and I will not try to address most of what they say. What I want to focus on is what McLaughlin says at the end of his paper about why we might be inclined to think that creatures like Commander Data are phenomenally conscious. I think that what he says provides the basis for a view that is at odds with his own.

VI

But before I get to that I want to address something that Block says, and McLaughlin seconds, about superficial functional isomorphs. He says that a superficial functional isomorph of humans might fail to have phenomenal consciousness because of a certain sort of *partial physical overlap* between it and humans. The overlap would consist in its being the case that its brain states are ones that in us are the neural bases of only phenomenally *un*conscious states. The discovery that this is true, he thinks, would defeat the "defeasible reason for attributing consciousness" that the functional isomorphism gives us. Block stipulates that we do not have this defeater in the case of Commander Data, and so don't have that reason for denying him phenomenal consciousness. But I think that the possibility of such a defeater in cases of functional isomorphism is supposed to undermine any temptation we might have to think that being a superficial functional isomorph of humans is sufficient for being phenomenally conscious—and McLaughlin takes it to refute analytical functionalism.

This claim overlooks a crucial distinction, that between a state's being the neural basis of a mental state in the sense of its being what I have

called a *core* realizer of it, and its being the neural basis of the state in the sense of being what I have called a *total* realizer of it (see Chapter 2, section V). Only total realizers are sufficient for the existence of the states realized; core realizers are merely salient parts of total realizers. Now consider a physical state of the functional isomorph that is a candidate for being a core realizer of a conscious mental state. There is no reason at all why this should not be a state that in humans is a core realizer of a phenomenally *un*conscious state. If it is only a core realizer of a phenomenally unconscious state it will not be sufficient for the instantiation of that state, and there is no reason why, in a different setting, it should not be a core realizer of a conscious state. Consider instead a physical state of the functional isomorph that is a total realizer of what corresponds to (plays the "superficial" functional role of) a phenomenally conscious state. Could this be a state that in humans is either a core realizer or a total realizer of a phenomenally unconscious state? Obviously not. If it were, then in having the core or total realizer of the phenomenally unconscious state humans would be having a state that plays the functional role of the phenomenally conscious state in question, and so, at the very least, should be behaving, or disposed to behave, as if they have it. None of the realizers of phenomenally unconscious states are like that, and I venture to say that none could be.

Block and McLaughlin mention something else that, they think, could defeat the reason for attributing consciousness that superficial isomorphism gives us. We might find that what we have in the case of the functional isomorph is a "homunculi-headed realization" (Block: 404). As McLaughlin elaborates the point, it might be that the isomorph's superficial organization "consists of radio communication among conscious beings that stand in a one-to-one relationship with our neurons, their communicative interaction preserving the relevant inhibitory and excitatory relations among neurons" (McLaughlin: 170). This raises issues I cannot go into here. But it should be noted that if we think that being a homunculi-head is incompatible with having genuine consciousness, there is no reason why we could not formulate our characterization of the defining functional roles of conscious states so as to exclude homunculi-headed realizations.[12]

[12] It may be thought that this would involve circularity; wouldn't we have to make use of the notion being defined, that of consciousness, in formulating the requirement that there not be the sort of interaction with conscious beings that McLaughlin describes? But such circularity is easily avoided. Let's distinguish being a functional isomorph in

So partial physical overlap as understood by Block and McLaughlin is either not a possibility or not a defeater of superficial functional isomorphism as evidence of consciousness, and functional isomorphism can be defined so as to rule out the possibility that functional isomorphs are homunculi heads. So analytical or commonsense functionalism, classified by Block as a version of "deflationism" about consciousness, is not threatened by these alleged possibilities. It also seems to me very misleading to classify this position, as Block and McLaughlin do, as one that denies "phenomenal realism." The metaphysical status ascribed by it to consciousness need be no different than that ascribed to it by versions of "phenomenal realism." Indeed, Block mentions a version of phenomenal realism, which he calls "superficialism," which identifies consciousness with the superficial functional organization we share with Commander Data. The difference between this view and analytical functionalism appears to be semantic rather than metaphysical—it is a difference having to do with the concept of consciousness rather than with what the concept picks out.

VII

At the end of his paper McLaughlin discusses the basis of the inclination to think, contrary to fact according to him, that Commander Data does have phenomenal consciousness. He says that if we had to interact extensively with robots like Commander Data "we would have to treat them as if they were phenomenally conscious; for that would be the only way that we could predict and make sense of their behavior" (p. 194). As a reason for saying that this would not amount to conceding that they are phenomenally conscious, he points out that "the same is true of homunculi heads and partial physical realizers"; given what I pointed out in section VI, this is not a good reason. In any case, he allows that

the weak sense and being a functional isomorph in the strong sense. Being a functional isomorph of a conscious person in the weak sense will not exclude being a homunculus head. But we can define, without circularity, a strong sense of being a functional isomorph of a conscious person which does exclude this. Something is a functional isomorph of a conscious person in the strong sense if (1) it is a functional isomorph in the weak sense of a conscious person and (2) its implementation of the functional roles of conscious states does not involve the operation of functional isomorphs in the weak sense of conscious persons that are distinct from it. Since any conscious person will (trivially) be at least a functional isomorph of a conscious person, it follows from (2) that a functional isomorph in the strong sense will not be a homunculus head.

we would, reasonably, take "the sentient stance" towards such creatures. And while he does not think with David Chalmers that terms like "pain" and "itch" have purely functional senses as well as phenomenal senses, the former being applicable to the likes of Commander Data, he thinks that they might acquire such senses if we were in regular contact with such creatures.[13] He also allows that Commander Data might have "higher-order beliefs, desires, intentions, and the like" (p. 195). And he thinks that while Commander Data cannot suffer, because he lacks phenomenal pain, he could be harmed, or at least wronged, by being blocked from the achievement of his life goals. So we might have moral obligations to him. All of this, I take him to be saying, underlies the mistaken intuition that he has phenomenal consciousness.

I will assume that Commander Data has pains, itches, etc. in functional senses of these terms, and also that he has genuine beliefs, desires, etc., and that his beliefs include higher-order beliefs concerning his own states. The crucial question now is whether there is any good reason for thinking that the functional senses of "pain" and the like are different from their phenomenal senses.

This question needs to be distinguished from the question of whether the phenomenal character of Commander Data's pains, itches, etc. is the same as that of our pains, itches, etc.; more generally, the question of whether Commander data has experiences having the very same qualia as are instantiated in our experiences. The question whether Commander Data's experiences have qualia is not the same as the question of whether his experiences have *our* qualia. If qualia are first-order physical properties, it follows from the stipulated difference between his physical nature and ours that none of our qualia are instantiated in him. And if qualia are multiply realizable it may be, as I suggested earlier, that all of the possible realizers of a given quale are physical properties that can be instantiated only in creatures having a certain physical nature, and that this precludes any of our qualia from being realized in physical properties that can be instantiated in Commander Data. It is entirely compatible with this that certain of Commander Data's states do have qualia—do have phenomenal characters—but that these are qualia that are never instantiated in us. These would be "alien qualia"—alien relative to us, of course. It was observed earlier that on the functionalist account of qualitative similarity and difference Commander Data will have states having qualia, because he will have states that are related to

[13] See Chalmers 1996.

one another by these relations; but there is nothing in that to suggest that any of the qualia instantiated in his experiences are ones that are instantiated in ours.

One might think that if one holds that the sense of "pain", etc., applicable to Commander Data is the phenomenal sense, then in saying that Commander Data has pain one is committed to holding that he has experiences qualitatively similar to experiences of our own. But this rests on an unwarranted assumption about the phenomenal senses of these terms. We apply the term "pain" in what I take to be its phenomenal sense to creatures of other species, and we have, I think, no reason to think that the way their pains feel to them is the same as the way our pains feel to us. A state's being a pain requires that it has a certain functional profile and, if this is something additional, that it have a qualitative character to which the creature is averse and which motivates behavior aimed at the elimination of the state. There is nothing in this to say that this qualitative character must be the same in all cases of pain.

I harp on this point because I think it is commonly overlooked. And I think it is sometimes overlooked by writers who insist that our concepts of phenomenal states are introspective/recognitional concepts whose reference is fixed from the "first person perspective." I do not question that we have concepts of pain and the like that satisfy this description—although I would deny that these are our *only* concepts of them. But insofar as such a concept is a concept of pain, as opposed to being a concept of a phenomenal character instantiated in the pains of creatures like us, the satisfaction conditions it incorporates must be indexed to creatures of the sort who possess the concept and cannot be completely general. Feeling like *this* (I hereby engage in an act of introspective demonstration) may be without qualification a sufficient condition for being a pain, but only in creatures like me is it anything like a necessary condition. I suspect that the belief that introspective/recognitional concepts of states like pain do incorporate fully general satisfaction conditions is a major source of the view that creatures like Commander Data cannot have genuine phenomenal consciousness and that terms like "pain" are applicable to them only in "merely" functional senses. Of course, such concepts would have to have fully general satisfaction conditions if they were our only concepts of these states. But it is compatible with our having concepts of these states—introspective/recognitional ones—that lack fully general satisfaction conditions that we have other concepts of them—functional ones—that do have fully general satisfaction conditions.

But let's return to the view that Commander Data has genuine non-phenomenal states, including higher-order beliefs, but has only ersatz phenomenal states—states that are pains, itches, etc. only in functional senses that are not phenomenal senses. Given that he is a functional isomorph of us, Commander Data will say things like "I have an excruciating pain in my side," "There is a musty smell in this room," and "I love the feeling of having my back rubbed." He will speak of "what it is like" to experience certain things, and, if he has read our books and articles, may speak of the "phenomenal character" of his experiences. He may even speak of them as having "qualia." How are we to understand all these utterances if we insist on denying him phenomenal consciousness?

Someone might suggest that in the case of the expressions "phenomenal character" and "qualia," which he got from us, the reference of these expressions is just what it is in our utterances, and that he is simply mistaken in thinking that his experiences have what these terms refer to. But this could hardly be true of "what it is like"; and given the virtual interdefinability of these expressions, it is not really plausible for "phenomenal character" and "qualia." Nor is it essential to the example that his terms are gotten from us. And it is not plausible that nothing at all answers to these expressions when he uses them; that instead of referring to states instantiated in us but not in him, they refer to nothing at all. He will be in physical states that stand to his self-ascriptions involving the use of these expressions in the same sorts of causal relations that the physical realizers of our phenomenal states stand to our self-ascriptions of such states. So perhaps we should say of his use of these expressions what McLaughlin would have us say of his use of "pain," namely that they are used in a purely functional, nonphenomenal, sense. (So, among other things, we have a nonphenomenal sense of "phenomenal"!) But to all appearances his use of them is just like our use of the same expressions. And he will have introspective/recognitional concepts that are related to his use of "pain" and the like in just the ways our introspective/recognitional concepts are related to our use of "pain." We can suppose—we *must* suppose given the functional isomorphism—that in his mouth these expressions stand for states of him, and properties of states of him, that are realized in his physical states and their properties in just the ways the referents of these terms in our use of them are realized in our physical states and their properties. If saying that a concept is "merely functional" is understood as implying that there is no related (coextensive) concept that is introspective/recognitional, then

we should deny that the concept he expresses with "pain" is merely functional—for in his case there will be a related concept that is introspective/recognitional. We can agree that his introspective/recognitional concept associated with "pain" is different from ours; the satisfaction conditions associated with his are indexed to creatures of his sort, while the satisfaction conditions associated with ours are indexed to creatures of our sort. But that is compatible with "pain" in his discourse meaning the same as "pain" in ours. What reason could there be for thinking that it doesn't? More generally, what reason could there be for insisting that his states lack phenomenal character, and that while they have what *he* calls phenomenal character, that isn't the real thing?

A bad reason for thinking this is that for phenomenal character, as well as for specific kinds of it (e.g. pain, or being-appeared-red-to), we have an introspective/recognitional concept, and one he could not have. If one thinks that introspective/recognitional concepts incorporate fully general satisfaction conditions, rather than ones partly indexed to creatures of the sort the subject is, this would lead to the conclusion that phenomenal character is something he can't have. But we have already seen that this is a mistake.

Block has suggested (in conversation) that "phenomenality" is a highly abstract phenomenal character—a super-determinable phenomenal character, that stands to more determinate phenomenal characters as phenomenal redness stands to phenomenal scarlet—and is such that of it, as of the more determinate phenomenal characters, we have an introspective concept. If we equate having states with phenomenal character with having states that instantiate determinates of this determinable, we will have to deny phenomenal character to states (like those of Commander Data) that do not instantiate determinates of it. I am not persuaded that there is such a super-determinable of which all of the phenomenal characters we are acquainted with are determinates. But if there is, the proper name for it is not "phenomenality" but "human phenomenality." The states of alien creatures—the likes of Commander Data—will not instantiate determinates of this determinable, but this only means that they lack human phenomenality, not that they lack phenomenality.

It is worth noting that if we have a case for saying that Commander Data lacks phenomenal consciousness in *our* sense of the term, he has the same case for saying that we lack phenomenal consciousness in *his* sense of the term. So we have something he doesn't have, and he has something we don't have—where this doesn't mean just that he

doesn't have our qualia and we don't have his. The parochialist claims (ours and his) will say that there is something about our states that make them phenomenally conscious in our sense but not in his, and something about his states that makes them phenomenally conscious in his sense but not in ours. Compare this with the view, mentioned above, that our states have determinates of "human phenomenality" while Commander Data's states have determinates of what we can call "robot phenomenality," these being two ways of having phenomenal character. The difference is that on the parochialist views the meaning of our term "phenomenal character" limits its application to states having human phenomenality, while the meaning of Commander Data's term "phenomenal character" limits its application to states having a determinable whose determinates are all properties instantiable only in robots like him. This makes the difference look very much like a mere semantic difference. There is nothing here to say that the mental lives of creatures like us are richer or better than those of creatures like Commander Data—or that the mental lives of the latter are richer or better than ours. Supposing that the semantics of our terms and Commander Data's terms were as imagined, it can seem that nothing would be lost if we both moved to a semantics which makes the term "phenomenal consciousness"—and terms like "pain," "itch," "nausea," etc.—have the same meaning in our language and in his. But that could hardly be the way the parochialist views the matter. His claim becomes uninteresting unless taken to imply that our mental lives are richer than those of the likes of Commander Data—that phenomenal consciousness is something more, and not just something different, than phenomenal consciousness in Commander Data's sense. But of course it follows from the functional isomorphism, together with the assumption that he does share with us states other than phenomenal ones, that he is as satisfied with his life as we are with ours. So it is hard to see how the "something more" claim made by a human parochialist could be more justified than the competing "something more" claim made by Commander Data, speaking as a parochialist.

Block points out that "Commander Data's functional equivalence to us guarantees that he has an internal space that is functionally equivalent to our phenomenal space" (p. 415); this is manifested in how he answers the question of whether red is closer to purple than blue is to yellow. He gives this as a reason for taking seriously the possibility that this space is grasped by him from a first-person perspective similar to that from which we grasp our phenomenal space. For him this is a reason

"for regarding Commander Data's consciousness as an open question," not a reason for regarding it as a fact. But I think it is the latter. To expand on the point, Commander Data's functional equivalence to us guarantees that he will make all of the sorts of judgments we make about similarities and differences in how things appear. For example, he will sometimes remark that because of differences in illumination two things of the same color look different. And such judgments will reflect similarities and differences in the contents of his perceptual states. The parochialist about phenomenal character must hold that all of this is compatible with Commander Data's states completely lacking phenomenal character—that there is nothing it is like for him to have them (although in *his* sense of "what it is like" there *is* something it is like!).

Consider the physical realizers of what we call phenomenal states and of what Commander Data calls phenomenal states. In both cases these will be complex microphysical states of affairs, consisting in micro-entities being propertied and related in complex ways. They will of course be microphysical states of affairs of somewhat different sorts, given the differences in composition between us and him. Adapting a famous thought experiment of Leibniz (*Monadology 17)*, imagine that tiny, but highly intelligent, creatures from outer space wander about in the microphysical states of affairs that realize the conscious states of humans and in those that realize the quasi-conscious states of Commander Data, and observe in minute detail what is going on in both. Intelligent creatures that they are, they construct a psychological theory about the possessors of these states and about how the states are physically realized. Their theory includes a notion of phenomenal character. They are aware of both the differences between the microphysical states of affairs in us and those in Commander Data, and also of the similarities that make states of affairs of both sorts realizers of functional states shared by us and Commander Data. Is there anything they could observe that would lead them to conclude that the differences make our phenomenal states genuine and those of Commander Data ersatz, rather than simply that the qualitative character of the states is different in the two cases?

Block might agree that the answer to this question is "no," but take this just to confirm his claim about the "metainaccessibility" of Commander Data's consciousness or lack thereof. But it seems to me questionable whether my hypothetical creatures could even make sense of the idea that one or the other of the kinds of creatures, either Commander Data or ourselves, has only ersatz phenomenal

consciousness. It may seem to us that we can make sense of it because we, unlike the hypothetical creatures, have introspective/recognitional concepts of states of one of the two kinds and not of states of the other. But I think that this seems to enable us to make sense of it only if we fall into the mistake of thinking that having states with qualia entails having states with *our* qualia.

We have stipulated, of course, that Commander Data's "depth psychology" is different from ours, and for all I have said it might be that our depth psychology is richer than his. But the case for his lacking phenomenal consciousness cannot rest on this; for it is easy to construct a version of the case in which it is his depth psychology, rather than ours, that is richer—if richness is just a matter of complexity. What is required to give us the relevant sort of edge over him is that the microphysical realizers of our states realize some non-functional aspect of our states that is absent from his, whereas the microphysical realizers of his states do not realize any comparable non-functional aspect of his states that is absent from ours. By a "non-functional aspect" of a state I mean an aspect of it over and above those that contribute to making it satisfy the "superficial" functional definition of having phenomenal character—the definition satisfied by both our states and his and so, according to the parochialist, not such that its satisfaction is sufficient to bestow genuine phenomenal character. Understanding it in this way, both our states and those of Commander Data will have non-functional aspects not shared by the other; and if these states differ in phenomenal character the differences will be due to differences in these non-functional aspects. What the parochialist must claim is that among the non-functional aspects of our states are some that contribute to giving them genuine phenomenal character, where the "genuineness" of phenomenal character doesn't just amount to its being the phenomenal character of *our* experiences. For the instantiations of these aspects to have microphysical realizations, as they must if physicalism is true, they must have causal profiles that individuate them. So the microphysical states of affairs that realize them must differ in their causal powers in such a way that only ours, and not Commander Data's, count as having genuine phenomenal character. It is an understatement to say that it is unclear how any difference in causal powers between these states of affairs could be of this sort.

Let's say that both our experiences and those of Commander Data have "functional qualia" (for short, F-qualia), it being an open question whether Commander Data's F-qualia are genuine qualia, and bestow

genuine phenomenal character. Our F-qualia and Commander Data's F-qualia will be different, and it will be differences in their non-functional aspects (in the above sense) that account for the difference. These differences will be realized in differences in the causal powers of the microphysical realizers of instantiations of the two sets of F-qualia, and presumably these differences will manifest themselves in differences in the "qualitative beliefs" caused in a subject by the instantiation of the F-qualia in his experiences. On the parochialist view there must be a further difference in the non-functional aspects which makes the phenomenal character of our experiences genuine and that of his not, and this must consist in a further difference in the causal powers of the microphysical realizers of instantiations of these qualia. On Block's view, as I understand it, we understand the claim that there is such a difference but have no conception of what it could be or of how it could be discovered that there is one—hence it is that Commander Data's consciousness or lack thereof is "metainaccessible." I question whether we do understand this claim.

VIII

I concede to McLaughlin that we cannot expect a proof that the likes of Commander Data have phenomenal consciousness, and I concede to Block that we cannot expect a proof either that they have phenomenal consciousness or that they don't. By a proof I mean an argument that shows either that denying phenomenal consciousness to Commander Data is no more reasonable than denying it to one's fellow human beings or that ascribing phenomenal consciousness to him, knowing his physical nature, is no more reasonable than ascribing it to a clothing store mannequin. It may be that the reason there cannot be such a proof is that, as I take David Papineau to hold, the concept of phenomenal consciousness is vague in such a way that there is no fact of the matter as to whether such creatures have phenomenal consciousness.[14] Such vagueness might be due to the reflection in our concepts of a strain in our thinking, an unresolved tension between parochial and liberal inclinations.

But let me say what I think would happen if we did, as McLaughlin imagines, come to interact with the likes of Commander Data on a day to

[14] Papineau 2002.

day basis and came to regard them as part of our moral community. Perhaps at the beginning we would adhere to (in our own thinking, though probably not in our communication with them) a distinction between the phenomenal sense of words like "pain" and a merely functional sense of them, taking only the latter to apply to Commander Data and the like. But I think that this distinction would gradually wither away; we would cease to have any sense that we were using words like "pain" in two different senses. If our concept of phenomenal consciousness is now a parochial one that denies phenomenal consciousness to such creatures, or if it is now vague in a way that leaves it indeterminate whether such creatures count as phenomenally conscious, it would evolve into a more liberal concept that allows them to count as phenomenally conscious. That is what I think would happen; I have no argument to show that this is so. What I want to insist on, however, is that if this happened, there is no sense in which we could be making a mistake in coming to talk and think in this way. There is a picture associated with the parochial view on which we would be making a mistake of a sort. This is the picture associated with the idea that there is in an important sense something *more* in our mental life, not just something *different*, than there is in the mental life of Commander Data. The mistake, on this picture, would be that of abandoning the concept of this important something more, and replacing it with a disjunctive concept that is satisfied both by this something more and by a state that in comparison with it is radically impoverished. It is this picture that I have tried to undermine.

APPENDIX

The Causal Theory of Properties

Throughout this work I have avoided tying the claims I have been defending to the causal theory of properties (CTP) I have defended elsewhere (in my 1980 and my 1998)—the view that all properties of concrete things are what in section I of Chapter 4 I called E-properties, properties whose causal profiles are essential to them. I have relied only on the weaker thesis that each such property is individuated by a causal profile in the sense that it and it alone has that profile in the actual world and worlds nomologically like it. Those who reject CTP—and I take this to include most contemporary philosophers—could consistently accept all of the central claims in this work. Nevertheless, I do accept CTP, and I think that some of what I have said here gives it support. A full-fledged defense of CTP would require me to address the various objections that have been raised against it, and that is something I will not undertake here. But I want to indicate, briefly, what the case in its favor is and how points made here strengthen it.

Basically, my case for CTP in my earlier work comes down to the claim that there is no plausible truthmaker for the identification of properties in different worlds having different causal profiles. Consider the set of causal profiles of all of the properties instantiable in the actual world. And consider an equally numerous set of causal profiles which belong to the properties instantiable in a world in which the causal laws are different. In both cases the causal profile of a member of the set will be specified in terms of its causal relations to other members of the same set. One can think of each of the sets as being characterizable by a vast Ramsey sentence which implies all of the laws that hold in the world in question. There are innumerable ways in which the members of the one set could be paired with those of the other. Is there anything that could make it true that the properties paired in one of these pairings are identical? Obviously we can't use sameness of causal profile as a basis for identifying properties in the two sets—for it will be true of each of the pairings that if the paired properties are identical then their causal profiles in the different worlds are different. Is there any relation between the two sets of causal profiles that would single out one of the possible pairings as giving us identity? It will no doubt be true that the different pairing will differ in how similar the causal profiles of the same property will be in the different worlds on the assumption that the pairing gives us identity. Perhaps there will be a pairing which if taken as giving us identity gives us a higher degree of similarity between the

causal profiles of the paired properties than what we get if regard any of the other pairings as giving us identity—although it seems more likely that some pairings will give us more similarity in some respects and others will give us more similarity in other respects. But even if there is a unique pairing that gives us maximum similarity, why should we say in such a case that the paired properties are identical, rather than saying simply that they are properties whose causal profiles are in certain ways similar?

A point I have emphasized in earlier work is that a natural way of thinking about the transworld identification of concrete objects is unavailable to us here. The way concrete objects can vary their properties across worlds mirrors the way they can vary their properties across time. I could have been a professional boxer if there is a possible history starting from some point in my actual career and terminating in my being a professional boxer. Applying this to properties, a property could have had a different causal profile in another world if there is a possible history starting from the property having the causal profile it actually has at some time and ending with its having a different causal profile. But if causal profiles are determined by the laws of nature, and these hold omnitemporally, there are no such possible histories. And even if the laws could change, there would be a question as to how we could be entitled to think that it is one and the same property that is first governed by one set of laws and then by another. Our normal criteria for asserting or denying that one and the same property is instantiated on different occasions assume that sameness of property goes with sameness of causal profile, and we have no criteria that could override these.

It may be objected that it is a mistake to suppose that there must be a constitutive account of what interworld identity of properties consists in—an account of why one of the pairings of actual world properties and properties in a nomologically different world is such that the paired properties are identical, despite the differences in their causal profiles. Identity facts, it may be said, need no truth makers other than themselves. Identity, or a least property identity, is a primitive, unanalysable relation.

But if this is true of inter-world property identity, it ought to be true of intra-world property identity. To hold that there is something that is constitutive of intra-world property identity, but nothing that is constitutive of inter-world property identity, would undermine the claim that there is a single relation, identity, common to the two cases. But if intra-world property identity is a primitive, unanalysable relation, it cannot consist in sameness of causal profile. It would seem, then, that it ought to be possible for it to come apart from sameness of causal profile—i.e. for there to be cases in which the same property has different causal profiles at different times (just as, on the contingency view, the same property can have different causal profiles in different worlds), and cases in which different properties have, at different times, the same causal profile. And these are not possibilities we can rule out on empirical grounds.

All that we have to go on in making judgments of intra-world property identity is sameness of causal profile. Going on this we would judge that we had the same property even if one property had been replaced by another having the same causal profile, and we would judge that we had different properties even if we had the same property with a different causal profile. The view that property identity is a primitive, unanalyzable relation only contingently related to sameness of causal profile even in the intra-world case threatens to make property identity unknowable. And if we allow that there is a constitutive relation between sameness of property and sameness of causal profile in the intra-world case, we should allow that there is one in the interworld case as well.

I argued in Chapter 4, section I that if there are both C-properties (properties having their causal profiles contingently) and E-properties, we can have no way of knowing of any property of which sort it is. There are two ways of avoiding the unknowability consequence. One is to deny that there are C-properties—in other words, to embrace CTP. The other is to deny that there are E-properties. But to do the latter requires holding either that there is no such property as being a braking system, or being an adding machine, or that such properties are C-properties and have different properties in other possible worlds—i.e. that there are possible worlds in which the very property that in this world is the property of being a braking system has a causal profile that is irrelevant to the function of enabling braking. This seems counterintuitive, to say the least. So should we grit our teeth and accept the unknowability claim? But if the conclusion that properties like being a braking system are C-properties rather than E-properties is objectionable, surely the conclusion that for all we know such properties are C-properties rather than E-properties is equally objectionable. Such objectionable conclusions are avoided if we accept CTP.

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