

# The Causal Theory of Properties and the Causal Theory of Reference, or How to Name Properties and Why It Matters\*

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The Causal Theory of Properties (CTP) (Shoemaker 1980a, 1980b, 1998) presents a striking picture: although a property might ultimately be distinct from the causal powers it confers on its instantiations (Shoemaker 1998, p. 64), those causal powers limit the property's identity. In the words of CTP's leading proponent, Sydney Shoemaker, "The formulation of the causal theory of properties I now favor . . . says that the causal features of a property, both forward-looking and backward-looking, are essential to it. And it says that properties having the same causal features are identical" (1998, p. 64). Thus, as Shoemaker presents it, CTP is the conjunction of two metaphysical theses: an essentialist thesis and an

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individuation thesis.<sup>1</sup> The former asserts that whatever causal relations a property enters into are essential to that property: if a property enters into a given causal relation in any possible world, the property enters into that causal relation in every possible world in which the property exists. The latter asserts that for any properties *P* and *Q*, *P* is identical to *Q* if and only if *P* and *Q* enter into all of the same causal relations.

Each thesis makes a distinctive contribution to CTP. The essentialist thesis alone does not preclude the existence of distinct properties that enter into all of the same causal relations essentially: that any given property must enter into the same causal relations in all possible worlds in which it exists does not preclude two properties from entering into the same pattern of causal relations (cf. Bird 2004 pp. 259-60). Similarly, the individuation thesis alone does not prohibit interworld variation in a property's causal relations: so long as no two properties enter into the same pattern of causal relations, the causal relations into which any one property enters can vary across possible worlds. Furthermore, as we shall see, the two theses can be, and have been, argued for independently.

Here is an overview of the essay. Section I critically examines Shoemaker's argument for the individuation thesis. Shoemaker's argument rests on concerns about the naming of causally indistinguishable properties. In response to such concerns, I lay out a positive account of the way in which properties are, or at least could be, named; this account

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<sup>1</sup> One could weaken the essentialist thesis by limiting the scope of its antecedent to actual-world causal relations. The stronger thesis should be acceptable to Shoemaker, for he takes branchings-off from the actual world to exhaust the realm of nonactual possibilities (1998, pp. 69-70—more on which below). On this view of possibility, unless a possible world could, after branching, witness the appearance of a new property or causal relation, the weak essentialist thesis entails the stronger one.

When I speak of properties entering into causal relations, I have in mind type-level relations. I do not here advocate any particular account of these, but they are *not* concrete, token causal interactions, say, interactions between property-instantiations or between the particular objects or events in which properties are instantiated (or exemplified). Rather, the idea is that certain facts about properties to some extent determine or constitute type-level causal relations; these general facts, together with the particular contingent state of the world, help to determine token-level causal interactions. On one way of viewing these matters—congenial to CTP—properties' dispositional essences constitute the type-level facts underwriting both token causal interactions and causal laws (Ellis and Lierse 1994); on an alternative, but still metaphysically robust view, token causal interactions are governed by causal laws, themselves contingent relations between universals or properties (considered as abstract entities) (Armstrong 1978; Dretske 1977; Tooley 1977). (Shoemaker does not accept the view that causal laws are contingent relations between universals; insofar as he is inclined toward the Dretske-Tooley-Armstrong view, it is a necessitarian version of it—see Shoemaker 1998, p. 61. By describing the view of laws advocated by Dretske, Tooley, and Armstrong, I mean only to illustrate available ways of talking about type-level relations, so as to distinguish that kind of talk from talk about token causal interactions.)

implies that reference to a single property can be secured even if that property enters into all of the same causal relations as some other property. Section II briefly considers a potential complication: that Section I's discussion of property-naming presupposes CTP's essentialist thesis. In Section III, I set out and respond to Shoemaker's argument for the essentialist thesis, an argument resting on what I take to be an unmotivated theory of possibility. Section IV presses a fairly standard objection to the essentialist thesis based on the counterintuitive status of CTP's modal claims. The purpose here is not so much to present the objection itself as to engage with a common rejoinder: that a Kripkean model of reference-fixing (Kripke 1980), taken together with Kripkean considerations of *a posteriori* necessity (*ibid.*), strips the intuitions in question of their force. This section applies some of the points made earlier about the naming of properties to Alexander Bird's recent (2001, 2002) deployment of Kripkean considerations in defense of a necessitarian view of causal laws. The final section considers and rejects a further epistemic argument sometimes offered in support of CTP or a closely allied thesis. Thus, given the weakness of extant arguments in support of CTP's component theses, and in light of the unanswered objection to the essentialist thesis, I conclude that CTP should, at least tentatively, be rejected.

### I. On the Naming of Indistinguishable Properties

In "Causal and Metaphysical Necessity," Shoemaker (1998) argues against the existence of what I will call 'indistinguishable properties': two properties that enter into all of the same causal relations in the actual world. Shoemaker means to show that the individuation thesis is true of actual-world properties and their causal relations; but assuming his reasoning is sound, it might be extended to yield the same result for other possible worlds, thereby showing that no single world contains indistinguishable properties.<sup>2</sup>

Here, in Shoemaker's own words, is his argument for the individuation thesis:

Supposing there are such properties [two properties that enter into all of the same causal relations in the actual world], it cannot be these that we intend to be referring to when we use singular property-referring terms—all we can plausibly be said to intend to refer to are equivalence classes of such properties. So if there are such properties, they don't fall within the extension of *our* term "property." Which seems to imply that if there are such properties, they aren't properties; which seems to imply that there are no such properties. (1998, p. 66)

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<sup>2</sup> For Shoemaker, this extension comes easily, given his theory of possibility (see note 1, above).

And now reconstructed:

*Hypothesis, for reductio:* There are two properties, *P1* and *P2*, that enter into all of the same causal relations in the actual world.

*Premise 1:* For any *R*, if *R* is a property, then the predicate ‘... is a property’ applies to *R*.

*Premise 2:* For any *R*, if the predicate ‘... is a property’ applies to *R*, some speakers are capable of naming *R* as an individual property.

*Premise 3:* For any *R*, if there are speakers capable of naming *R* as an individual property, some instantiations of *R* have, in the actual world, distinctive effects on those speakers (effects on which those speakers’ reference-fixing intentions can be differentially focused).

*Premise 4:* By *Hypothesis*, neither *P1* nor *P2* has distinctive effects.

Therefore, *P1* and *P2* are not properties, reducing *Hypothesis* to absurdity.

Below I argue that *Premises 2* and *3* are false. First, however, a digression seems in order, if for no other reason than to clarify the dialectic.

The argument, as reconstructed above, might strike some readers as a straw man, partly because of its deductive character (Shoemaker cannot have in mind anything *that* strong!) and partly because of its appeal to what are, broadly speaking, epistemological considerations. Both concerns are misguided, however. Take first the worry about the argument’s logical force. Might it be better to interpret Shoemaker’s argument as inductive in form? Perhaps, but *vis-à-vis* the criticisms articulated below, the argument’s logical structure is irrelevant. I object to the *premises* of the argument. Thus, if my objections hold up, they undercut whatever force the argument is intended to have. A conclusion derives no rational support, inductive or deductive, from false premises.

Regarding the importance of epistemological concerns, consider how Shoemaker introduces the argument at issue:

In my original defense of the causal theory of properties I put considerable weight on epistemological arguments aimed at showing that

there cannot be properties that make no contribution to causal powers, that there cannot be two or more properties that share all of their causal features, and that properties cannot change their causal features over time. These arguments have often been charged with being 'verificationist.' I think that charge is confused. (1998, p. 65)

In the footnote accompanying this text, Shoemaker spells out—in deductive form, mind you—the sort of epistemological argument that, by his lights, is meritorious and that his critics miss. Shoemaker goes on to say that, all the same, he can now do without the older epistemological arguments but that one epistemological argument is worth giving:

Where there is still room for the deployment of an epistemological argument is in attacking the idea that there can be properties that share all of their causal features. And what epistemological considerations show, in the first instance, is that if there are sets of properties whose members are identical with respect to their causal features, we necessarily lack the resources for referring to particular members of these sets. (1998, p. 66)

In the remainder of the paragraph, Shoemaker states his argument for the individuation thesis. To be clear, then, Shoemaker does not present epistemological considerations as second-rate or as providing something less than genuine arguments. To the contrary, he thinks those who criticize his epistemological arguments are mistaken and that at least one new epistemological argument (a semantic argument, of sorts) also supports the individuation thesis. Shoemaker takes this new argument seriously—it is the only direct argument he offers to support CTP's individuation thesis.

Back, then, to a critical appraisal of Shoemaker's argument, as I have reconstructed it. First take *Premise 2* (for any *R*, if the predicate '... is a property' applies to *R*, some speakers are capable of naming *R* as an individual property). It is clear that individuals and kinds can be in the extension of a term even where humans have not named those individuals or kinds separately. If a chemical element appears only in the late stages of the universe, after all sentient beings have expired, it is nonetheless in the (timeless) extension of the currently used predicate '... is a kind of element.' Consider this issue from the standpoint of the causal theory of reference, which I shall take to be the best going theory of reference for such terms as 'element' and 'property.' It is an objective fact about the universe which things are elements. If the term 'element' comes into the right causal relation to the natural kind *element*, then the extension of the predicate '... is a kind of element' is fixed by the contribution of nature to include all of the relevant

determinates or species, not merely the ones humans can name individually. And so it goes for 'property' and '... is a (kind of) property.'<sup>3</sup>

Shoemaker might object that I have given *Premise 2* too narrow a reading, maintaining instead that the capacity in question is an in-principle capacity. Thus, although it might just happen that humans never appear in the vicinity of a certain element, humans could name that element were they to come across it.

So long as the in-principle capacity in question demands the nomological possibility of naming, my concern stands. Simply take the conditions at the late stages of the universe nomologically to preclude human existence, at least in the locale where the element in question appears. Perhaps the very conditions required for the formation of this element—e.g., incredibly high temperatures or incredibly powerful gravitational fields—rule out the presence of humans in the vicinity.

To press an even more liberal interpretation of the capacities in question—so that only the *metaphysical* possibility of naming is required—would create trouble of its own. For Shoemaker, the problem would be one of irrelevance. He holds that nomological possibility exhausts metaphysical possibility (Shoemaker 1998, pp. 69–70). Thus, from Shoemaker's perspective, the interpretation under consideration introduces nothing new into the discussion; the criticism stated in the preceding paragraph applies equally to this supposedly more liberal interpretation of *Premise 2*. Independent of Shoemaker's views about

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<sup>3</sup> In taking CTR to apply to 'property,' I presuppose that *property-hood* is itself a second-order property of the kinds of things that would normally be categorized as properties—*squareness*, for example (Armstrong 1978, chap. 23). On Armstrong's view, in order that something be a genuine property it must have a role in the natural order of cause and effect. Perhaps, then, insofar as entering into some causal relation or other is a kind of role in the natural order, *property-hood* is a genuine property: the one shared by all things that enter into some type-level causal relation or other and in virtue of which they do so. This assumption is tendentious in certain respects, and many readers will be skeptical. Regardless, we must have some account of the truth-conditions of statements comprising '... is a property.' Even if *property* does not play a role in the causal order, or for some other reason one rejects the application of CTR to 'property,' the moral of the present discussion of *Premise 2* most likely holds. On a descriptivist theory, for example, the extension of '... is a property' is fixed by such a descriptive claim as 'properties are ways of being'. If there are two distinct ways of being that play the same causal role in the actual world (as by *Hypothesis*, there are), then, assuming the extension of '... is a property' is fixed in the manner just suggested, these indistinguishable properties are separately subsumed by '... is a property'; they are distinct members of the extension of '... is a property.' The application of CTR is perhaps more convincing in the case of terms for more specific kinds, such as 'lead' and 'electron,' the kind of terms to which it will be applied below in the discussion of *Premise 3*. Note further that, although some of the discussion of *Premise 2* rests on the view that *property-hood* is a genuine property, my criticisms of *Premise 3* do not depend on this assumption.

modality, the liberal interpretation of *Premise 2* threatens to undermine *Premise 3*. Assume that *Premise 2* requires only the metaphysical possibility of naming. What, then, beyond the nomologically possible, should count as metaphysically possible? An obvious suggestion is to allow the possibility of different causal relations from those that hold in the actual world. If, however, *P1* and *P2* can enter into different causal relations from the ones they enter into in the actual world, the in-principle possibility of naming indistinguishable properties is too easy to come by. It is in-principle possible for the subject to name *P1* and *P2*, because in the sort of world we are imagining, subjects can tell the difference between the two properties and so apply different terms to their instances. Thus, Shoemaker should not accept the genuinely liberal interpretation of *Premise 2*, even were he to give up his restrictive view of possibility. Of course, it is open to Shoemaker to accept a range of metaphysical possibilities that outstrips the set of nomological ones while also holding that *P1* and *P2* are indistinguishable in every possible world. Recall, though, that *P1* and *P2* were arbitrarily chosen. With this point clearly in mind, it is difficult to see any grounds for the proposed view. To appeal to CTP would beg the question.

‘Property’ is, however, an unusual term in its extreme generality, and on these grounds, one might reasonably wonder whether what is true of ‘element’ is true of ‘property’ as well. Those who are sympathetic to *Premise 2* might want a more detailed account of how the reference of ‘property’ could be determinately fixed so that ‘... is a property’ could distinctly subsume *P1* and *P2*. To the fleshing out of such details I now turn.

Consider one promising account of the reference-fixing process, the samples-and-foils model (Stanford and Kitcher 2000).<sup>4</sup> On Kripke and Putnam’s original picture of reference-fixation for natural kind and property terms (Kripke 1980; Putnam 1975), positive interactions suffice to fix reference (on property terms in particular, see Kripke 1980, p. 116). Speakers direct their attention toward a sample of a natural kind, substance, or property and say “*t* is to refer henceforth to whatever is of the same kind as this sample,” or something less formal but to the same effect. In many cases, this process fails to isolate a determinate kind or property, for instance, when a sample instantiates more than one kind or property (see Devitt and Sterelny’s discussion of the

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<sup>4</sup> The idea that natural kinds themselves are in some sense determined by relations between samples and foils goes back at least to Quine (1969, p. 119), although he uses the term ‘paradigms’ in place of ‘samples.’ Putnam uses ‘sample’ and ‘paradigm’ almost interchangeably. Given, however, the checkered history of the use of the term ‘paradigm,’ it is best to settle on ‘sample.’ (Putnam himself notes one of the dangers of using ‘paradigm’—1975, p. 245.)

*qua* problem—1987, pp. 72–75). In these cases, it seems plausible that the subject resolves the indeterminacy by directing complementary claims toward contrasting samples, i.e., foils: “and *t* does not refer to stuff of that kind,” the subject adds.<sup>5</sup>

Yet, although this approach should frequently succeed, in the case of the term ‘property,’ the necessary contrast between samples and foils is lacking. All samples, as well as all foils, instantiate some property or other and thus instantiate something that instantiates *property-hood*.<sup>6</sup> Perhaps, though, the use of positive samples alone suffices to fix the reference of ‘property’ via a kind of abstraction. The speaker might, for example, gesture toward whatever objects happen to be lying about and say, “These things all have properties,” or “‘Property’ shall refer to whatever is instantiated, directly or indirectly, in all of these things.” Residual indeterminacy would remain, however.<sup>7</sup> A speaker who attends to a varied collection of objects and says, “‘Property’ shall refer to whatever is instantiated in all of these things,” might nevertheless fail to isolate *property-hood*, for the objects in question most likely instantiate some other very general properties, such as *having mass* and *holding a position in space-time*.

Perhaps surprisingly, this problem might be solved by the application of an attenuated form of the samples-and-foils method, revealed by speakers’ general patterns of usage. Speakers can use property terms in ways that differentiate the intended referent of ‘property’ from the

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<sup>5</sup> Many of Putnam’s remarks suggest an alternative: that the grounding pronouncement makes explicit reference to a superordinate kind, e.g., *liquid*, as a way of attaching *t* to a unique natural kind. A sample of water might be a sample of many things, the thinking goes, but it is only a sample of one kind of liquid. This approach does not provide a general solution to the *qua* problem, partly because the problem of indeterminacy arises for the relevant superordinate terms, assuming that they too are natural kind terms: ‘liquid’ can play its presumed role in the fixation of the reference of ‘water’ only if the reference of ‘liquid’ is already secured; but samples of liquid are samples of more than one natural kind, so the fixation of reference for ‘liquid’ faces a *qua* problem of its own. Furthermore, even after subjects have fixed the reference of superordinate kind terms, the question arises whether the resulting resources suffice to resolve the indeterminacy: a sample may be of more than one liquid kind, for example, or more than one mammalian kind.

<sup>6</sup> It is not clear that an *object* instantiates *property-hood* simply in virtue of its instantiating some property or other. The property the object instantiates itself instantiates *property-hood*, but the object does not have the property of being a property. All the same, there is some sense in which *property-hood* is manifest whenever any property is instantiated, and thus, if the speaker’s intentions are formulated in broad enough terms, local objects and their property instantiations can provide some positive, if indirect, connection to *property-hood*. Notice, too, that, in whatever way objects manifest *property-hood*, all objects manifest it; in which case the problem of finding appropriate foils remains.

<sup>7</sup> Note that I am not concerned here with the indeterminacy of translation, argued for by Quine (1960).



referents of other terms for very generally instantiated properties; this can be seen in their judgments about various sentences including the relevant terms. The following are acceptable statements and arguably true, if a bit odd sounding:

- (1) *Having mass* is a property.
- (2) *Being at a position in space-time* is a property.
- (3) *Being a property* is a property.

In contrast, the following are either nonsensical or obviously false:

- (4) *Being a property* has mass.
- (5) *Being a property* occupies a position in space-time.

As are these:

- (6) *Having mass* has mass.
- (7) *Occupying a position in space-time* occupies a position in space-time.

Our judgments about these sentences reveal two important asymmetries in our attitudes toward the properties and terms involved: (a) ‘property’ is self-subsuming, i.e., it applies in predicate form to the very thing it names as a singular term, whereas the other terms for very generally instantiated properties are not self-subsuming [compare (3), (6) and (7)]; and (b) ‘property’ is applied in predicate form to those things to which the other very generally instantiated property-terms refer [(1), (2)], but the latter terms are not applied in predicate form to whatever is referred to by ‘property’ [(4) and (5)] (nor are those terms applied in predicate form to those things to which other very general terms refer: “*Having mass* occupies a position in space-time” is no more acceptable than (5)). Assuming that the implicit intentions driving these patterns of usage correctly describe the properties involved, these intentions can help speakers to attach ‘property’ to *property-hood* by excluding other very generally instantiated properties as candidate referents of ‘property.’

Here is the samples-and-foils method at work. Whatever any of the generally applicable terms refers to is itself subject to the application of ‘property;’ these provide positive samples (because they instantiate properties that instantiate *being a property*) but, as noted above,

provide no foils. The terms other than 'property' are not self-subsuming, though, as evidenced by the final group of sentences displayed above. Given, then, that 'property' is meant to refer to something self-subsuming, the referents of terms for other widely instantiated properties serve *indirectly* as foils: 'property' does not refer to *having mass*, because 'property' is meant to refer to something self-subsuming, while speakers intend that 'mass' not refer to something self-subsuming; thus, whatever 'mass' refers to provides an example of something to which 'property-hood' does not refer (in the sense that the two terms, functioning as singular terms, refer to different things). In this way, the speaker effectively uses *mass* as a foil for the application of 'property' via her attitude toward the application of 'has mass,' even though all available concrete samples and foils instantiate (or in some other way display) both *property-hood* and *has mass*.

Consideration of two further sentences suggests another way in which speakers' intentions can tease the referent of 'property' apart from the referents of terms for other widely instantiated properties:

- (8) Anything that has mass has a property.
- (9) Anything that has a property has mass.

I take the standard judgments about these sentences to be "true, or likely to be" in the case of (8) and "likely to be false" in the case of (9). By endorsing this pair of judgments, the speaker manifests the intention that 'property' refer to something that could, in principle, be instantiated in the absence of the instantiation of *mass*—i.e., an intention to apply 'property' more broadly than 'having mass' (similar remarks apply to 'occupying a position in space-time').<sup>8</sup>

My appeal to patterns of usage relegates the fixation of the reference of 'property' to a late stage in human cognitive history; for these patterns can arise only after humans have coined terms that refer to other very generally instantiated properties. It is not clear that this constitutes an objection to the proposed model; it might be that humans begin to use a term for *property* only after significant cognitive and cultural development. Nevertheless, this situation might be avoided by the exploitation of a further mark distinguishing *property-hood* from other very general ways of being: its connection to causality. Each normal

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<sup>8</sup> This kind of asymmetry is especially important in the case of *being abstract*, for which sentences analogous to (4), (5), (6), and (7) do not manifest the right sort of deviance. "*Property-hood* is abstract" does not offend in the way (4) does, but consider the contrast between "Anything that is a property is abstract" and "Anything that is abstract is a property."

speaker has access to a concept expressing the causal relation, regardless of whether she has ever thought or talked about space-time or mass; thinking in causal terms comes early in the normal course of human development.<sup>9</sup> Imagine, then, that a subject has two different experiences, say, one of a horse running past and the other of a tree waving in the wind. In each case, the subject can think that *something or other* about the object observed is causally responsible for such-and-such aspect of her experience. The subject can also compare the two experiences in a term-grounding intention, thinking, for example, that ‘property’ should refer to whatever kind of thing it is the two objects share *in virtue of which they cause any experience at all*. In this way, the subject gets hold of the bare fact that each of the objects has some way or other of being—something responsible for those objects’ causing some experience or other. To cast this as a linguistic act, imagine that the speaker says, “Let ‘property’ refer to that sort of thing the presence of which is responsible for an object’s having some effects or other.” Thus ‘property’ might become fixed to all properties, even to those, if there are any, that enter into all of the same causal relations as some other property; once the reference of ‘property’ is fixed, whether ‘... is a property’ applies to a given entity or kind depends on whether that thing is a species of the relevant genus, *property*. Something’s being a property is a fact about the world, independent of human abilities.<sup>10</sup>

Consideration of the speaker’s mental contribution to the fixation of reference might arouse a related concern about *Premise 2*. The causal theory’s reference-fixing story suggests a significant mental contribution on the part of speakers. What theory of mental content underwrites this contribution? A discussion and evaluation of leading theories would run too far afield.<sup>11</sup> There is, however, a noteworthy general assumption lying behind such theories: that mental content is independent of and, to at least some extent, prior to linguistic content; in fact, on many such theories, linguistic content derives to no small degree *from* mental content. On the latter view, the extension of a natural language term is fixed by the content of the mental representation, or

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<sup>9</sup> For evidence of causal reasoning in young children, see Massey and Gelman (1988), Bauer and Mandler (1989), Gelman (1990), and Gopnik et al. (2001); see Carey and Markman (1999) for a survey of results in developmental psychology, much of which suggests that the child applies a concept of causality in a variety of domains.

<sup>10</sup> A complication might arise in respect of properties instantiated only by human abilities: on some views, a property exists in a given world only when instantiated in that world; in which case if humans were to go out of existence, the properties in question would too. Thus, in this limited way, which properties exist might not be independent of human abilities.

<sup>11</sup> See Cummins (1996), Dretske (1988), Fodor (1990), Millikan (1984).

concept (here I use the two interchangeably), that the term expresses or is otherwise associated with in some privileged way. This approach threatens *Premise 2* in a straightforward way; for if 'property' derives its extension from the content of the concept PROPERTY, then no speakers need be capable of *naming* much of anything in order that 'property' have properties in its extension; the only requirement is that 'property' be associated with the mental representation having *property* as its referential (or truth-conditional) content.

Of course, Shoemaker's argument against the existence of indistinguishable properties could be reformulated in terms of mental representations: the altered *Premise 2* would read, "For any *R*, if the mental representation '... IS A KIND OF PROPERTY' applies to *R*, some subjects are capable of acquiring a concept of *R*." This claim is, however, beholden to the facts about mental content; insofar as one thinks that *any* of the leading naturalistic theories will win the day, the concerns raised above about *Premise 2* arise again. Naturalistic theories predicate referential content on some natural relation (where this entails that the relation be characterized nonsemantically and nonintentionally) between the subject's mental representations and the relevant aspects of the world beyond the subject. On the most influential naturalistic theories, a particular kind of causal history or nomic relation determines that the subject acquires a concept with a particular content. It is unclear why, in the case of PROPERTY, such acquisition mandates that the subject acquire concepts of individual properties as prerequisite. The reformulated *Premise 2* does not follow in any natural way from the problems that theories of mental content set out to solve and thus cannot plausibly be laid down as a constraint on theories of mental content. The relevant question is simply whether the nonsemantically individuated mental representation that I have, for convenience, been calling PROPERTY stands in the right causal, informational, or historical relation to *property-hood*.

Matters are a bit more complicated in the case of a reformulated *Premise 3*. On the one hand, if Shoemaker were to reformulate his argument against indistinguishable properties in terms of mental representations, he would have to abandon the support he offers for (what I have cast as) *Premise 3*. Shoemaker's argument is driven by a view about the role of speakers' intentions in naming, *viz.* that in order to name distinct properties, a subject must be in a position to direct differential intentions toward those properties. This line of thought is of dubious application, however, once our discussion shifts to the mental representation of properties. A theory of intentional content should illuminate the conditions under which a given thought (or combination of mental representations) has a particular content. To ground such

content in the subject's intentions, across the board, fails to illuminate mental content; rather, it presupposes mental content—the content of the intentions in question. Some mental content must be fixed independently of intentions in order that subjects have any intentions at all (which could plausibly aid in the fixation of further content). On the other hand, any theory of mental content that assigns reference or extensions on the basis of causal connections—and this includes nomic, historical, and information-based theories—seems to presuppose that, for two of a subject's mental representations to stand in different referential relations, they must stand in different causal relations to whatever they represent; and how, one might wonder, could mental representations *P1* and *P2* stand in different causal relations to indistinguishable properties *P1* and *P2*? We cannot answer this question satisfactorily absent a detailed examination of theories of mental content. I propose instead to return to the case of natural language terms and to show why *Premise 3* as originally stated is false, leaving to the reader the adaptation of what follows to a version of *Premise 3* couched in terms of mental representations.

*Premise 3* asserts that a property must have distinctive effects in order that any subject name or be capable of naming it. There are, however, at least two ways in which reference can be fixed separately to indistinguishable properties: the first depends on the differential distribution of properties in the actual world; the second involves differences in the counterfactual behavior of properties.

Take first the case of differential distribution. As above, let us refer to our hypothesized indistinguishable properties as *P1* and *P2*. Assume that *P1* and *P2* are distributed in a disjoint fashion throughout the actual universe. It is the year 1850. There are many instances of *P1* in the Oregon Territory's Willamette Valley, but no instances of *P2*. Far away in the southeastern state of Georgia, there are many instances of *P2* but none of *P1*. Anglo settlers in the Willamette Valley coin a term for *P1* and fix the term's reference by the standard procedure. English speakers in Georgia have, for some time, had a term for *P2*. Now, by hypothesis, *P1* and *P2* are distinct properties. Thus, so long as the model provided by Kripke and Putnam is in effect, each community successfully attaches a term only to one of these, for the dubbing members of each community causally interact only with instances of their local property; they intend their terms to apply to *this property here*. This much of the story should suffice to refute *Premise 3*. Notice, though, that it is possible for a single speaker to use two distinct terms, one for each property. Imagine that a young Georgian takes the extant advice to "go west!" and sets out for the Willamette Valley. Upon arrival she borrows the local term for *P1*, using it in conversation for quite

some time before interacting directly with instances of *P1*; as it turns out, instances of *P1* are relatively rare in her immediate environment (there are not many *P1*s up around Eugene, where our Southerner settles). During her period of adjustment, she occasionally uses the Southern term for *P2*, say, when telling stories of home to her newfound friends. At least for a significant interval following relocation, a single speaker of a single language has two distinct terms, one referring to *P1*, the other to *P2*.

Consider a second way to attach distinct terms to *P1* and *P2*. In keeping with CTR, I assume that the mechanisms underlying reference to natural kinds and properties are *fundamentally* causal; nevertheless, descriptions can *sometimes* play a role in reference-fixing. So long as the kind or property terms used in the reference-fixing descriptions have *their* reference fixed causally, descriptions can be used to fix reference determinately (and this point applies recursively: descriptions can be used to fix the reference of kind or property terms appearing in a description that is used to fix the reference of some further kind or property term, and so on—so long as this process is ultimately grounded in the use of kind and property terms the reference of which was fixed causally—cf. McGinn 1989, pp. 34–35). A speaker might, for example, formulate a precise description of an hypothesized particle that specifies the ways that particle interacts with certain objects in the actual world—objects to which the speaker in question can already successfully refer.<sup>12</sup>

Assuming that speakers can fix reference using precisely formulated descriptions, speakers can refer to *P1* and *P2* using distinct terms even if, in the actual world, samples of *P1* and *P2* are not as neatly segregated as they were in my preceding example. Instead of exploiting the differential distribution of instances of *P1* and *P2*, speakers can employ a description to refer to nonactual entities with which *P1* and *P2* would, counterfactually, enter into distinct causal relations. Assume, perhaps contrary to historical fact, that phlogiston was described with sufficient precision that clearly nothing in the actual world satisfies the associated description but just as clearly some worlds do contain a substance satisfying the description (and thus contain phlogiston). Assume further that *P1* is responsible for observable effect-types *O1*, *O2*, ... *On* in the actual world and also that, in the nearest possible worlds in which *P1* comes into contact with high concentrations of phlogiston, it causes an explosion. Property *P2* is, of course, responsible for the same observable effect-types *O1*, *O2*, ... *On* in the actual world, but in the nearest possible

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<sup>12</sup> Cf. Ian Hacking (1983, pp. 87–90) on how the reference of ‘meson’ was fixed.

worlds in which it comes into contact with high concentrations of phlogiston, it causes the emission of sudden, intense light (but no explosion). Consider a philosophically savvy and perhaps somewhat quirky subject who decides to try to name indistinguishable properties, on the off-chance that any happen to be instantiated in her environment. Our subject surveys numerous samples, in each case saying, “Let  $t_1$  refer to whatever property is responsible for effects  $O_1, O_2, \dots$  *On* [whichever the sample manifests] and would, in the presence of high concentrations of phlogiston, cause whatever instantiates it to explode—if there is such a property instantiated in this sample; furthermore, let  $t_2$  refer to whatever property is responsible for effects  $O_1, O_2, \dots$  *On* [whichever the sample manifests] and would, in the presence of high concentrations of phlogiston, cause whatever instantiates it to emit a sudden, intense light (without exploding)—if there is such a property instantiated in this sample.” The *conditional* nature of these reference-fixing intentions allows the subject to fix reference even though, generally speaking, her causal interactions with instances of  $P_1$  are indistinguishable to her from her causal interactions with instances of  $P_2$ : she does not know and cannot reliably detect which samples instantiate  $P_1$  and which instantiate  $P_2$ . This ignorance matters not. So long as the subject happens to get hold of a significant number of samples of each property, she attaches  $t_1$  to  $P_1$  and  $t_2$  to  $P_2$  by virtue of these properties’ differential effects in counterfactual situations. I conclude, then, that *Premise 3* is false.<sup>13</sup>

To close this section, I consider a rejoinder that might be offered in defense of *Premise 3*. In spelling out my counterexamples to *Premise 3*, I allowed reference-fixing speakers use of the term ‘property.’ A critic might worry that speakers cannot employ ‘property’ to this effect unless the extension of ‘... is a property’ already includes  $P_1$  and  $P_2$ . That assumption, it might be thought, begs the question: it is illicit to assume that speakers can exploit the meaning of ‘property’ when naming  $P_1$  and  $P_2$ —as if the relation ‘... is a different kind of property

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<sup>13</sup> George Molnar (1999, p. 14) worries that if the identities of properties were severed from their dispositions or causal relations, properties would differ in number only, which he finds implausible. It is, of course, open to us simply to reject the Leibnizian intuition; however, the argument in the text suggests a different response, which may be worth developing. A theory of property identity consistent with the falsity of CTP might combine three factors: difference in respect of (1) which worlds properties exist in, (2) the extent of their instantiation in the worlds in which they exist, and (3) which causal relations they enter into in which worlds. It is, though, a matter of further inquiry whether more than one bare property will wind up with indistinguishable roles—and thus differ in number—even after these three factors have been fully considered.

from ...' holds between them—when it has not yet been determined whether *P1* and *P2* can be individually named; for if they cannot be individually named, *Premise 2* entails that they are not distinct properties and thus that they cannot be separately named.

Keep in mind, however, that *P1* and *P2* are distinct properties by hypothesis; they are offered as values of *P* and *Q* in *Hypothesis*. Thus, it is legitimate to evaluate *Premise 3* on the assumption that *P1* and *P2* are distinct properties, if only to see whether, on that assumption together with neutral auxiliary premises, such indistinguishable properties could be named (or, *vis-à-vis Premise 2*, could be in the extension of '... is a property' without having been named).<sup>14</sup>

## II. The Causal Theory of Reference: Essentialism and Constitution

The arguments of the preceding section relied heavily on Putnam and Kripke's model of reference-fixing. Some philosophers, however, have taken this model to imply that natural kinds (and properties, presumably) enter into at least some of their causal relations essentially (McGinn 1975, p. 180). If this essentialist reading of CTR is correct, then even if I have left Shoemaker without an argument for the individuation thesis, I have done so by presupposing CTP's essentialist thesis. To make matters worse, some prominent critics of CTP find the essentialist thesis less palatable than the individuation thesis—and for good reason, I would contend.<sup>15</sup>

This concern misses the mark, for the essentialism entailed by CTR is not CTP's essentialist thesis. Typical expositions of CTR do take for granted that individuals and natural kinds have essential properties. If a term *t* is subject to CTR, *t* refers to an individual or kind that has been specified (e.g., by demonstration) with respect to the actual world in all possible worlds in which that individual exists or that kind is instantiated (and *t* refers to no other individual or members of any other kind, in any possible world). According to CTR, speakers achieve this rigid designation by causally interacting with

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<sup>14</sup> Notice further that my counterexamples to *Premise 3* do not require speakers to use the term 'property' to fix the reference of *P1* and *P2*. My hypothetical speakers might just as well have used less definite constructions, for example, "Let *t1* refer to whatever it is about these samples that is responsible for their having these effects," filling in 'these effects' as the case requires.

<sup>15</sup> Armstrong (1978, p. 45; 1999, p. 35), for example, levels principled arguments against the essentialist thesis, while treating the individuation thesis as negotiable, in fact likely to be true of the actual world.



actual individuals, kind members, or property instances, thereby attaching the term in question to just that individual, kind, or property, in the actual world as well as in counterfactual ones.<sup>16</sup> This, however, presupposes conditions for the sameness of individual, property, or kind across possible worlds. In the case of a chemical kind, for instance, the condition is thought to have something to do with microstructure, although there can be disagreement about the details in any particular case. The connection to essentialism should be clear: if the condition of shared kind membership determines whether some possible thing falls under *t*, then that condition expresses an essential property of the referents of *t*; there is no possible world in which something to which *t* refers fails to meet that condition, for such an item would thereby not be (or be a) *t* (where *t* is now used, rather than mentioned).

This much essentialism does not entail that we have discovered the essences of any particular natural kinds or properties nor that those essences are particular type-level causal relations. For example, we now think that we have discovered an essential property of gold—that it has atomic number 79—but if it turns out that we are wrong, it will not speak against CTR. Furthermore, the assumption that having atomic number 79 is essential to gold does not entail that for something to be gold it must enter into all of the causal relations that, in this world, follow nomologically from something's having atomic number 79 (cf. Mellor 1977; Salmon 1981). The causal theory of reference entails this richer essentialist conclusion only if one applies CTP's essentialist thesis; but in the present context to do so would beg the question.

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<sup>16</sup> In the case of individuals, the thing referred to in nonactual worlds is comparatively clear-cut. The cases of kinds and properties involve a special complication: given that the collection of instantiations of a property or kind can vary from one world to the next, one cannot straightforwardly apply the model of rigid designation to kind or property terms (Devitt 2005; LaPorte 2000; Schwartz 2002), at least not to explain the reference of their predicate forms. For my purposes, I can skirt this debate by tentatively endorsing Devitt's (2005) model of rigid application, so long as it is understood to involve the designation of a property or kind when the reference of a property or kind term is being fixed. For example, the English word 'water' applies to all and only samples of H<sub>2</sub>O, in the actual world or otherwise, because when the term's reference was fixed, speakers picked out a single property ("the thing about the sample responsible for this kind of effect"), which then determined the counterfactual range of the predicate form's application. It might do just as well to assume that property and kind terms, when used as singular terms, designate abstract individuals—i.e., properties and kinds as abstract entities (LaPorte 2000); regardless of whether it is important to describe such singular terms as rigid designators (Schwartz 2002), the stable reference of singular property-terms could explain why the extensions of the predicative forms of those terms can vary from world to world.

A different essentialist tack takes type-level constitution to be essential to natural kinds: the kind *gold* is such that its samples necessarily are constituted by the kinds of particles that make up gold in the actual world. If there are such abstract entities as the kinds *gold* and *electron*, one would expect these to be necessarily related: perhaps *gold* is a complex universal, in which case the universal *electron* is one of its necessary components. If we assume that the causal powers of larger wholes supervene on the causal powers of their constituents, CTP's essentialist thesis, as applied to gold, might seem to follow. If a kind inherits its causal powers from its constituents and it has those constituents necessarily, then it would seem to follow that the kind has its causal powers necessarily—but only so long as the *constituents* enter into their causal relations necessarily. Thus, such a strategy would beg the question: the essentialist conclusion concerning the causal relations of complex kinds such as gold rests ultimately on the application of CTP's essentialist thesis to those kinds' relevant constituents. Furthermore, it does no good for the advocate of CTP to focus on the necessary constitution of those constituents. Ultimately such a strategy bottoms out in fundamental constituents, *which have no constitution*; so it certainly is not necessary that those fundamental constituents be constituted in a certain way and derive their causal powers from the causal powers of their necessary constituents.<sup>17</sup>

We should, however, acknowledge that a legitimate intuition drives the application of CTP's essentialist thesis to fundamental constituents: in the case of the fundamental constituents, we seem to have no way of understanding them but by their causal relations. This intuition will be given its due in the final section, where it anchors an argument in support of CTP's essentialist thesis. For now, though, it should simply be noted that my application of CTR in Section I does not presuppose CTP's essentialist thesis. The causal naming of a property gets hold of the property's essential nature, whatever it is; that much follows from CTR (at least if CTR is taken, as it normally is, to entail rigid designation). Whether these essential properties are the causal relations into which the property named enters or the causal relations into which its relevant constituents enter is a controversial question that must

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<sup>17</sup> One could deny that there is a fundamental level (Block 2003, p. 138), claiming instead an infinitely descending chain of constituents. Serious difficulties afflict this view, however. First, it does not seem empirically plausible (Molnar 1999, p. 9ff). Second, and more important in the present context, it does not provide any direct route from CTR to CTP's essentialist thesis, for it is still subject to the charge of question-begging: a complex kind or property inherits its causal relations necessarily only if there is at least one level of decomposition with components that enter into *their* causal relations essentially—whether those component kinds or properties are fundamental is beside the matter.

be resolved independently of CTR—the only constraint being that the essences involved are things speakers could somehow get hold of causally.

### III. Possibility and the Privilege of the Actual

Consider Shoemaker's argument in favor of CTP's essentialist thesis.<sup>18</sup> This argument rests on the claim that genuine possibilities are limited to branchings-off, as it were, from the actual world: "constraints on intra-world variation are also constraints on inter-world variation" (Shoemaker 1998, p. 70). On this view, the causal relations into which a given property enters cannot possibly be other than they are in the actual world. The causal laws do not change over time in the actual world, and thus there can be no counterfactual variation in type-level causal relations.

The view of possibility Shoemaker presupposes is strikingly implausible. In the actual world, no human can live for ten thousand years—there is an intraworld constraint on lifespan following from the laws of nature. Why should this entail that it is metaphysically impossible for a human to live ten thousand years? The branching approach to possibility is, as Shoemaker points out, "a general feature of our thought about possibility" (*ibid.* p. 69), but it is far from a hard-and-fast constraint on metaphysical possibility. Notice that my example of an extended human lifespan involves a temporal deformation of the actual state of affairs, in keeping with our general tendency, noted by Shoemaker, to consider possibilities as alterations to the actual world. I have, however, exercised this tendency in a more liberal manner than Shoemaker's constraint permits, for the procedure I have followed admits the stretching, extending, and altering of causal relations between properties. Imagine a body with a given mass having a slightly different effect than it actually has on the gravitational field; now imagine the effect changing a little bit more along the same dimension, now a little bit more. This process leads quickly to the imagining of a world where the property of having some particular mass enters into quite different causal relations from those it enters into in the actual world. Shoemaker might well reject the imaginative process to which I have

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<sup>18</sup> And note that Shoemaker clearly intends to offer a distinct argument for a distinct thesis. After stating his argument for the individuation thesis, he contrasts the issue addressed by that argument with the issue of essentialism, which he acknowledges he has yet to address directly. Then, after a few pages' digression, Shoemaker opens a new section by announcing his intention to argue for the essentialist thesis, "But now I must address the question of why we should think that the causal features of properties are essential to them" (1998, p. 68). He then proceeds to give the argument I discuss in the present section of the main text.

appealed, either claiming that I am mistaken in my description of what I imagine or denying that such a description, even if accurate, guarantees the possibility of what has been imagined. A number of Shoemaker's remarks suggest such responses (1980a, pp. 230–31, 1998, pp. 60, 72), and partly for this reason they will be our focus in Section IV.

#### IV. *A Posteriori* Necessity and the Burden of Proof

The debate over CTP's essentialist thesis (and related views<sup>19</sup>) turns partly on questions about the burden of proof. It is a commonly felt intuition that various properties could have been causally related differently from the way in which they actually are related: *gravitational force* and *mass* are, in fact, related in a particular way, but they could have been related differently. This kind of intuition weighs heavily against CTP's essentialist thesis and as a result, places the burden of argument squarely on the advocates of CTP; and, as remarked above, the intuition also counts against the view of possibility to which Shoemaker appeals in his argument for the essentialist thesis.

The situation for CTP appears worse when we take CTP as it is typically intended, as a theory of properties in general. As a theory of *what it is to be* a property, CTP runs up against the very strong, general intuition that it is possible that there be properties contingently causally related. If all possible properties (of the sort that enter into any causal relations at all—for this qualification, see Shoemaker 1998, p. 65) enter into their causal relations essentially, then it is not even *possible* that there be two properties contingently causally related. Thus, CTP asks us to swallow a large and bitter metaphysical pill without much motivation.

In response to worries of the kinds bruited above, defenders of CTP and their allies offer a disarming riposte, arguing that our ability to imagine alterations in causal relations proves nothing about their modal status: the causal laws might be necessary truths discovered *a posteriori* (Bird 2004, pp. 273–75; Ellis 1999, pp. 30–31; Shoemaker 1980a, pp. 223, 230–31, 1998, p. 60; Swoyer 1982, p. 210). Partly on the strength of this rejoinder, CTP's proponents can swallow said bitter pill, embracing the application of the essentialist thesis to all possible properties (cf. Bird, 2004). Kripke has shown that our modal intuitions are sometimes unreliable, in particular, that we are sometimes mistaken in what we take to be

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<sup>19</sup> I have in mind dispositional essentialism (Ellis and Lierse 1994) and necessitarianism about natural laws (Bird 2001, 2004; Fales 1993; Swoyer 1982); as they are typically understood, these views entail CTP's essentialist thesis, at least in a limited form that applies only to dispositional properties or only to some subset of the causal relations into which properties enter.

contingent; so things are in respect of the contingency intuitions taken above to count against CTP—or so CTP's defenders can maintain.

This would be to invoke Kripke's results too quickly. Appealing to *a posteriori* necessity is effective only if accompanied by a plausible explanation of the error, i.e., of why it seems so obvious that *some properties or other* could be contingently related even though, in fact, none could be. "Hesperus is Phosphorous" seems contingent, but it is necessary all the same. Philosophers endorse Kripke's analysis of this case and others like it, partly because his examples involve unequivocal intuitions about naming. 'Hesperus' names *that very object* (and we imagine pointing to a single thing); likewise for 'Phosphorous.' Add to this the uncontroversial nature of identity (from which it follows that that very object could not have failed to be itself), and one has a clear case of necessity (cf. Schaffer 2005). Furthermore, given that the example is grounded in widely known historical facts, it is especially easy to see the epistemic confusion, i.e., to see how people could have taken something necessarily true to be false and could have found a necessary truth informative. Kripke's cases teach us an abstract philosophical lesson: some claims express seemingly contingent, *a posteriori* necessities. Nevertheless, in debates such as the present one, the abstract possibility alone—that any claim that appears to express a contingent truth might in fact express an *a posteriori* necessity—carries little argumentative weight. Further arguments are required, of the sort Kripke gives regarding identity claims, to show that the mistake in question is at all likely to have been made.

Can the defender of CTP produce a rich and convincing example of the sort Kripke gives concerning identities? Perhaps the clearest kind of example would be a case where, in fact, people thought at one point in history that a property could enter into different causal relations from those it actually does enter into, then, by empirical investigation, discovered that they were *necessarily* wrong—that the property in question could not possibly have entered into those causal relations, because others that it necessarily enters into preclude the causal relation people had thought could or did hold. This is a tall order. Recently, however, Alexander Bird has offered (2001) and defended (2002) an example that comes close to fitting the bill. Bird claims that a law commonly thought to be contingent—that salt dissolves in water—is, in fact, necessarily true: it is revealed by empirical investigation that in every world in which salt and water exist, salt dissolves in water. The argument has a neat structure. The existence of salt and water entails at least one law governing the bonding of the molecules that constitute salt and water. Yet, although there is a range of possible laws that would do the trick, the holding of any one of them ensures

that salt dissolves in water; for any law that effects the proper sort of bonding also effects dissolving.

This argument can be easily adapted to the present discussion, with Bird's talk of the necessity of laws translated into talk about properties entering into causal relations essentially. Bird himself claims that his argument can be applied to properties as well as substances (2001, p. 273; 2002, p. 261). Furthermore, the standard relation between necessity and essentialism holds. If it is necessary that salt dissolve in water, then there is no possible world in which salt does not have the characteristic of dissolving in water; thus, something cannot be salt without being so related to water; thus, it is essential to salt that it dissolve in water.

How does Bird's example hold up?<sup>20</sup> I will argue that it begs the question, for a general reason that harks back to the earlier discussion of constitution, essential properties, and causal relations. First, though, I should say something about the dialectic. Helen Beebe (2002) and Stathis Psillos (2002) offer potent criticisms of Bird's particular example involving salt and water, to which Bird responds partly by offering a different example involving atoms' spectral emissions (2002, p. 260). In some sense, the discussion should play out at this level. I have demanded an example where what was an apparently contingent type-level causal relation turned out, after empirical investigation, to be necessarily true. This is required if the Kripke-style defense of CTP's essentialist thesis and related necessitarian views is to carry any significant weight. Bird offers such an example, in fact two. In addition, however, he offers a general plausibility argument that promises to do much the same work as a specific example would do. Even as Bird backs off a bit in response to critics, at least with regard to the examples at issue (e.g., 2002, p. 265), he emphasizes the general plausibility of the pattern of relations proposed to hold in his specific examples: the down-and-up structure (2002, p. 258) (more on which presently). My strategy, then, is to point out the fundamental problem with Bird's general pattern of reasoning, with discussion of his specific examples playing a primarily illustrative role.

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<sup>20</sup> Note that, even if sound, Bird's argument does not prove the essentialist thesis; Bird's argument concludes only that some properties enter into some of their causal relations necessarily, not that none enter into any of their causal relations contingently. Nevertheless, were it successful, the argument would do appreciable work in the present context. It would partly undermine our confidence in the intuition that causal relations can hold contingently, by showing that some of our specific intuitions regarding the contingency of causal relations turn out to be erroneous (cf. Bird 2001, p. 267). This would impugn intuitions of contingency among causal relations in a way that the mere possibility of error—which Kripke makes us aware of via his examples involving identity—does not.

In some cases, the existence of a particular substance necessitates that a lower-level law (or one of a related family of laws) holds, so as to allow the formation of the essential structure of that substance; this is Bird's downward entailment. The natural world, however, exhibits a high degree of interdependence among properties: typically, a law of nature manifests itself in many ways. Thus, it is plausible that, in at least some cases, the same law required for the formation of a substance entails further causal relations involving that substance; this is Bird's upward entailment. The downward and upward entailments together constitute the down-and-up structure; when that structure is present, it entails that a substance enters into at least some of its causal relations necessarily—and thus that those relations are essential to the substance in question.

Bird argues that the down-and-up structure holds in the case of salt's dissolving in water. The existence of salt entails Coulomb's Law (or some law very much like it); but the holding of Coulomb's law (or any law sufficiently similar to it to allow the formation of salt) secures the electrical phenomena that cause salt to dissolve in water. We should wonder, though, whether the upward entailment in fact holds. Bird correctly observes that salt is not simply sodium and chloride ions floating in each other's vicinity; it is sodium and chloride held together by an ionic bond. Bird takes this to be a lesson learned from Kripke: "the identity of a substance depends not only on what it is made of but also on how it is made" (2002, p. 260; see also 2001, p. 270). This insight drives Bird's argument, for the nature of the ionic bond grounds the upward entailment. According to Bird (2001, p. 270), if a substance does not behave in the way that one would expect an ionically bonded substance to behave in the actual world, then the components of that substance are not ionically bonded. In all possible worlds in which salt exists, then, the ionic bond will break under roughly the electrostatic conditions in which it does in the actual world, else that bond would not constitute an ionic bond (or anything acceptably similar), and the substance so bonded would not be salt.

To be sure, there is some lesson to be learned here from Kripke, but the lesson pulls in a different direction. 'Ionic bond' is a natural kind term, like 'salt' and 'water,' and is subject to the same externalist, Kripkean semantics as other natural kind and property terms. (Ionic bonding might be a natural *relation* rather than a substance, but that does not warrant a distinct semantics.) Thus, Bird should not help himself to the view that an "ionic bond is, by definition, a bond that exists in virtue of the electrostatic attraction between ions" (2001, p. 270); if he wishes to maintain that view, he must come to grips with the status of 'electrostatic attraction' as a natural kind

term, and offer a nondescriptivist account of the fixation of its reference—and so on if ‘electrostatic attraction’ is taken to be governed by a descriptivist semantics, until he reaches component terms that behave as natural kind or property terms. In a completed physics, some of these primitive terms would refer to fundamental particles and forces, the identity of which cannot, as such, be rooted in their constituents, and the counterfactual reference to which cannot be determined by their constitution. To assume that either their identity or that of, say, ionic bonding consists in its entering into a certain range of causal relations would, however, beg the question in favor of a strong modal thesis—one running counter to the contingentist intuitions Bird aims to undermine.

Here Bird faces a dilemma. If ‘ionic bond’ gets hold of a simple relation, then unless one assumes that simple relations enter into their causal relations essentially, it remains an open question whether any of the causal relations into which the ionic bond enters in the actual world are essential to the ionic bond—i.e., it remains an open question how ionically bonded substances will behave in nonactual possible worlds. If ‘ionic bond’ refers to a complex relation, then, although that relation might have necessary constituents, and those necessary constituents might themselves have necessary constituents, the ionic bond ultimately has fundamental constituents (electromagnetic force, perhaps) that, in other possible worlds, might or might not behave in the way they do in the actual world.<sup>21</sup> In consequence, those fundamental constituents might or might not ground the sorts of behavior we observe in ionically bonded substances in this world. Thus, to insist that ionically bonded substances must behave a certain way in nonactual possible worlds is to presuppose CTP’s essentialist thesis as applied to fundamental relations: it is to presuppose a modal claim running contrary to common intuitions about contingency.

Bird emphasizes the role of scientific investigation in the discovery of necessary laws (e.g., 2002, p. 265), but empirical investigation lacks the modal implications Bird attributes to it. Empirical investigation can tell us that salt is made of sodium and chloride ions held together by an ionic

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<sup>21</sup> Compare Bird’s response to Beebe, in which he offers the choice between thinking of properties in a dispositional manner (in which case it immediately follows that some laws are necessary) or a categoricist manner (in which case down-and-up reasoning can be applied) (Bird 2002, p. 261). This cannot, however, be the range of options in the cases of fundamental properties and relations; they have no categorical basis, as this is normally understood, because they have no constituents. At the fundamental level, the alternatives to dispositional properties and relations are simple properties and relations—‘quiddities,’ as they are sometimes called. This being allowed, the possibility arises that the same simple property or relation can enter into different causal relations in other possible worlds.



bond, but it cannot tell us what causal relations those things, including the ionic bond itself, enter into in other possible worlds. This constitutes a general problem for Bird's argument, regardless of the example used. No matter what force is found to be necessary as part of the downward entailment, nothing but a strong essentialist or necessitarian claim can underwrite its (or its fundamental constituents') upward effects.<sup>22</sup> The subatomic forces found in our world may be necessary constituents of the subatomic particles themselves; but nothing guarantees that those forces will enter into the same causal relations (causing emission of light in the same way, for example—see Bird 2002, pp. 259–60) in other possible worlds.

Strong intuitions of contingency run counter to CTP's essentialist thesis, as well as to the view of possibility Shoemaker invokes in support of the essentialist thesis. These intuitions of contingency also speak against dispositional essentialism and necessitarian views of causal laws. The preceding discussion has, I think, undermined the force of the most promising, or at least most commonly pursued, strategy for neutralizing these intuitions of contingency. Perhaps, then, defenders of CTP should hope for a direct argument in favor of a causal understanding of properties.

### V. CTP and Epistemic Access to the Natures of Properties

The view is widely held that, with regard to fundamental properties, a catalogue of causal relations is all science has yielded (Ellis and Lierse 1994, p. 29–32) and, perhaps, is all good science could ever yield (Blackburn 1990; Swoyer 1982, p. 214; Molnar 1999, pp. 13–14). This observation is sometimes wrought into an argument for CTP or for a closely related thesis.

Consider the central line of reasoning in Simon Blackburn's article "Filling in Space" (1990). Blackburn claims:

A region with charge is very different from a region without: perhaps different enough to explain all we could ever know about nature. It

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<sup>22</sup> Similar remarks apply to the position advocated by Alice Drewery (2005) in her recent criticism of Bird's argument. Although Drewery's concerns in some ways resemble mine, Drewery, like Bird, takes the resolution of this issue to depend on empirical investigation (*ibid.*, pp. 391–94), in particular, into the values of fundamental constants. Here I disagree. On Drewery's view, physicists might discover that the value of a fundamental constant could not possibly differ and at the same time allow for the existence of a given type of particle, thus deciding matters in Bird's favor; this, however, counts as an empirical resolution *only if we presuppose that entering into certain causal relations—those proscribed by our hypothetical change in the value of a fundamental constant—are essential to the type of particle in question*. Thus, Drewery's discussion begs the question in favor of the essentialist view.

differs precisely in its dispositions or powers. But science finds only dispositional properties, all the way down. . . . Just as the molecular theory gives us only things with dispositions, so any conceivable improvement in science will give us only a better pattern of dispositions and powers.

That's the way physics works. Is that the way it *has to work*? I believe so. (Blackburn 1990, p. 63, emphasis added)

Regarding categorical bases of causal dispositions, Blackburn adds, "It seems as though we need them, but it now also seems as though we cannot have them—our best physical understanding of the world gives us no conception of what they might be" (1990, p. 65).

Can this view be worked into an argument for CTP? Granted, Blackburn does not explicitly commit himself to an essentialist view of the relation between properties and their causal relations. Nevertheless, to allow a contingent relation would undermine his argument that, in respect of categorical bases of fundamental properties, "we cannot have them." If a fundamental property can come apart from its actual dispositions, then that property itself—whatever is distinct from the real-world dispositions and which could be associated with different dispositions—"will remain, therefore, entirely beyond our ken, a something-we-know-not-what identified only by the powers and dispositions it supports" (1990, p. 64). Blackburn rejects this possibility partly on the basis of anti-skeptical arguments similar to Shoemaker's (1980a, p. 215) and partly on the basis of a regress argument.<sup>23</sup> In the end,

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<sup>23</sup> This is not to say that I concur with Blackburn's worries about the threat of skepticism. So far as I can tell, these concerns are overblown (see Swinburne 1980, Schaffer 2005). Parts of the present essay might be considered an antidote to such worries in their semantic form, the idea being that if CTP's individuation thesis were not true of properties, we could not refer to properties (or could not know whether we are referring to properties—this is one way to interpret Shoemaker's "epistemological" characterization of his argument for CTP's individuation thesis). We should not be moved by Blackburn's regress argument either. Blackburn's worry can be put thusly: if a given property is only contingently related to its actual-world effects, this must somehow be explained or grounded in some other categorical property, one that makes the relation hold between the first categorical property and its effects; that further relation must, however, be grounded in some other categorical property or relation, and so on (Blackburn 1990, p. 64). Why not think, though, that effects are nothing more than the instantiation of further categorical properties (that our talk of dispositions is at heart only talk about the instantiation of categorical properties, including the categorical properties instantiated by our cognitive and perceptual processes)? Understood in this way, if causal laws are contingent relations between categorical properties, there is no need for a separate account of how the categorical properties are related to something called a 'disposition.' One can stop the regress simply by refusing to reify dispositions, i.e., by refusing to treat dispositions as distinct entities whose relations to their categorical grounds must be explained.

Blackburn is left with the view stated at the outset: at its best, science can offer only a causal-dispositional account of the nature of fundamental properties; and via additional philosophical arguments, Blackburn concludes that these scientific deliverances should be taken to capture the nature of those properties (modulo Blackburn's tentative, closing remarks about neutral monism).

Thus, Blackburn endorses something very much like CTP—applied to fundamental properties, anyway—on the basis of the following sort of argument. Call this argument 'CCP,' for 'causal conception of properties:'

*Premise 1.* We understand fundamental properties solely in terms of the specific type-level causal relations into which they enter.

*Premise 2.* If this is the only way (or the best way) we understand fundamental properties, then it captures their metaphysical natures (i.e., if *Premise 1* is true, then to enter into a particular set of type-level causal relations is simply what it is to be a given fundamental property).<sup>24</sup>

*Conclusion.* The nature of fundamental properties is such that entering into a particular set of type-level causal relations is simply what it is to be a given fundamental property.

Given what it is for something to have a nature, CTP, now limited to fundamental properties, follows briskly from CCP's conclusion.<sup>25</sup> If one supplements CCP with a pair of plausible theses, familiar from earlier discussion, CCP yields a full-blown CTP. The supplementary theses I have in mind are (a) that the causal relations into which a nonfundamental property enters are determined by the causal relations into

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<sup>24</sup> The point here is *not* that any genuine property must have some effects or other. Many philosophers who accept this metaphysical criterion for property-hood reject CTP's essentialist thesis and any other thesis that renders necessary the causal relations into which a property enters. For example, Armstrong—perhaps CTP's most prominent detractor (1999)—appeals, in a variety of contexts, to what has come to be known as the Eleatic Principle, which applies to properties as much as anything else: "Everything that exists makes a difference to the causal powers of something" (1997, p. 41); Kim (1998, p. 119) has recently endorsed a similar principle, which he elsewhere calls 'Alexander's dictum' (e.g., Kim 1993, p. 348). Such principles are too weak to play the role of *Premise 2* in CCP.

<sup>25</sup> As the individuation thesis arguably does. I will focus on the essentialist thesis, though, for it is in these terms that CCP's shortcomings can be best explained. Given that CCP fails to establish its conclusion, that conclusion cannot be used to support CTP's essentialist *or* its individuation thesis.

which its fundamental components enter and (b) that the fundamental properties composing a nonfundamental property—i.e., the ones determinative of the causal relations into which the nonfundamental property enters—are essential to it.

Concerning the evaluation of CCP, note first that natural scientists often treat various relations between properties as contingent, at least when theorizing and designing experiments. Furthermore, scientists' term-grounding intentions are equally consistent with various conflicting future beliefs about the causal relations into which the kinds so named enter. Those who ground scientific terms do not mean to tie permanently the properties or kinds so named to any particular effects (although cases where descriptions are used explicitly to define theoretical terms might constitute exceptions—see note 12). If scientists were to have such intentions, new terms would be coined and old ones abandoned much more frequently than is actually observed. Instead, when members of the scientific community fix the reference of a scientific term, their intentions often include descriptions that are later abandoned without a change in terminology (cf. Stanford and Kitcher's [2000, pp. 115–20] discussion of 'acid'). This hardly shows that CCP's *Premise 1* is false, but it does begin to reveal problems with CCP's *Premise 2*. It is true that we have no way of interacting with or usefully describing properties except in terms of their causal relations, but this fact sits side by side with a conception of properties that does not rigidly tie particular properties to any particular effects. Thus, the sense in which CCP's *Premise 1* is true undermines CCP's *Premise 2*. On a correct reading, *Premise 1* asserts that, for any given property, at any given time at which we understand it, we do so in terms of some particular causal relations or other (perhaps different and mutually exclusive ones at different times). This, however, calls CCP's *Premise 2* into question. Standard scientific methodology rests on the general assumption that it is possible that properties be contingently related, for science often progresses by the consideration of various ways in which a given range of properties might be causally related. This method rarely (never?) eventuates in unequivocal assertions of the necessary truth of its results. Thus, we should reject CCP's *Premise 2*.

The advocate of CTP might insist that contingency assumptions, as well as our general willingness to change causal characterizations of individual properties, are useful but ultimately misleading—they reveal only epistemic possibilities, as it is sometimes said. When scientists are in a state of substantial ignorance, it is good epistemic practice for them to consider a wide range of apparent possibilities; all the same, the subject matter of which they are at that point ignorant *might* comprise a body of necessary truths.

In response, I grant that CTP's essentialist thesis is *consistent* with scientific methodology while holding that mere consistency makes little dialectical difference. We appear to think of properties as being contingently related to the causal relations into which they enter. That it is logically possible for those appearances to be misleading is not germane. The question at hand concerns the burden of proof, and the point about consistency does nothing to shift that burden away from the advocate of CTP.

Perhaps, though, *Premise 2* derives its plausibility from the *end result* of the scientific enterprise, not the manner of approach. About well-understood properties, physicists say such things as "electrons have negative charge—that's part of what it is to be an electron." This, however, offers the defender of CTP no better than a wash. The pressing question is how to interpret "what it is to be" in such claims, what modal gloss to give it. Does the working scientist mean "what it necessarily is to be," "what it is in this world to be," or "what it is, in this world and ones nomically like it, to be?" There is nothing in standard scientific discourse to decide this matter, and reasonably so: scientists are interested in finding out the way the world is, and thus their discourse regarding the modal nature of properties they investigate need be no more determinate than this empirical enterprise requires.

The defender of CCP gets no better result by considering the equations used to characterize natural properties. Such equations assert precise functional dependences holding among various quantities. We should not, however, conflate those laws' mathematical form with the necessary truth of mathematical axioms and theorems. The use of analytical tools allows us to characterize properties' causal relations in a precise way, but it does not entail the necessary truth of those characterizations. Questions about the proper modal gloss of the equations arise here, just as similar questions arose above: Do precise mathematical characterizations of properties' causal relations express essential characteristics of these properties, merely their actual causal relations, or something else? Again, nothing in scientific discourse resolves the dispute. And insofar as scientists themselves be queried, one should wonder which intuition will have stronger pull in the minds of scientists: the intuition that the equations in question express the very essence of the properties being investigated (where the philosopher's notion of an essence is made clear to the scientists) or the intuition that it is possible for there to be contingently related properties. If the result is either a stalemate or a pattern of responses that deems the latter intuition less negotiable, the appeal to the end results of scientific theorizing makes no headway in defense of CTP.

A further difference between the present case and the case of identity renders CCP's *Premise 2* even less attractive. Identity, of the sort at issue, is a formal notion, whereas *being a property* is, plausibly, a natural kind or property. As a result, the referent of 'property' is determined in accordance with CTR, unlike in the case of 'identity.' Terms of which CTR is true can, and often do, get attached to their extensions without our having a complete and accurate conception of those extensions. If *being a property* is a natural property (i.e., part of the causal order of the universe), then our going conception of properties might well turn out to be wrong, even though, all along, '... is a property' has applied to all and only the properties. It might be that, in keeping with CCP's *Premise 1*, we conceive of properties only in terms of their causal relations yet still have an incomplete or erroneous conception of *property-hood*. In consequence, when drawing inferences from our conception of properties (as, for example, one does in endorsing CCP's *Premise 2*), we should take our intuitions with a grain of salt, in the same way Kripke and Putnam show that our intuitions regarding the nature of other natural kinds and properties must be taken with a grain of salt.<sup>26</sup>

There is a sense, then, in which the appeal only to bare possibilities of error—also relevant in Section IV—ends in stalemate. Many philosophers conceive of properties as being of the sort of thing at least some of which could be contingently related, but as Kripke has shown, that conception could be mistaken. Point CTP. The defenders of various essentialist theses conceive of at least some properties as being of the sort of thing that is necessarily wedded to its particular type-level causal relations, but the history of mistaken claims about necessity shows that that conception of properties could be mistaken. Point CTP's detractors. Moreover, insofar as we are willing to take bare possibilities seriously, it is possible that both views are false, and necessarily false; it could be that 'property' is like 'unicorn,' its extension empty and necessarily so (Kripke 1980, p. 157)!<sup>27</sup>

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<sup>26</sup> Such a position might seem to give rise to unacceptable skeptical results (cf. Wittmer and Sarnecki's (1998) discussion of problems that might arise from treating 'natural kind' as a natural kind term). Schaffer (2005) puts this kind of skeptical concern in healthy perspective, though, showing that it is a version of skepticism about the external world and that it can be handled accordingly.

<sup>27</sup> Note also how difficult it is for psychological speculation to decide among the various possibilities of error. On the one hand, Armstrong (1997, p. 82) has offered a plausible psychological explanation of why we might reify dispositions, and this could easily be extended to account for illusory modal aspects of our thinking about properties (e.g., the thought that they are necessarily related to their effects). On the other hand, Bird (2004, pp. 273–75) has offered an equally plausible psychological explanation of why we might mistakenly take properties to be contingently related to their effects.

Finally, let us not forget the general concerns attending any argument that moves from a claim of the form “we understand  $x$  only in manner  $m$ ” to a conclusion of the form “being  $m$  is constitutive of being  $x$ .” This style of argument has an unimpressive track-record: we know tables only through their effects, but we should not identify tables with those effects; the phenomenalist attempt to do so fails terribly (cf. Martin 1997, pp. 214–215; Swinburne 1980, pp. 317–318). Granted, Shoemaker (1998, p. 64) stops short of identifying properties with their causal relations, but it is difficult to see how his doing so advances the case for CTP. Once we have allowed some kind of underlying basis to properties, over and above the causal relations into which properties enter, what reason is there to think the two—basis and causal relations—cannot come apart? If we refer to and know about property  $P$  via its relation to effects  $E$ , and we admit that  $P$  and  $E$  are distinct, where is the strength in moving from the observed connection to the corresponding metaphysical claim about the very nature of  $P$ ?<sup>28</sup>

Things have shaped up in this way. Shoemaker’s arguments for CTP’s component theses are not compelling. Furthermore, strong intuitions run against CTP’s essentialist thesis. The standard tactic for defending CTP’s essentialist thesis (as well as related theses) against this intuition-based objection remains unmotivated; although Bird’s argument promises to bolster the appeal to *a posteriori* necessity, his argument begs the question. A further argument for CTP, CCP, rests on an implausible premise. In contrast to the view suggested by CCP’s premises, our empirical reasoning about properties *seems* to proceed on the assumption that properties are contingently related to their causes and effects—or at least that it is possible that some properties or other be. Furthermore, CCP seems mired in an implausible verificationist reduction of properties to their causal relations. In consequence, then, I reject CTP, at least tentatively. It will require much more powerful

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<sup>28</sup> Causal theories of knowledge and representation obtund the temptation to identify  $P$  with  $E$  or to assert any strong logical connection between  $P$  and  $E$ . On the causal view, we represent and have knowledge of  $P$  in virtue of our being part of a pattern of causal relations, a pattern that includes effects that  $P$  and  $E$  have on the human brain or mind. Also, we should not, in general, conflate  $E$  with either  $P$ ’s or  $E$ ’s effects *on us*: of course, in *some* cases, a particular effect of  $P$  is  $P$ ’s direct effect on a human brain or mind, but in many other cases,  $E$  is some change in the mind-independent world—a change that might or might not then affect the human brain or mind. There is little reason to think that the mental properties instantiated as a result of causal interactions with nonmental properties (or, more generally, properties that are instantiated beyond the mind of the subject) must themselves reduplicate the nature of the properties that are known about or represented in virtue of those causal interactions (or in virtue of the more general causal relations that govern these interactions). Insofar as the contrary thought motivates CCP’s *Premise 2*, it is suspect.

considerations than have been offered to date in favor of CTP to overcome the appearance that at least some properties enter into their causal relations contingently.

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