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Rigid Designators and Mind-Brain Identity

A kind of mind-brain identity theory that is immune to recent objections by Kripke (1971 and 1972)[1] is outlined and defended in this paper. For reasons, the details of which will be given later, I have characterized the view as a *nonmaterialist physicalism*. It is nonmaterialist in that it does not attempt to eliminate or in any way deemphasize the importance of the "truly mental." On the contrary, it accords central roles to *consciousness*, "private experience," subjectivity, "raw feels," "what it's like to be something,"[2] thoughts, pains, feelings, emotions, etc., as we live through them in all of their qualitative richness. The theory also claims, however, that all of these genuinely mental entities are also genuinely physical, from which it follows that some genuinely physical entities are genuinely mental. This should occasion no shock, for it is a consequence of any authentic mental-physical identity thesis. Of course, some call themselves identity theorists and, at the same time, deny the existence of the genuinely mental (in my sense); but the result of this is always some kind of physical-physical identity thesis rather than a genuine mental-physical identity claim. One of the main reasons that Kripke's arguments do not hold against this theory is that it incorporates a significant revision of our basic beliefs about the nature of "the physical." The revision, however, is by no means ad hoc. It is virtually forced upon us, quite independently of Kripke's argument—indeed, quite apart from the mind-brain issue—by contemporary physics, physiology, neurophychology, and psychophysiology. It will turn out that Kripke's arguments *do* reveal, in a novel and cogent manner, the inadequacies of materialism. At the same time they provide valuable considerations that can be used to bolster the case for nonmaterialist physicalism.

Note: This research was supported in part by the National Science Foundation and the Minnesota Center for Philosophy of Science of the University of Minnesota.

All of this will become more clear later, I hope, when more detail is given. But, even at this point, perhaps I should attempt a crude and somewhat inaccurate characterization of "the physical." *The physical* is, very roughly, the subject matter of physics. By 'subject matter' I mean *not* the *theories*, *laws*, *principles*, etc., of physics, but rather what the theories and laws are about. *The physical* thus includes tables, stars, human bodies and brains, and whatever the constituents of these may be. The crucial contention is that contemporary science gives us good reason to suppose that these constituents are quite different from what common sense *and* traditional materialism believe them to be. While "the dematerialization of matter" has perhaps been overplayed in some quarters, its advocates do make an important point (see, e.g., Hanson, 1962 and Feigl, 1962); and this point is crucial for the mind-body problem. A nonmaterialist physicalism is one that rejects those erroneous prescientific beliefs about physical entities that I shall argue are endemic to common sense and are carried over, to a great extent, into traditional *and* contemporary materialism. The elimination of these beliefs clears the way for a mind-brain identity theory that avoids the antimentalist reductionism of materialism, behaviorism, and similar views. (No contempt of common sense is involved here at all. Science, at best, is modified and improved common sense. Often the improvement is minimal; but, if it is genuine, surely it ought to be preferred to the unimproved version.)

Before considering Kripke's argument against mind-brain identity, I should remark that I am assuming that his ("quasi-technical") system of "rigid designation," "reference-fixing," etc., is a viable system. This is not to assume that it provides, necessarily, an account that is in perfect accord with our customary modes of conceptualization, inference, ascription of necessity, etc. Kripke, I think, intends and believes that it does, but many disagree. This explains, no doubt, why they feel that some of his conclusions are wrong or at best highly counterintuitive or based on eccentric terminology. Be this as it may, I believe that his terminology is clear and consistent and that his system provides, if not an "analysis," at least a tenable alternative "reconstruction" of conceptualization, reasoning, etc., both in everyday and in scientific contexts. (I am *not* so sure about his *essentialism*. However, for the sake of argument—

that is, for the purpose of defending the identity thesis against his objections—I shall accept his essentialism insofar as I am able to understand it.)

Let me now introduce the elements of Kripke's system that are needed for the argument in question. A *rigid designator* is a symbol the referent of which remains the same in our discourse about all possible worlds *provided two conditions obtain*. The first is the rather trivial one that the language must remain the same. Obviously if we change the meaning or the conventional (*or* stipulated) use of a term, its referent will not necessarily remain constant. The second condition is that the referent exist in the possible world in question, and this condition will, of course, fail to obtain in many possible worlds. Another way of stating the matter is to say that the referent of a rigid designator either remains constant or becomes null as our discourse ranges over different possible worlds. Proper names are, for Kripke, paradigm examples of rigid designators. As long as the term 'Richard Nixon' has its standard and established role in our language, it refers to the same entity, namely Nixon, no matter what possible world we may be talking about, *unless*, of course, we happen to be talking about a possible world in which Nixon does not exist. (Instead of using the "possible worlds" terminology, we could say that a rigid designator has the same referent in every occurrence no matter whether the statement in which it occurs is about an actual or a counterfactual state of affairs.) The most common instances of nonrigid or "accidental" designators are descriptive phrases. To use an example of Kripke, the phrase 'the inventor of bifocals' refers to Benjamin Franklin; but obviously the phrase is not a rigid designator. There are many possible worlds in which bifocals were invented by someone else—or we can easily imagine counterfactual situations such that bifocals were invented, say, by Thomas Paine. In discourse about the latter situation the referent of the phrase 'the inventor of bifocals' would be Thomas Paine instead of Benjamin Franklin.

We come now to a crucial juncture in Kripke's system. In attempting to make it as clear as possible, I shall use an example of different from and somewhat simpler than those employed by Kripke. Suppose we are convinced that one and only one man invented the incandescent electric light bulb but that we do not know who he was.

Nevertheless, suppose that we stipulate that the term 'Oscar' is to be used to *rigidly designate* this so far unidentified inventor. What does this mean? It means that 'Oscar' always refers to the man who invented, as a contingent matter of fact in this the actual world, the incandescent bulb. And this referential relation holds whether or not our discourse is about the actual world or about other possible worlds—whether it is about actual or counterfactual states of affairs. There are, of course, many possible worlds in which Oscar did not invent the bulb, worlds in which someone else invented it or in which it was not invented at all. This is just to say that there are possible worlds in which the bulb was not invented by the man who actually did invent it (in this, the actual world—to be redundant). Nevertheless, in our discourse about these worlds 'Oscar' still refers to the same man—the man who invented the bulb in this, the actual world.

It is evident that 'Oscar' is *not* being used as an abbreviation of the descriptive phrase 'the inventor of the incandescent electric light bulb.' The referent of the descriptive phrase changes, being dependent on which possible world (or set of possible worlds) our discourse is about, whereas we have made the referent of 'Oscar' constant (or null) by stipulation.[3] The stipulation alone, however, is *not sufficient* to *fix the reference* of 'Oscar.' The crucial point, alluded to above, may now be put as follows: There is, on the one hand, the *stipulation* that the referent of 'Oscar' is always to be the the man who invented, in this, the actual world, the incandescent electric light bulb. On the other hand, there is *the* (*contingent*) *fact* that one specific man did invent it. This stipulation *plus* this contingent fact *fixes* or *picks out* this specific man as the referent of 'Oscar.'[4] This emphasis on the crucial role of contingent facts in *fixing the reference* of terms in the language is perhaps the most striking aspect of Kripke's system.

Whether Kripke would endorse the following explication of this mode of reference-fixing, I do not know. I have found it helpful in organizing my thinking about the matter. Instead of issuing stipulations in a metalanguage about the referent of 'Oscar,' we can use instead a *reference-fixing postulate* stated in the object language (analogous to Carnapian "meaning postulates." See, e.g., Carnap, 1952, and Maxwell, 1961). The postulate would be something like:

> If one and only one person invented the incandescent electric light bulb, then that person was Oscar.

or:

> $(\exists x)\ [Ixb \cdot (y)\ (Iyb \supset x = y)] \supset [Iob \cdot (y)\ (Iyb \supset o = y)]$
> where '*Ixb*' stands for '*x* invented the incandescent electric light bulb' and '*o*' stands for 'Oscar.'

The "postulate" fixes the *reference* of 'Oscar' (or '*o*'), but, in contrast to a Carnapian "meaning postulate," it is not intended to fix a *connotation* or a *sense* of the term(s) in question.

This procedure can be generalized in an interesting manner. Let 'T' stand for any conjuction of sentences that expresses the content of a given scientific theory, and let 'R_T' stand for the *Ramsey sentence* of the theory. ('R_T' is formed from 'T' by replacing each theoretical term of the theory with an existentially quantified variable of appropriate logical type.) Carnap (1957) proposed that the expression '$R_T \supset$ T' be taken as a meaning postualte, fixing the meanings of the theoretical terms of the theory (assuming—correctly, I believe—that 'R_T' expresses the contingent or the factual content of the theory). It is considerably better, I believe, to take '$R_T \supset$ T' as a *reference-fixing postulate* for the theoretical terms. Prima facie, the difference may seem subtle and minimal, but I am convinced that it has important implications for our understanding of the structure of scientific theories, and indeed, of the nature of most of our knowledge. Explanation of the details of these matters, however, belongs to another project.

Before proceeding to the mind-brain identity thesis, it will be helpful to continue examination of the "Oscar" example in order to understand better Kripke's views about identity in general. Suppose that, after fixing the referent of 'Oscar' as we did above, we make the (contingent) discovery that Thomas A. Edison invented the incandescent electric light bulb. It follows, obviously, that Oscar and Edison are identical—that "they" are one and the same person. It also follows, given the Kripkean system, that Edison and Oscar are *necessarily* identical. This follows simply because both 'Oscar' and 'Thomas A. Edison' are rigid designators. This means that 'Oscar' *always* refers to the same man and that, of course, the

referent of 'Thomas A. Edison' *always* remains constant, whether our discourse is about the actual world (or about actual situations) or about any other possible world or any counterfactual situation. It follows that, if Edison and Oscar are identical in any possible world (including the actual world, of course), then "they" are identical in all possible worlds (in all actual and counterfactual situations). Therefore, "They" are *necessarily* identical, since something holds *necessarily* if and only if it holds in all possible worlds—in all actual and counterfactual situations.

It may seem highly counterintuitive to claim that it is *necessarily true* that Oscar is Thomas A. Edison. Knowledge that Oscar is Thomas A. Edison *seems* to be genuine contingent knowledge. Kripke provides an explanation of the existence of such "illusions of contingency." Although knowledge that Oscar is Edison is knowledge of a necessary truth, *we come to know* it by means of what he calls a "contingent associated discovery." In this case, the contingent associated discovery is the discovery that Edison invented the incandescent bulb (and nobody else did). This discovery plus our stipulation that 'Oscar' rigidly designates the inventor of the bulb entails that Oscar and Edison are necessarily identical.

It is helpful, I believe, to expand somewhat this explanation. Let us say that the reference-fixing stipulation (plus the contingent fact that one and only one person invented the bulb) *fixed the referent* of 'Oscar' *ontologically*. At that point, however, we did not know (so the example supposes) *who* the referent *was* or, let us put it, the referent was not *epistemically determined*. When we discover, subsequently, that Edison invented the bulb, we discover what (who) the referent of 'Oscar' is; i.e., the discovery that Edison invented the bulb *epistemically determines* the referent of 'Oscar.' (More accurately, the discovery plus the ontological reference-fixing postulate produces the epistemic determination.) The status of the statement, 'Oscar is identical with Thomas A. Edison,' may now be explained as follows. Although the statement is *necessarily* true, it *conveys*, but *does not assert*, the *contingent* information that 'Oscar' (rigidly) designates Thomas A. Edison, which is tantamount to conveying the contingent information that Edison invented the bulb (given our reference-fixing postulate to the effect that Oscar invented the bulb). What, then, does the statement, 'Oscar is identical

with Thomas A. Edison,' *assert*? Given the apparatus we are employing, we must say, I believe, that it asserts that the man in question, call him 'Oscar' or 'Edison,' or 'the man who invented the bulb'—*that this man is identical with himself.* Small wonder that it is necessarily true!

This result, if I am correct and it *is* a result, of the Kripkean system might seem to signal a serious defect or at best to trivialize Kripke's treatment of identity. Trivial or not, I do not believe that it indicates a defect. On the contrary, it emphasizes the crucial point that *every identity is an identity of something with itself* (in the sense of 'identity' that is the concern of this paper—the sense that is relevant for mind-brain identity). As Kripke notes, identity is that relation that holds *always and only* between an entity and itself. So all identities are self-identities; and, since all self-identities hold necessarily, it follows that all identities are necessary identities.

This is a good point at which to give a somewhat truncated but forceful sketch of Kripke's argument against the mind-brain identity thesis. The sketch follows:

(1) There seems to be *no way* for a brain state (or brain event) to be *necessarily* identical with a mental state (or a mental event). So, (1′) if mind-brain identities exist, they are contingent identities. But (as we have seen above) (2) there *are no* contingent identities. Therefore, there are no mind-brain identities.

Obviously the argument is valid; if we are to reject the conclusion, we must reject at least one premise. Many—probably most—mind-brain identity theorists accept the first premise. Indeed, they emphasize and insist that mental-physical identities are contingent identities. They then proceed, either explicitly or tacitly, to reject premise (2). Needless to say, I accept (2) and shall argue that (1) and therefore (1′) are false.

Kripke emphasizes that this is just what the identity theorist *must* do if he is to retain any hope of rejecting the argument's conclusion. He then argues at some length that the first premise seems quite invulnerable. I shall argue that the first premise is false.

Kripke notes and indeed emphasizes that his apparatus provides what might seem to offer an escape route for the identity theorist, and we have already touched upon the matter earlier. If we could show that the apparent truth of premise (1) is due entirely to an *illusion of contingency*, we would have produced conclusive grounds

for rejecting the premise. In order to do this we would need to indicate how there could be a *contingent associated fact* that is responsible for this "illusion of contingency." Kripke argues that the existence of such a fact seems out of the question. Before examining these arguments, it will be helpful to continue our discussion of identity and necessity.

It was contended above that 'Oscar is Edison' *conveyed*, although it did *not assert*, the contingent information that 'Oscar' designates Edison, which, in conjunction with the reference-fixing postulate for 'Oscar,' entails that Edison invented the bulb. Coming from the opposite direction, it was our contingent discovery that Edison invented the bulb that informed us that 'Oscar' designates (rigidly) Edison, i.e., this discovery *epistemically determined* the referent of 'Oscar.' And this, in turn, gives us the a posteriori (!) knowledge of the necessary truth that Edison and Oscar are one and the same man. The aura of mystery or paradox about a posteriori necessity disappears when we recognize that we have rigged our language so that the reference of 'Oscar' depends on a contingent fact and, moreover, that it remains epistemically undermined until we discover what that contingent fact is. The necessity of Oscar's being Edison should present no mystery. It derives entirely from the nature or the function of the language used plus the necessary truth that everything is identical with itself. We do not *fully* understand the complete function of the term 'Oscar' until we discover the contingent fact which, by virtue of our own stipulation, fixes its reference. This is how we come to know, a posteriori, that 'Oscar is Edison' expresses a truth and, indeed, a necessary one.

Frege is faulted, correctly, by Kripke for suggesting that identity should be construed as a relation holding between linguistic symbols rather than as a relation holding between objects (or between an object and itself). However, I believe that there is a valid insight behind Frege's mistake. Identity statements often *convey*, even though they do not *assert*, information about the referents of some of the symbols used. This information, in turn, when conjoined with (either tacit or explicit) knowledge about our conventional linguistic usage yields whatever contingent, nonlinguistic information that the identity statement provides. The valid insight, then, is that the unasserted but conveyed *contingent* information about the symbols

used *plus* explicit or tacit knowledge about the *conventional* linguistic functions of the symbols conveys the extralinguistic, contingent information that identity statements provide.

Strictly speaking, what I have just claimed holds for those identity statements in which the identity sign is flanked on both sides by names or other rigid designators (e.g., 'Oscar = Edison' or 'Water = H_2O'). If statements such as 'Scott is the author of *Waverly*' are to be classified as identity statements, as I suppose they usually are, then the following holds. On Russell's analysis, the illustrative statement not only conveys but also asserts the contingent fact that Scott wrote *Waverly* (and nobody else did), i.e., that one and only one man wrote *Waverly* and that Scott wrote *Waverly*. On Strawson's analysis, it is not asserted but rather presupposed that one and only one man wrote *Waverly*. I prefer Russell's analysis, but it does not matter for the moment. The point that concerns us is that the existence of contingent identity *statements* (such as these) by no means entails that there are contingent *identities*. The *statement* in the example tells us that Scott wrote *Waverly* and that nobody else did. However, long ago Russell made it clear that there is no relation of identity that somehow holds between the author of *Waverly* and Scott. The relevant identity relation is the one that holds between Scott and himself, and this of course holds necessarily. As I see it, this is what is behind Russell's contention that the author of *Waverly* is "not a constituent of the proposition that Scott is the author of *Waverly*." Thus his position clearly seems to be that the identity sign must always be flanked on both sides by names (or other rigid designators) or by variables whose only permissible values are rigid designators. If this is observed, then we can always *salvae veritate* and otherwise properly attach the necessity operator to every sentence and every function of the form '$x = y$,' viz. '$\Box\ (x = y)$.' For example, 'Scott is the author of *Waverly*' becomes:

$$(\exists x)\ [Wxw \cdot (y)\ (Wyw \equiv \Box\ y = s)]$$

The necessity of the *identity relation* is made explicit although the so-called *identity statement* is contingent.

Let us now consider, with Kripke, the allegedly contingent identities that have been unearthed by scientific inquiry. According to him, long before the important discoveries of Clausius, Rumford, and others, the users of our language had fixed, rigidly, the referent

of 'heat' as being *that which causes heat sensations*.[5] (This was accomplished, no doubt, by tacitly accepted linguistic conventions rather than by explicit stipulations. It should also be noted parenthetically here that many will object to Kripke's taking "common nouns" to be rigid designators in this manner, especially since, as he sees it, this amounts to treating them analogously to proper names, i.e., to giving them referents but no *connotation* or *sense*. I am inclined to agree with Kripke about this but hope that it is not necessary to argue the matter here; for the main point at present is to consider the mind-brain problem within the context of Kripke's framework.) Eventually it was discovered that heat sensations are caused by molecular motion (or by a certain level of mean molecular kinetic energy—this is all somewhat inaccurate, of course, but it does not matter here). This is the "contingent associated discovery" that provides us, a posteriori, with knowledge of the necessary identity of heat and molecular motion. As counterintuitive as this may seem, I believe that it is impeccable, given the Kripkean framework. Moreover, this is precisely analogous to the necessary identity of Oscar and Edison. (Let us grant Kripke, for the moment, at least, that 'molecular motion' *is* a rigid designator.) Since 'heat' and 'molecular motion' are both rigid designators, it follows that, if heat is identical with molecular motion in any world, it is identical with molecular motion in all possible worlds; therefore the identity is necessary. (This does not mean, of course, that molecular motion causes "heat sensation" in all possible worlds—any more than the necessary identity of Oscar and Edison implies that Edison [alias Oscar] invented the incandescent bulb in all possible worlds.)

Returning now to the mind-brain identity thesis, consider a claim that, say, a certain *determinate* kind of pain, call it 'pain$_{39}$' is identical with a certain *determinate* kind of brain state b_{76}.[6] Rather than speaking of *states*, it is much better, I believe, to (attempt to) identify mental *events* with physical *events*. So let us change the matter a little and take 'pain$_{39}$' to refer to the *occurrence* of a certain determinate kind of pain and let 'b_{76}' refer to a certain determinate kind of brain event. (This is actually more in line with Kripke's main example. In it, the physical entity is *C*-fiber stimulation, which is a process or an event.) Let us suppose further that 'b_{76}' is the genuine rigid designator for the relevant physical event that

Kripke suggests we use just in case '*C*-fiber stimulation' is not a rigid designator.

Now, since 'pain39' and 'b_{76}' are both rigid designators, it follows that, if pain39 and b_{76} are identical, they are necessarily identical. So, if the identity does hold, there must be some contingent associated fact involved in fixing the reference either of 'pain39' or of 'b_{76},' a fact, moreover, that would explain the all but overwhelming "illusion of contingency" about the claim of identity. Kripke argues convincingly and, in my opinion, conclusively that no such fact can exist for a designator such as 'pain39.' He says that the referent of 'pain' is picked out by a *necessary* (or "essential") property of pain, by, indeed, the property of *being pain*. This precludes the existence of a contingent reference-fixing fact for 'pain' (and for 'pain39'); for the reference of 'pain' (and 'pain39') is fixed *ontologically without* any reference fixing fact. It is fixed *solely* by virtue of conventional linguistic practice. In contrast, fixing the reference of 'Oscar' and 'heat' involved contingent facts *in addition* to the linguistic factors. Finally, and equally importantly, language alone not only fixes ontologically the reference of 'pain,' it also *epistemically determines* what its referent *is*; in this case no contingent associated fact is involved.

So the referent of 'pain' is picked out by a necessary truth about pain, namely, the truth that pain is necessarily pain. It is *not possible* that pain (or pain39) could have been something that was not pain. This necessary truth may seem quite trivial, and in a sense it is. Note, however, that is is not a necessary truth about the inventor of the incandescent bulb that he invented the incandescent bulb. Under the appropriate arrangement of Russell's "scope operator," we can even say truthfully that it is not necessarily true that the inventor of the bulb was the inventor of the bulb; i.e., the man who *did* invent it *might* not have (cf. Kripke, p. 279). Someone other than Edison might have done it. (Or more than one person might have invented it, or it might not have been invented at all.) Or, to say it in still another manner; the man who in this, the actual, world invented the bulb did not invent it in every possible world. Or, returning to the essentialist framework, being the inventor of the bulb is not an *essential* property of the inventor of the bulb. (Or course, however, being the inventor of the bulb *is* an essential property of *being* the inventor of the bulb [as is the property of being an inventor,

etc.] .) Consider another example. Neither being red nor being crimson is an essential property of my sweater, which *is*, as a matter of contingent fact, crimson. But being red is of course an essential property of being crimson. Being red, therefore, is an essential property of an "accidental" property of my sweater. So we see that there are not only "illusions of contingency" but, as in the case of the inventor being the inventor, "illusions of necessity" as well. Something which, prima facie, seems necessary may turn out on closer examination to be contingent.

These considerations will stand us in good stead shortly, but another point needs to be made before we proceed. We saw above that our conventional linguistic practice vis a vis the word 'pain' precludes the existence of a contingent reference-fixing fact for the word 'pain' (pain and our mode of awareness of it being what they are). This, however, by no means precludes the existence of *another rigid designator* whose referent is also pain (or pain$_{39}$) by virtue, moreover, of a contingent associated fact. Consider a contrived but simple example. Let us suppose that it occurs to our friend Jones that once or twice a week lately he has been quite irritable in the mornings, yelling at his kids, being cross with his wife, etc. He becomes convinced that this is due to some unidentified physiological or psychological factor in himself. He wonders what it could be and begins to speculate about it. To facilitate his thinking, he selects the term 'factor a' as a rigid designator, fixing its reference with the description, 'the cause of my recent undesirable behavior towards my family.' Jones has also noticed that he has been having a unique kind of headache recently to which, in line with his characteristic pedantic practices, he ostensively gives the name 'pain$_{39}$.' One day it occurs to Jones that he has blindly failed to notice that the undesirable behavior occurs when and only when he is afflicted with pain$_{39}$. He decides that *factor a* is probably one and the same as pain$_{39}$. If this is true, then 'pain$_{39}$ = factor a' expresses a necessary truth, since 'pain$_{39}$' and 'factor a' are both rigid designators. There is an *illusion of contingency* here, however, because of the *contingent associated discovery* that pain$_{39}$ is the cause of the undesirable behavior. This contingent fact picks out pain$_{39}$ as the referent of 'factor a,' and when this fact becomes *known*, the reference of 'factor a' becomes epistemically determined.

I hope that it is unnecessary to emphasize that I am *not* laying the groundwork for any kind of behaviorist or "functionalist" *analysis* of mental events. I agree with Kripke (p. 336) that such *analyses* of mental entities in terms of their causal roles are self-evidently absurd. This example just reminds us that mental events do, however, *have* causal (or "functional") properties in addition to their "essential" (and other intrinsic) properties. Just as (one of) the causal properties of molecular motion picked it out as being the referent of 'heat,' there is nothing to prevent a causal property of a mental event from picking *it* out as the referent of a rigid designator—a designator, moreover, other than its original, *ostensively fixed* one. This distinction between the fixing of the reference of a term by means of a contingent (causal) fact, on the one hand, and an *analysis* that aims to give the *meaning*, *sense*, or *connotation* of a term, on the other, is obviously a crucial distinction for the Kripkean framework (as I believe it must be for *any* viable framework).

Returning once again to Kripke's arguments, I have agreed very strongly with him that the referent of the *word* 'pain' (and the referent of the word 'pain$_{39}$') is picked out by a necessary fact about (or an "essential" property of) the referent; i.e., the word 'pain$_{39}$' rigidly designates the event *pain*$_{39}$ by virtue of the necessity of pain$_{39}$'s *being* pain$_{39}$. This precludes the possibility of fixing the reference of the term 'pain$_{39}$' by means of any contingent fact. But we have seen above that this by no means precludes the existence of another, different word, say 'factor a' that rigidly designates the *event* pain$_{39}$ and *that*, moreover, *rigidly designates it by virtue of a contingent fact*. It seems to me that such a possibility is overlooked by Kripke. However this may be, I claim that *terms referring to certain kinds of brain events*, properly construed,—terms such as *b*$_{76}$'—*do rigidly refer to mental events* (events such as pain$_{39}$). *Such reference is accomplished*, moreover, *by means of the* (*contingent*) *neurophysiological causal roles of the relevant events*. These "accidental" causal properties of the events *fix their reference ontologically*. However, due to our lack of neurological, psycho-physiological, and neuropsychological knowedge about the details of these causal properties, the reference has *not* been, so far, *epistemically determined*. Nevertheless, the identity theorist speculates that it is mental events that are the real actors in *some* of these

neurophysiological causal roles. More specifically, he speculates that there is a certain brain event, call it 'b_{76},' which plays, contingently, a certain neurophysiological causal role. Moreover, the referent of 'b_{76}' can, in principle, be fixed by means of this (contingent) role; i.e., the relevant neurophysiological details, if only we knew them, could pick out the referent of 'b_{76}' ontologically. Next, he continues, the relevant (contingent) psychophysiological or neuropsychological details, if only we knew them, could epistemically determine that it is pain$_{39}$ that plays the neurophysiological role in question.

Kripke stresses the disanalogies between claiming that heat (or an instance of heat) is identical with molecular motion, on the one hand, and claiming that a brain event is identical with a pain, on the other. He concludes that, although heat and molecular motion are necessarily identical, these disanalogies preclude the possibility of a brain event and a pain's being necessarily identical and therefore preclude their being identical at all. He is correct about the existence of the disanalogies but wrong, I believe, in inferring that they preclude the necessity of mind-brain identities. He summarizes his argument on this matter (p. 340) as follows:

> Thus pain, unlike heat, is not only rigidly designated by 'pain' but the reference of the designator is determined by an essential property of the referent. Thus it is not possible to say that although pain is necessarily identical with a certain physical state, a certain phenomenon can be picked out in the same way we pick out pain without being correlated with that physical state. If any phenomenon is picked out in exactly the same way we pick out pain, then that phenomenon is pain.

This is certainly correct. However, it does not preclude mind-brain identities. For what we *can* say is that, although pain$_{39}$ is necessarily identical with a certain brain event (call it 'b_{76}'), a (different!) brain event could, in some possible worlds, be picked out in the same way that we (in the actual world) pick out b_{76} without being identical with or even correlated with pain. This is true because the referent of 'b_{76}' is fixed as being the event that plays such and such a neurophysiological causal role *in this world*. In some other possible worlds *that role* will be played by entities other than b_{76}. The identity theorist maintains, of course, that the role in question is played by pain$_{39}$ *in this world*, although it could be played by another event (which might not even be a mental event) in some other possible

world. This is what is responsible for *the illusion of contingency* concerning the necessary identity of pain39 and b_{76}.

It seems that Kripke assumes, tacitly at least, that designators such as 'pain39' correspond to the designator 'heat' and thus that those such as 'b_{76}' correspond to 'molecular motion.' I contend that the relevant analogies are rather between 'heat' and 'b_{76}' on the one hand and 'molecular motion' and 'pain39' on the other. For the reference of 'heat' and the reference of 'b_{76}' are fixed by contingent facts (by "accidental properties" of the referents). And it is the contingent associated discoveries that molecular motion causes heat sensations and that pain39 plays such and such a neurophysiological causal role that account for, respectively, the illusions of contingency about the necessary identity of heat and molecular motion and the necessary identity of pain39 and the brain event b_{76}.

Now it may seem that Kripke has protected his flank on this score, for he does contend (p. 336) that "*being a brain state* is evidently an essential property of *B* (the brain state)." In other words, he would claim that every brain state of necessity *had* to be a brain state (and surely he would make the analogous claim about brain events). He goes on to say, "even being a brain state of a specific type is an essential property of [the brain state] *B*." If the same *is* true of brain *events* (whether Kripke so contends or not), then my counterargument *would* be unsound; for this would entail that the reference of 'b_{76}' is fixed by means of a necessary truth (i.e., that an "essential property" of b_{76} fixes it as the referent of 'b_{76}'). This would preclude fixing the reference of 'b_{76}' by means of one of the "accidental properties" of the referent, and therefore there could not exist any contingent associated fact to account for the apparent contingency of the correlation between b_{76} and pain39. Following Kripke (p. 336), the difficulty may also be put: "If $A = B$, then the identity of *A* with *B* is necessary, and any essential property of one must be an essential property of the other." Now suppose that being a brain event *is* an essential property of b_{76}. Since being a brain event is *not* an essential property of pain39, it would follow that b_{76} and pain39 do not share all of their essential properties and thus cannot be identical.

It is time now for one of the central and, perhaps, one of the most counterintuitive contentions of this paper: *being a brain event*

is not, in general, an essential property of brain events. (Although, of course, *being a brain event* is an essential property of *being* a brain event.) Again, this is a matter of *scope* (in Russell's sense of "scope"). Just as Russell pointed out long ago how it is that we can say that a given inventor might not have been an inventor (e.g., Edison might have spent his life writing mystery novels, never inventing even a mouse trap), we are now in a position to understand how *a given brain event might not have been a brain event*. For, I claim, *to be a brain event* is to play a neurophysiological causal role of an appropriate, broadly specifiable ("determin*able*") kind; and to be a brain event of a specific ("determin*ate*") kind is to play a specific, determinate kind of neurophysiological causal role (e.g., of the kind we are supposing b_{76} to play), and if we assume (in agreement with Hume) that *to say of a given event (or kind of event) that it plays a certain kind of causal role is to say something contingent*, then we see immediately that *to say of a given event (or kind of event) that it is a brain event is to say something contingent*. This follows, of course, because to say of an event that it is a brain event is merely to say that it plays a certain kind of causal role. And to say that this very brain event might not have been a brain event is merely to say that although this event, as a matter of contingent fact, plays a certain causal role, it is possible that it might not have played such a role; in some possible worlds it plays a very different role. As to the case at hand, although pain39 (alias b_{76}) plays a certain specific neurophysiological causal role and is thereby (contingently) a brain event (of a certain kind), it *might not* have played such a role. It might not even have played any kind of neurological role, and thus it might not have been a brain event. Exactly the same holds for b_{76}—which is, in effect, to say the same thing again, for b_{76} and pain39 are necessarily identical; 'b_{76}' and 'pain39' refer to one and the same event. Moreover and *obviously* by now, *being a brain event* is *not* an essential property of *the brain event* b_{76}; but *being a pain is* an essential property of *the brain event* b_{76}. And, of course, being a brain event is *not* an essential property of the *brain* (!) *event*, pain39; but being a pain *is* an essential property of the brain event,[7] pain39. Pain39 and b_{76} *do* share all of "their" properties, including all of "their" essential properties; they are one and the same event. To paraphrase Russell, there is no more

difficulty about a pain being both a sensation and a brain event than there is about a man being both a rational animal and a barber.

The apparent difficulties involved in claiming that to be a brain event is to play a certain kind of neurophysiological causal role and that pain and other mental events play such neurophysiological roles will be considered presently. First I should like to assume, just for the moment, that these difficulties are not insuperable. This will permit me to answer a reformulation of Kripke's argument (p. 340) which, he says, may be "more vivid [and be made] without such specific reference to the technical apparatus [that has been developed]." I shall summarize this version of his argument very briefly, but I believe that none of its essentials will be omitted. Let us imagine God creating the world. What shall we say about the act of creation of molecular motion? Is it not true that this very act was the creation of heat? When molecules became sufficiently agitated, Kripke says, there were fires, things were hot, temperatures were high, etc. And this held before and independently of the creation of any sentient beings. What, then, gives us the *illusion* that, after creating molecular motion, God still had substantive work to do in order to make it identical with heat? Kripke answers that what *was* a substantive task for the Deity was to make molecular motion produce heat sensations. To do this, He had to create sentient beings such that this *contingent causal connection*[8] between molecular motion and their heat sensations holds. Only after God has done this, Kripke continues, "will there be beings who can learn that the sentence 'Heat is the motion of molecules' expresses an *a posteriori* [but necessary] truth in precisely the same way we do."

What about the creation of brain events and mental events? Kripke holds that our strong feeling that the creation of a certain kind of brain event, e.g., b_{76}, and the creation of a certain kind of mental event, e.g., pain_{39}, are two separate acts of creation is *not* an illusion. When God brought about the existence of *C*-fiber stimulation, he says, He still had further substantive creative work to do in order for pain to come into existence (and in order for it to be correlated with *C*-fiber stimulation).

I shall not, at this point, summarize his argument for this latter contention, for I believe that, again, he takes the term 'molecular motion' from the "heat" example to be analogous to the term '*C*-

fiber stimulation.' As I explained earlier, I hold that the relevant analogy holds between 'molecular motion' and the term 'pain.' He does make an important point about *C*-fiber stimulation, but I shall return to it later.

What I want to do next is to argue directly that, when God made the relevant kind of brain event, say b_{76}, this very act of creation was the creation of (the mental event—the sensation) pain$_{39}$. After God created b_{76}, there did *not* remain for Him the substantive task of creating pain$_{39}$ (nor the task of then correlating it with b_{76}). The creation of b_{76} *was* the creation of pain$_{39}$, for "they" are one and the same event. What *was* a substantive task for the Deity was to give pain$_{39}$ (alias b_{76}) the kind of (contingent) neurophysiological causal role that it has. He *could* have decided to give it a different neurophysiological role or even not to give it *any neurophysiological* role at all (just as He *could* have decided not to give molecular motion the causal role of producing "heat sensations"). Our implicit recognition that the Deity had to make this contingent decision about the causal role of b_{76} is responsible for our *mistaken* feeling that the creation of b_{76} was a different act from the act of creation of pain$_{39}$ and thus for the *illusion of contingency* about the *actual necessity* of the identity of (the mental event) pain$_{39}$ and (the brain event) b_{76}.

The following, I believe, has now been established: *If* to be a brain event is to play a kind of neurophysiological causal role and if sensations (and other mental events) can play such roles, *then* it is possible that some brain events just *are* (identical with) mental events; and, moreover, it has been established that any such identity that holds between a mental event and a brain event *holds necessarily*. I must now try to provide some support for the claim that to be a brain event is to play a kind of neurophysiological causal role and the claim that it is possible that mental events play (some of) these roles. Let me begin this task by returning to Kripke's contention about *C*-fiber stimulation, which was mentioned above.

The relevant passage (from pp. 340-341) follows:

> What about the case of the stimulation of C-fibers? To create this phenomenon, it would seem that God need only to create beings with C-fibers capable of the appropriate type of physical stimulation; whether the beings are conscious or not is irrelevant here. It would seem though, that to make the C-fiber stimu-

lation correspond to pain, or be felt as pain, God must do something in addition to the mere creation of the C-fiber stimulation; He must let the creatures feel the C-fiber stimulation as *pain*, and not as a tickle, or as warmth, or as nothing, as apparently would also have been within His powers. If these things in fact are within His powers, the relation between the pain God creates and the stimulation of C-fibers cannot be identity. For if so, the stimulation could exist without the pain; and since 'pain' and 'C-fiber stimulation' are rigid, this fact implies that the relation between the two phenomena is not that of identity. God had to do some work, in addition to making the man himself, to make a certain man be the inventor of bifocals; the man could well exist without inventing any such thing. The same cannot be said for pain; if the phenomenon exists at all, no further work should be required to make it into pain.

Now we must ask ourselves: What kind of phenomenon *is* C-fiber stimulation?[9] Obviously, '*C*-fiber stimulation' cannot refer merely to an external stimulus, i.e., to a stimulus *external to the C-fibers*. It *would* be self-evidently absurd to hold that an external stimulus could be identical with pain. On the other hand, such an external stimulus is presumably almost always a crucial factor in the *production* of pain. But pain itself surely must correspond more closely with activity *within* the *C*-fibers than with any external stimulus. It follows, I believe, that, if the term '*C*-fiber stimulation' is to be retained in this discussion, it must be taken to refer to an appropriate kind of *internal C*-fiber *activity* rather than to an *external* stimulus which, in reality, produces (as a *response*) this appropriate kind of activity. Otherwise the dice would be unfairly loaded against any identity thesis—a result that Kripke almost certainly would want to avoid. The question now becomes: Is it possible that some of the events that occur in *C*-fiber regions of the brain are such that it is feasible to identify them with mental events? Or more bluntly: Is it possible that some of the events that comprise *C*-fiber activity are mental events? The identity theorist must, or course, answer in the affirmative.

Does it follow from such an answer that the identity theorist thereby denies Kripke's contentions quoted above? This question is by no means as unequivocal as it may seem. For much the same reasons, neither is the question as to whether or not the mind-brain identity thesis is a contingent claim. To consider these questions we shall need to develop a small amount of "quasi technical" ap-

paratus of our own. We need the notion of *causal structure* and the notion of a *causal network*. The accompanying greatly oversimplified sketch will serve both to explain these notions and to help answer the questions at issue. In the diagram, the circles represent events, and the arrows connecting them represent causal connections. A lower-case letter indicates that an event is a brain event. If the letter is from the beginning portion of the alphabet, the brain event is (also) a mental event; letters toward the end of the alphabet indicate brain events (or other neurological events) that are not mental events. Capital letters indicate "input" and "output" events —input into the neurological network and output from the network. For example, the event, A, might be light striking the eyes and B sound waves entering the ears, while X and Y might be lifting an arm and uttering a word, respectively. Dots and arrows with no circles at their heads or no circles at their tails indicate that large portions of (indeed, most of) the network is not shown in the diagram.

The entire diagram represents a *causal network*, and every item shown is an essential part of the particular network that is illustrated. In other words, a causal network consists of a number of (causally connected) events and of the causal connections among them. The *causal structure* of the network consists entirely of the causal connections and the positions or loci of the events in the network. For example, if in the diagram event B were replaced by another event or even by an event of another *kind*, the result would be a *different*

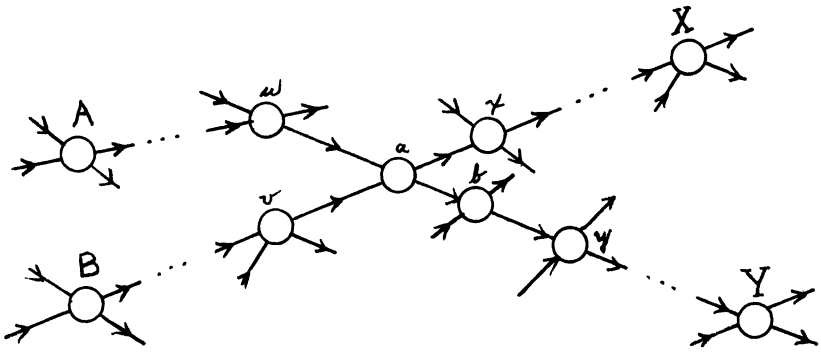

Figure 1

causal *network*, but the causal *structure* would remain *exactly the same*. The same holds for event a, event y, or any and all other events.

Let us now suppose that the events represented in the central part of the diagram occur in the *C*-fiber regions of the brain and that the event labeled 'a' is pain$_{39}$ (alias b_{76}). Pain$_{39}$ is, thus, a part of the activity taking place in this region of the *C*-fibers. Its immediate causal ancestors u and v are also a part of this activity, although, unlike a (alias pain$_{39}$, alias b_{76}), they are not mental events. Among pain$_{39}$'s causal descendants are b, a brain event that is also a mental event (anger$_{64}$, perhaps), and y, a brain event and perhaps a *C*-fiber event that is *not* a mental event.

At this point, I should emphasize that the view being advocated is much easier to present and defend when an *event ontology*, as opposed to a *substance* or *thing ontology*, is presupposed. This is to presuppose that the universe consists entirely of *events* and the causal relations that hold among them. For example, what we commonsensically take to be a *thing* (or a *substance* or a *portion of matter*) consists entirely, according to the event ontology, of a family of events intimately related to each other in certain ways.[10] But, it might be asked by way of objection, what *are* events? Are they not what *happen* to *things* or what *things* (or groups of *things*) *do*? How then is it possible to eliminate *things* in favor of *events*? We may reply, first, that, even in the commonsense framework, there are some events that do not involve *things* or *pieces of matter* in a necessary or obvious way. Let us call such events "pure events." If I could be assured of not being taken too seriously, I would say that a pure event is (something like) the instancing of a property or the exemplification of a property, in a suitably broad sense of 'property'. This is not to be taken as a definition (we are taking events to be primitives) but, rather, a crude, informal characterization. Now, for example, the presence of ambient light, heat, etc., as well as fluctuations of them are *events* that do not, in any obvious manner, involve *substances* or *portions of matter*. Certainly they are conceptually independent of substances. The existence in their own right of such *pure events* is not impugned by the fact that physics tells us that they are *caused* by other events; and whether these other events involve "substances" or are themselves pure events does not matter either as far as the autonomous existence of the pure events

is concerned. The same considerations hold for the presence of gravitational and other kinds of fields and for fluctuations therein. Other examples of *pure events* are: a twinge of pain, a feeling of nausea, and a surge of pleasure or joy. In fact, I should say that all mental events are, rather obviously, pure events. *Assuming an event ontology*, then, *amounts to assuming that the universe consists entirely of* pure events. What we commonsensically believe to be *things*, or *"substances"* or hunks of matter are, according to the event ontologist, families of (pure) events, families of families of pure events, etc., related to each other in certain, intimate ways.

Now, I have been convinced by Russell and by reflecting on implications of contemporary physics that such an event ontology is correct or, at the very worst, that it is no more incorrect than a *thing* or *substance* ontology; and, as remarked earlier, it is more convenient for the view that I am proposing in this paper. However, the view does not *have* to presuppose an event ontology; so I hope that those who find such an ontology unpalatable will bear with me a little longer. On the other hand, it must be emphasized that *the view does have to assume that some physical events are pure events and that all mental events are pure events*. Unless this is explicitly recognized, the position is very difficult to understand and, I believe, impossible to accept. For example, if C-fiber activity is thought of as consisting of threadlike pieces of matter (the "C-fibers") waving around and perhaps stroking each other, then any attempt to identify such activity with pain (as felt in all of its excruciating immediacy) does become patently absurd. However, if we recognize that C-fiber activity is a complex causal network in which at least some of the events are pure events and that neurophysiology, physics, chemistry, etc., provide us *only* with knowledge of the *causal structure* of the network, the way is left entirely open for the neuropsychologist to theorize that some of the events in the network *just are pains* (in all of their qualitative, experiential, mentalistic richness).

Let us now return to Kripke's claim that, in order to create C-fiber stimulation (C-fiber activity, in our terms), "it would seem that God need only to create beings with C-fibers capable of the appropriate type of *physical* . . . [activity]; whether the beings are conscious or not is irrelevant" [my italics]. Interpreted in one way, this

claim is true; but under this interpretation, it in no way counts against the identity thesis. Interpreted in another way, the claim is inconsistent with the identity thesis; however, under this second interpretation, I contend, it becomes false. Under the first interpretation, 'C-fiber activity' refers to a *causal structure*; more specifically, it refers to a certain kind of causal structure of a complex of events in the C-fiber regions of the brain. Now, quite obviously, it is (logically) possible for one and the same causal structure to be exemplified by many different complexes of events (by many different causal networks). So in order for God to create C-fiber activity *in this sense*, all He has to do is create a complex of events that has the appropriate causal structure. *The nature of the events in the complex* is *irrelevant*; some or all of them may be tickles, feelings of warmth, or, even, pain; or, on the other hand, every one of them could be entirely nonmental. In this sense of 'C-fiber activity', Kripke is entirely correct in his claim that whether or not conscious beings are involved is irrelevant. However, the identity thesis, properly formulated, does *not* attempt to identify mental activity with C-fiber activity *in this sense*; i.e., it does *not* identify pain with the *causal structure of the complex of events—just as Kripke does not identify heat with the causal structure of heat-sensation production*. What is identified with (a specific kind of) pain is a (specific kind of) event, or complex of events, in the causal *network*—a (kind of) event, moreover, that has the position it has in the network *in this, the actual, world*. (Analogously, what is identified with heat is a [specific kind of] event, or complex of events, that causes the heat sensations in this, the actual world.) If the term 'C-fiber activity' is used to refer to such events (or complexes of events)—events that have the appropriate position in the causal network in this, the actual world—then, according to the identity thesis, 'C-fiber activity' *in this* (second) *sense* refers to pain and *does so rigidly*. If Kripke's claim is interpretated according to this sense of 'C-fiber activity,' then it must be denied; for, in this sense, 'C-fiber activity' rigidly designates pain, and the existence of sentient beings is necessarily involved with the existence of pain and, therefore, necessarily involved with the existence of C-fiber activity *in this sense* (just as the existence of mobile molecules is necessarily involved with the existence of heat).

It is not part of my purpose to speculate about what sense of 'C-fiber activity' (or 'C-fiber stimulation') Kripke has in mind. But surely he would agree that the identity theorist can legitimately use the term in the second sense that I have discussed and that, if he is to be refuted, the refutation must be accomplished under the aegis of such a use. Let us now ask whether or not it can be plausibly contended that in order to create C-fiber activity, *in the second sense of 'C-fiber activity'*, all God has to do is create beings with C-fibers capable of the appropriate kind of *physical* activity and whether or not the beings are sentient is irrelevant. I have argued, of course, that such a contention is false, but I think that it is instructive to inquire as to why it may seem so prima facie plausible. This, too, has already been answered—at least implicitly, I believe. As noted, we may tend to think of the *physical* activity of C-fibers as being nothing but (inert) threadlike pieces of matter waving about and perhaps rubbing against each other; and, it certainly would be absurd to claim that such goings-on are identical with occurrences of pains (in the genuinely mentalistic sense of 'pain' that we and Kripke are using throughout). So that Kripke's claim about the irrelevance of consciousness vis-à-vis the appropriate kind of *physical* activity is plausible, it seems to me, *only* if *the physical* is conceived in such a rather naive and, I claim, such a scientifically inaccurate manner. That such a conception is scientifically inaccurate follows from considerations that are quite independent of the mind-brain identity thesis. I have contended this at length elsewhere (e.g., 1970, 1972, 1976), following Russell (1948, 1956), Schlick (1974), and others. In other words, C-fiber activity, *in the sense required*, does not consist of "impure" events like threads of matter waving about; rather, C-fiber activity (or the component of it with which we are concerned) is a complex of *pure events* such that physical science has something to say about their causal structure but absolutely nothing about their "intrinsic nature" (more on this presently).

But we must not be too hasty in faulting Kripke for operating with the naive, inadequate notion of the physical (if, indeed, he does so). For, I believe, traditional (Hobbesian) materialists *as well as many contemporary ones* attempt to identify "the mental" with "the physical" *in* something very much like *this defective sense of 'physical'*. (Eliminative [or "replacemant"] materialism does not

do so. However, we shall soon see that it is not a genuine mind-brain identity theory and, therefore, is not within the scope of our present concerns—although both Kripke and I seem to find it difficult to resist the temptation to reject it as being "self-evidently absurd.") As I have already indicated, if the identity thesis is interpreted materialistically, then Kripke's objections are not only cogent, but, in my opinion, virtually conclusive.

Returning to the main point, let us examine again the term 'C-fiber activity'—or, better and less subject to ambiguity, the rigid designator that I, in response to Kripke's suggestion, have been using in its stead, 'b_{76}'. Once more we must emphasize that the referent of this rigid designator is *epistemically undetermined* as far as neurophysiology and other "purely physical" sciences are concerned. Physical science leaves us completely ignorant as to *what* the referent of 'C-fiber activity' (or better, 'b_{76}') *is*; it provides us *only* with knowledge about the locus of the referent in the causal network. Or, stated without the quasi-technical, rigid-designator terminology, physical science leaves us entirely ignorant as to *what* C-fiber activity *is* and provides us *only* with knowledge about its causal structure (including, of course, its causal connections to the rest of the neurophysiological causal network).

We see now that when God created the *C*-fiber event, pain$_{39}$ (alias a, alias b_{76}), the existence of an essentially involved conscious being was *not* irrelevant; it was *necessarily* required. The creation of *this* particular bit of *C*-fiber activity *just was* the creation of pain$_{39}$ (alias a, alias b_{76}). Nothing *else* had to be done in order to make it be *felt* as pain; its "essence" *is* being *felt as pain*. And, of course, it would *not* be in God's powers to make pain$_{39}$ (alias a and b_{76}) be felt as a tickle, or as warmth, or as nothing, rather than felt as pain. Feeling a certain determinate kind of pain is one and the same event *as* pain$_{39}$. (To *be* pain is to be *felt* as pain.) On the other hand, in addition to creating pain$_{39}$ (alias b_{76}, alias a), God did do *something* else; He made the contingent decision to give pain$_{39}$ the causal role that is indicated in the diagram. He *could* have decided to give it an entirely different neurophysiological causal role or even to give it no neurophysiological role at all; for example, He might have decided to cast the world in a Cartesian mold. Analogously, God could have decided to give molecular motion (alias heat) a different

causal role from the one that it has; He might, for example, have decided *not* to have it cause heat sensations. And, just as He could have decided to have events of a different kind, say low-frequency radio waves, be the principal and proximal cause of heat sensations, he also could have decided to have an event of a quite different kind play the neurophysiological causal role that, as a matter of contingent fact, is played by pain39. In particular, he could have decided to have this role played by a nonmental event.

The points illustrated by these examples follow from the more general principle: *it is* (logically) *possible for different causal networks to have the same causal structure*; or, in other words, one and the same causal structure may be realized in a number of different ways, i.e., may be exemplified by a number of different causal networks. Thus God could have created a causal network such that it differed from the one in the diagram only in that the positions occupied by a and b were occupied by different events—perhaps by events that were nonmental. This creation would have been a different causal network, but it would have been the same causal structure. Or, giving the Diety a rest, *in some possible worlds, mental events are* (some of the) *elements of* C-*fiber activity*, and, *in other possible worlds, none of the elements of* C-*fiber activity are mental events*. More generally, *in some possible worlds, mental events are brain events*, and, *in other possible worlds, no mental events are brain events*. This is true, I claim, because to be a brain event is to occupy a position in an appropriate portion of the neurophysiological causal network, and it is a contingent matter as to what kind of events occupy any such position. *With this understanding*, we may take the *identity thesis* to be *the thesis that all mental events are brain events. Such a thesis is contingent*, as we have just seen. But *this*, of course, *does not by any means entail that there are contingent identities*. A fortiori, it is entirely consistent with what, indeed, *must* be the case: *all the identities* that hold between mental events and brain events *hold necessarily*. How all of this comes to be the case has already been explained repeatedly, perhaps ad nauseum, and with several variations above. Nevertheless, since it *is* the heart of the matter, I shall make one more try.

We have just formulated the identity thesis as the claim that all mental events are brain events. This may be reformulated to be-

come: Any mental event is identical with some brain event. We may write this as

$$(x)\ [Mx \supset (\exists y)\ (By \cdot \Box\, x = y)]$$

(where 'Mx' stands for 'x is a mental event,' 'By' for 'y is a brain event,' and '$\Box\, x = y$' for 'x and y are necessarily identical'). Now *the statement as a whole is contingent*. But if the statement is true, then the following holds: Consider any value of 'x' that satisfies 'Mx,' say 'pain39,' where pain39 *is* a mental event. Then there must be (exactly) one value of 'y' say '$b76$,' such that the expression '$\Box$ pain39 = $b76$' expresses a true proposition, i.e., such that it is necessarily true that pain39 is identical with $b76$. This, along with what has gone on before, removes, I hope, any obstacles in the way of accepting the claim that the identity thesis is a contingent thesis, although all identities that hold between mental events and brain events hold necessarily. Recall once more that *there are contingent identity statements*, but *there are no contingent identities*. The identity thesis is a *statement* (or is expressed by a statement). *It* is not an identity, but, rather, it asserts the existence of identities of a certain kind. The *statement* is contingent, but the *identities*, if they hold at all, hold necessarily.

It is true that many, perhaps most, identity theorists speak of contingent identities. But surely this is because they are misled by illusions of contingency. These "illusions" arise because the more interesting and important identity *statements* are either contingent or involve "associated contingent facts" in the ways that are now familiar to us.

Unfortunately, the strongest objection to the identity thesis is, in my opinion, yet to come. Just how it is related to Kripke's objections remains to be seen. Given what physiology and physics tell us about *C*-fibers and their activity, is it reasonable or even coherent to suppose that mental events comprise (a portion of) such activity? A prime—perhaps *the* prime—ingredient of this activity seems to be neuronal activity, which, let us assume, consists of chemical and (the associated) electrical activity. Chemical and electrical events, in turn, involve the transfer and transportation of electrons, ions, etc. How can one claim that (some of) the goings-on of these tiny charged particles of matter are identical with pains, joys, sorrows,

thoughts that two plus two equals four, etc.? Surely, it may seem, such a claim is absurd! I once heard Benson Mates remark that it makes no more sense to identify a mental event with a brain event than it does to identify a quadratic equation with a billy goat. It is not difficult to empathize with his sentiments. Let us state the objection in a more general manner: (1) We know from common sense, from physics, from neurophysiology, etc., what brain events are like. (2) We know ("by acquaintance"—and perhaps better than we know anything else) what mental events are like. (3) This knowledge reveals that brain events differ radically from mental events; more specifically, it reveals that mental events have properties that brain events lack and that brain events have properties that mental events lack. Therefore, the objection concludes, no mental events are brain events.[11]

This, in my opinion, is *the* argument against the identity thesis, and the most important specific objections to the thesis, including Kripke's, depend upon it in one way or another. The details of the dependence need not concern us. What should be done, rather, is to acknowledge the obvious: premise (or, rather, intermediate conclusion) number (3) above must be denied if the identity thesis is to be maintained; if the thesis is to be plausible, it must be plausible to contend that some brain events share *all* of their properties, both "essential" and "accidental" ones, with mental events. More precisely:

$$(x)\ \{Mx \supset (\exists y)\ [By \cdot (\Phi)\ (\Phi x \equiv \Phi y)]\}$$

where 'Mx' stands for 'x is a mental event,' 'By' for 'y is a brain event,' and '(Φ)' is to be read as 'for any property, Φ.'

The typical materialist move is to deny premise (2) above. Materialists tend to hold that knowledge of mental events, if it exists at all, is at best second or third rate knowledge. The belief that we are directly acquainted with the (ingredients of) mental events that comprise our very being is, according to them, at least partly and perhaps totally mistaken. Some go on to maintain that knowledge claims about our mental events (about "private experience," etc.) are so defective that they should, in principle, be abandoned entirely—that, as our knowledge from physics, physiology, etc. increases, we shall see that talk about (allegedly) mental events, private experience, etc., is on a par with talk about witches, demons, or

perhaps phlogiston and epicycles. When that happy day arrives, they tell us, we shall talk only about brain events, molecules and electrons, and other "scientifically respectable" entities. This position has been called the *replacement* or the *disappearance* version of the identity thesis (see, e.g., Feyerabend, 1963, and Rorty, 1965). Quite obviously, however, it is not an identity thesis at all; it purports to eliminate mental entities altogether rather than to identify them with brain events. This is not the place to give detailed arguments against such a view. I *will* say more about it later, but now I just want to remark that this position is certainly rejected by Kripke. It is fair to say, I believe, that both he and I find it "self-evidently absurd."

Some materialists who reject premise (2) take a different tack. According to them, knowledge claims (purporting to be) about mental entities are so confused or otherwise defective that they should be "translated" into "topic-neutral" statements. The following example is given by J. J. C. Smart (1959):

> When a person says 'I see a yellowish-orange after-image' he is saying something like this: 'There is something going on which is like what is going on when I have my eyes open, am awake, and there is an orange illuminated in good light in front of me, that is, when I really see an orange.'

The idea seems to be that the troublesome, mentalistically tainted term 'yellowish-orange after-image' is replaced by the descriptive phrase 'something going on which is like . . .' The descriptive phrase, we are told, is *topic-neutral* in that it makes no commitment as to *what* its referent *is*; it merely indicates, the materialist tells us, that it (the referent) has certain relations[12] to epistemically and metaphysically respectable entities such as oranges, normal illumination, etc. The materialist might then go on to point out that, since this cleaned-up way of referring to what *were* allegedly mental entities leaves their *intrinsic nature*[13] entirely open and unspecified, it makes perfectly good sense to advance the contingent hypothesis that they are brain states (or brain events).

It is easy to anticipate, I believe, Kripke's reaction to this move, although I am reluctant to put words into his mouth: neither can the "topic-neutral" descriptive phrase be a *translation* of the term 'yellowish-orange after-image', nor can it be used to fix its reference. For being a yellowish-orange after-image is surely an essential prop-

erty of yellowish-orange after-images; and, even more importantly, being an item in direct experience, being or involving a (visual) sensation, and (therefore) being a mental entity are all essential properties of yellowish-orange after-images. As was explained at some length earlier, this precludes fixing the reference of 'yellowish-orange after-image' entirely by means of relationships between after-images and nonmental items.

We have also seen, it is true, that this does not prevent us from *referring* to entities like after-images by means of descriptions (including "topic-neutral" ones) or even by means of "topic-neutral" rigid designators. In fact, we could just stipulate that the rigid designator '$b77$' refers to a type of brain event that is very similar to the brain event produced "when I have my eyes open, am awake, and there is an orange illuminated in good light . . . etc." We could then propose the contingent hypothesis that a yellowish-orange after-image is what is so produced, which, if true, would entitle us to assert a posteriori the necessary truth that $b77$ is a yellowish-orange after-image.

This move, in fact, *should* be made by the *identity theorist*, I maintain. It is not, however, open to the *materialist*, for to make it is to abandon materialism. Far from eliminating the "truly mental," this tactic yields the result that some brain events just *are*, intrinsically, nothing but "truly mental" events. These considerations show, I believe, that this variety of materialism must retreat to the following position:

> We do not *translate* mentalistic discourse into topical-neutral discourse, the materialist must hold; rather we *replace* the former with the latter, and, moreover, the replacement does not result in the loss of any cognitive content that is important, significant, scientifically respectable, etc.

Thus the so-called *topic-neutral translation* thesis turns out to be a variety of—or rather an implementation of—the "disappearance" or "replacement" thesis. These views have been considered here as examples of unsuccessful attempts by materialists to answer the main objection to the identity thesis. They turn out *not* to be genuine mind-brain identity theses, and they "solve" the mind-brain problem by sweeping the genuinely mental under the rug.

This failure of materialism results from the fact that it must attack the objection at its strongest point, premise (2). I say this *not*

because I believe that knowledge about our mental events is certain, infallible, or complete (I do not so believe), but rather because it provides us with the best (perhaps the only) knowledge that we have of the *intrinsic* properties of individual events (as opposed to *causal* and other *structural* properties). Moreover, if the objection is to retain anything at all of its great intuitive potency, premises (1) and (2) as well as intermediate conclusion (3) must be taken to refer to knowledge about *intrinsic* properties.

There is a widespread tendency to identify[14] the mind-body identity thesis with materialism. To do so, however, is to miss the point *entirely* of any genuine mind-brain identity claim. Materialism, as it is typically proposed and defended, seeks to eliminate the *genuinely mental* realm, to deny that genuinely mental events exist. But, if there *are* no mental events, then the thesis that all mental events are brain events is either nonsensical or vacuously true. A *genuine mind*-brain identity thesis must hold that there are both mental events and brain events, that all mental events are brain events, and that therefore *some brain events are mental events*—in the most full-blown "mentalistic" sense of 'mental.' Such a view I have called *nonmaterialist physicalism*[15] (see, e.g., Maxwell, 1976).

As should be apparent by now, I propose to defend the identity thesis against the prime objection by denying premise (1). More specifically: although physics, neurophysiology, etc., *do* provide us with the best knowledge we have of the *structure* of the neurophysiological causal networks that comprise the brain, they provide us with *no knowledge* (or precious little) about the *intrinsic* properties of individual brain events.[16] *Thus the possibility is entirely open that some of these brain events* just are *our twinges of pain, our feelings of joy and sorrow, our thoughts that two plus two equals four, etc.* Such a brain event would, of course, "share"[17] all of its properties with the mental event which it *is*—all "essential" properties and all "accidental" properties, all intrinsic properties and all causal properties, etc., etc. By now, I hope, this is no more mysterious than the fact that the 51-year-old brother of Billy Carter "shares" all of his properties, be they accidental, essential, intrinsic, relational, etc., with the present (February 1977) president of the United States.

Well, perhaps it *is somewhat* more mysterious, for reasons to be

discussed in a moment. But first it should be emphasized that the materialist has the matter entirely backwards and reversed: there is no need whatever to replace mentalistic terms with "topic-neutral" ones. For, I hold, premise (2) is correct: we *do* know (*by acquaintance*) the intrinsic nature of our mental events, i.e., we know *what* the "topic" of discourse about mental events *is*. On the other hand, we do not have this kind of knowledge about anything in the non-mental realm, i.e., we reject premise (1) insofar as it pertains to the intrinsic nature of the entities involved. Therefore, with one kind of exception, we *must* refer to physical events in a *topic-neutral* manner, unless we are willing to introduce a certain amount of confusion and unnecessary puzzlement.[18] We can refer to such physical events only with descriptions or with terms whose reference has been fixed by means of descriptions or by other *topic-neutral*, non-ostensive means.[19] This is not, of course, a "disappearance" or "replacement" view of the physical. It is just that our references to physical events by means of *topic-neutral designators* is an explicit signal of our ignorance of their intrinsic nature—our ignorance as to *what* such physical entities *are*. It is a reminder that our knowledge of them is limited to their causal and other structural properties. The kind of exception to all this mentioned above is comprised by those physical events that are mental events.

I have been trying to remove, layer by layer, the obstacles that stand in the way of maintaining a mind-brain identity thesis—emphasizing along the way the untenability of accomplishing this by means of antimentalist stratagems such as materialism. So far the task has been relatively easy, if somewhat tedious and repetitive due to the fact that layers tend to overlap each other. We approach now what is perhaps the last and certainly the thickest and most formidable layer. This difficulty arises from our rejection, or, rather from our *qualified* acceptance, of premise (1). We agreed that (physical[20]) science provides us with the best information that we have about the structure of the physical realm, including the structure of the brain. But, we insist, science is in the main completely silent about the intrinsic, qualitative properties exemplified by physical events.[21] The difficulty is two-fold: (a) Science does seem, sometimes, to deal explicitly with intrinsic properties. For example, we certainly seem to be dealing directly with intrinsic properties when

we say that electrons are negatively charged—indeed, that each electron has a charge of 4.8×10^{-10} e.s.u. It would appear that having a negative electrical charge of 4.8×10^{-10} e.s.u. is an intrinsic property of an electron; moreover, *being an electron* seems to be an intrinsic property. (b) The structures exemplified in our (private) experience, i.e., the structures we know by "acquaintance," are prima facie quite different from any known *or* hypothesized brain structures—from any structures exemplified in brain events. If these differences are actual rather than merely apparent, then the identity thesis is refuted: *unless each mental event "shares" all of its properties, both intrinsic and structural with some brain event, identity cannot hold.*

The first difficulty is not serious. *To be an electron* is to play a certain kind of *causal* (and/or otherwise *structural*) role: or more precisely, the reference of the term 'electron' is fixed (ontologically) by specifying the positions that electrons occupy in causal-structural networks. Similarly the reference of 'having a negative charge of 4.8×10^{-10} e.s.u.' is (ontologically) fixed by the causal-structural role played by such charges. However, the reference of such terms is not (to this date) *epistemically determined*. The terms *do* refer to intrinsic properties, but we do not know *what* the referents *are*, e.g., we do not know what a negative electrical charge *is*—just as we did not know what heat *was* until we discovered that molecular motion caused heat sensation. (Actually, just as we do not know what an electron *is*, we *still* don't know what heat [alias molecular motion] *is*. We just know more about its causal roles than we used to.) Our earlier statement that physical science provides us with knowledge of structural properties but not with knowledge of intrinsic properties was an oversimplification: science *does* assert the *existence* of instances of a variety of intrinsic properties; moreover, it provides information about the various causal-structural roles that such instances play. However, it *does* leave us completely ignorant as to *what* these intrinsic properties *are*. This crucial matter calls for repeated emphasis: physics, chemistry, physiology, etc., leave us entirely ignorant about the intrinsic nature of physical entities in general and of brain events in particular; the physical sciences, properly construed, do refer to intrinsic properties, but they do so via *topic-neutral* designators—designators that leave us entirely in

the dark as to *what* their referents *are*; their referents remain epistemically *un*determined. This disposes of the first difficulty, (a). For it leaves entirely open the possibility that some brain events just *are* events such as the occurrence of a twinge of pain, the occurrence of a red expanse in the visual field, thinking that two plus two equals four, and exemplification of other intrinsic properties that characterize our experience (our "mental processes"). This consequence that (at least) *a portion of the physical realm may be intrinsically mental* must be entertained in complete literalness by anyone who wishes to entertain seriously a genuine mind-brain identity thesis.

What the statement of the second difficulty, (b), amounts to is a somewhat more precise statement of the "grain objection" referred to in a footnote on p. 392 above. The objection asks, for example, how is it that the occurrence of a smooth, continuous expanse of red in our visual experience can be identical with a brain process that must, it would seem, involve particulate, discontinuous affairs such as transfers of or interactions among large numbers of electrons, ions, or the like? Surely being smooth or continuous is a *structural* property, and being particulate or discontinuous is also a structural property, one moreover that is incompatible with being smooth and continuous. This strongly suggests, the objection continues, that at least some mental events exemplify structural properties that are not exemplified by any brain event, or, at any rate, not in any brain event that is an otherwise feasible candidate for being identical with the mental event. It follows that the mental event and the brain event do not share all of their (structural) properties, and thus, the objector concludes, they cannot be identical.

The difficulty is genuine and crucial. Unless there is good reason to hope that it can be overcome, there is no good reason to hope that mind-brain identity is possible. This difficulty is not, however, the one that has been the main concern of this paper, which has been the difficulty posed by Kripke. Nevertheless our answer to Kripke's challenge has emphasized the indirectness, the abstractness, and the incompleteness of our knowledge of the physical realm, and reflection upon this makes the "grain objection" appear—to me, at least—somewhat less formidable. It is true that we have not, in principle, set any limits on the scope of our knowledge about the structure

of the physical realm; but the indirect, highly theoretical nature of such knowledge strongly suggests that it *is* quite incomplete and imperfect. There are also strong independent grounds for the same conclusion. Surely very few historians, philosophers, and practitioners of the physical sciences believe that our knowledge of the structure of the manifold of physical events is nearing perfection or completeness. For example, what many consider to be the unsatisfactory status of the foundations of quantum theory may well be due to crucial gaps in our knowledge of structure at the micro-level; and perhaps it is not too fanciful to suspect that the failure to integrate quantum theory and general relativity is due in part to a lack of knowledge of structures of causal networks that are somewhere between the very small ones and the very large ones. Perhaps it is precisely this "middle-sized" realm that provides the relevant context for investigation of mind-brain identities. In sum, as our knowledge grows about the various manifolds of events that constitute the physical realm, perhaps we shall discover that some of the structures that are exemplified by them *are* entirely isomorphic and quite possibly identical with instances of the structures with which we are acquainted in our "private" experience.

Even within the bounds of present physical theory, we might consider a fanciful but logically coherent possibility. Fields—electrical, magnetic, or gravitational—and fluctuations in fields are, *as far as their structures are concerned*, viable candidates for identification with (some kinds of) mental states or mental events. There are, no doubt, strong objections against supposing that, say a fluctuation in an electrical field could be a mental event (such as a twinge of pain). However, such objections could not be based on a difference in structure or "grain"; as far as I can see, such a fluctuation could be entirely isomorphic in all respects with a twinge of pain. The identity theorist must hope that continued developments in physics, neurophysiology, etc., will make manifest the existence of physical entities that have such appropriate structures and that are also otherwise more feasible candidates for being identified with mental entities.

Fortunately some neurophysiologists and neuropsychologists are devoting detailed attention to these problems. For example, the holographic theories of Pribram and others represent attempts to

incorporate the structural features of mental functions (e.g., memory) and the structural features of brain processes into *one* (self-identical!) model (Pribam, Baron, & Nuwer, 1974). More accurately, they attempt to describe models in which the structural properties that characterize brain processes are ("also") structural properties of mental functions, and conversely. In other words, they are searching for a model such that, in any given case, there is only *one* process (or function), and it is both a brain process and a mental process.

Whether or not the holographic approach will survive long-range investigation is not a matter about which I would care to forecast, even if I felt competent about its details. It does seem clear that this general *kind* of approach is a necessary condition for significant future development and progress in dealing with mind-body problems. A model such as the holographic one should, obviously, warm the heart of an identity theorist. If it turned out to be "successful" —if it stood up to experimental testing, successfully predicted startling new experimental outcomes, etc.—this would provide a considerable degree of confirmation (by no means conclusive, of course) of the identity thesis.

Let us suppose the holographic model turned out to be unsuccessful. Would this refute or "falsify" the identity thesis? Would it even count very strongly against it (strongly disconfirm it)? Both questions must be answered, I believe, in the negative. This seems to me an instance of a kind of methodological situation that frequently obtains in scientific inquiry, a situation such that positive experimental results would strongly confirm the hypothesis being tested but such that negative results, far from refuting the hypothesis (*pace* Popper), would disconfirm it only very slightly. (For discussion of a notorious example, the experimental "detection" of the neutrino, see Maxwell, 1974.) It is true that, if there followed *repeated* failures of *other* various identity theoretic models in addition to failure of the holographic model, then the identity thesis would begin to be appreciably, perhaps strongly, disconfirmed, especially if all of this were accompanied by impressive successes of dualistic models. I mention this matter to illustrate the complexity of the relationships between experimental evidence and contingent scientific (*cum* philosophical) problems *such as the mind-body problem*! I have discussed this in some detail in Maxwell 1976; and I argue there that it leads

to the conclusion that, in several of the traditional problem areas, the mind-body problem being a prime example, there is no sharp line or very helpful distinction between scientific inquiry and philosophical inquiry. In other words, philosophical investigation is *not* exhausted without remainder by logical, conceptual, and linguistic considerations however important, difficult, and interesting these may be. For this very general reason coupled with more specific ones such as the "grain" problem just discussed, I do not believe that philosophers are going to contribute a great deal more to the "solutions" of mind-brain issues until they attain something close to specialists' competence in neurophysiology, neuropsychology, etc. I am willing to go one step further and predict that the next important breakthrough, if it comes at all, will come from the neurosciences. On the other hand, the neuroscientists will probably not contribute much either unless they understand and appreciate the logical, conceptual and, *yes* (!), the contingent components of the "mind-body problem" that have concerned philosophers over the centuries. The work of Kripke that we have been considering provides valuable, fresh perspectives on these crucial components.

Notes

1. In subsequent references to Kripke, page numbers refer to his 1972 essay.

2. Cf. Thomas Nagel, 1974.

3. In natural languages, of course, such results are accomplished by (implicit) rules of language or conventional language practice, etc., rather than by explicit stipulations.

4. Kripke maintains—correctly, it seems to me—that the reference of proper names, especially those of persons, is hardly ever fixed in the simple way that it is in our case of Oscar. The example is therefore, as far as proper names are concerned, somewhat artificial; I have used it because of its relative transparence and simplicity and, moreover, because reference-fixing relevant for cases of the so-called contingent identities discovered by scientific investigation (e.g., common salt is sodium chloride) *does* parallel, very closely for Kripke, that for the *Oscar* example.

5. As far as actual linguistic practice is concerned, this seems quite wrong to me. But it does not matter; let us suppose that we did and do use a language in which 'heat' does rigidly designate whatever it is that causes "heat sensations."

6. Kripke directs his arguments mainly against "type-type" mental-physical identities and says that advocates of "token-token" identities are perhaps partially immune to his criticism. The reason for the immunity is not clear to me. However, I shall also consider, in the main, type-type identities. Absolving them of Kripke's charges will also absolve token-token identities, since these are entailed by the type-type ones.

7. Although, as indicated earlier, being a brain event *is* an essential property of *being* a brain event; and being a brain event *is* an essential property of *being* a brain event of a specific kind. Also, being a pain is *never* an essential property of *being* a specific kind of

brain event. Again, all of this is true simply because it *is necessarily* true that all neurophysiological roles are neurophysiological roles, but it is not necessarily true that pain plays any neurophysiological role at all.

8. This is *my* way of putting this point.

9. Kripke says (p. 337), "I know virtually nothing about *C*-fibers except that the stimulation of them is said to be correlated with pain." My ignorance about *C*-fibers is, I am sure, at least as great as Kripke's. Unfortunately, however, we have to consider some questions about their nature if we are to deal adequately with the possibility of identifying their stimulation with pain.

10. As Russell, 1956, has put the matter:

> The world is composed of events, not of things with changing states, or rather, everything that we have a right to say about the world can be said on the assumption that there are only events and not things. Things, as opposed to events, are an unnecessary hypothesis. This part of what I have to say is not exactly new, since it was said by Heraclitus. His view, however, annoyed Plato and has therefore ever since been considered not quite gentlemanly. In these democratic days this consideration need not frighten us. Two kinds of supposed entities are dissolved if we adopt the view of Heraclitus: on the one hand, persons, and on the other hand, material objects. Grammar suggests that you and I are more or less permanent entities with changing states, but the permanent entities are unnecessary, and the changing states suffice for saying all that we know on the matter. Exactly the same sort of thing applies to physical objects. If you go into a shop and buy a loaf of bread, you think that you have bought a "thing" which you can bring home with you. What you have in fact bought is a series of occurrences linked together by certain causal laws.

11. The "grain" objection, attributed to Wilfrid Sellars (1965) and elaborated by Paul E. Meehl (1966), is a special case of this objection.

12. In this example the relation is asserted to be just "bare" similarity. I shall ignore any difficulties that may plague such a relation (see, s.g., Shaffer, 1961).

13. My terms or, rather, Russell's (used toward another end, of course).

14. You should pardon the expression!

15. *Physicalism* because to be a physical event is to have a locus in the spatio-temporal causal network.

16. The claim is a general one, holding out only for the brain but for all physical systems. See, e.g., Russell, 1948, and Maxwell, 1970.

17. The word 'share' is put in "shudder quotes" because what we are talking about, of course, is a thing "sharing" all of its properties with itself. This seems to be a somewhat atypical way of talking. The same is true of saying that if "two [!] things" are identical, "they" "share" all of "their" properties, etc. All of this results, does it not, because reflexive relations, especially identities, are somewhat atypical?

18. In most of our practical, everyday discourse, such confusion does not, of course, arise. In such contexts, there is no more need to reform our customary beliefs and modes of reference than there would be to replace, in most of its uses, the word 'salt" with the words 'sodium chloride' on the grounds that common table salt, sodium chloride, is just one out of thousands of kinds of salts, most of which are inedible and poisonous.

19. In a full-scale program, such reference-fixing can be accomplished systematically by using either Ramsey sentences or model-theoretic techniques. See above, p. 369, and Maxwell, 1970.

20. Psychology and some social sciences, properly conducted, do deal explicitly with intrinsic as well as structural properties.

21. This paper cannot provide a systematic account of the distinction between intrin-

sic and structural properties. I *have* made preliminary efforts in this direction in Maxwell, 1970. I believe that the examples used here, however, coupled with our common-sense grasp of the distinction, will be sufficient for the purposes of this paper.

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