

SPECIES-SPECIFIC PROPERTIES AND MORE
NARROW REDUCTIVE STRATEGIES

It is now commonplace to observe that mental properties can be “multiply realized” by an indefinite number of physically dissimilar systems, and in such a way as to preclude any straightforward identification with physical properties.¹ In light of this, various suggestions have been made in an attempt to salvage the traditional type-identity theory. Some claim that the multiple realization of physical properties vitiates any anti-reductionist argument.² Others accommodate the facts of multiple realization by construing mental types in terms of higher-order properties, for example, the second-order property of having certain first-order physical properties which play a particular causal role.³ Still others appeal to a wider notion of the first-order properties, most notably, infinite disjunctions of maximally consistent sets of first-order physical properties.⁴ And a final group of identity theorists appeal to a more narrow notion of the first-order properties, relativizing mental types to a species, then identifying them with first-order physical properties.⁵

Among these variations and permutations on the type-identity theory, I will focus on the latter “narrow reductive strategy,” hereafter referred to as the “NRS.” A careful examination of this topic is long overdue, seeing that the other strategies have generated much discussion in their own right, while the NRS has been criticized only in passing. Moreover, this criticism has been indecisive in a number of respects. Nevertheless, I want to discuss other more serious problems with the NRS, problems which have largely gone unnoticed.

To set the stage for what follows, the chief desideratum of any narrow reductive strategy is threefold: (a) find psychological properties which are (b) sufficiently narrow to avoid the phenomenon of multiple realization, while being (c) explanatorily adequate to the demands of psychological theorizing. Most critics have focused their attention on (c). Principally, Ned Block has claimed that the narrow, species-relative mental types are explanatorily inadequate inasmuch as they cannot capture important psychological generalizations which might obtain across species.⁶ My argument is decidedly different. First, as regard to

condition (c), I think the NRS is best viewed as a form of theoretical replacement which should make no pretext of reducing cross-species properties. This I discuss in section 2, and it will have important ramifications for Block's argument examined in section 3. Yet a deeper problem, in my view, lies with (a) and (b), and in sections 4 through 5 I attempt to show that these two conditions cannot be jointly satisfied. If one carries out the logic of the NRS, the result is a theory involving particulars or token events – not types or properties at all.

1. THE NRS

To help facilitate the discussion, I will use the term “standard psychological property” to cover a broad range of mental phenomena, such as the having of belief, desire, sensation and image, as well as properties more indigenous to scientific practice, such as being an input analyzer, having a filter for selective attention, and the like. What makes these properties standard, for our purposes, is their *level of generality*. They are general features which can be shared by various kinds of cognitive systems. (I will also follow common practice and use the terms “property” and “type” interchangeably as designating these features. If one insists on the distinction, I always intend the property by which objects are of the same type.)

Now with respect to these standard psychological properties, the NRS begins by conceding that they are not lawfully coextensive with physical properties, and this, due to the facts about multiple realization. Consider the property of having pain. It is realized by various and sundry physical states, in human beings by a system of neuron firings, in dolphins by a different neurophysiology, in extraterrestrials by X-fibers, and so on. Nevertheless, the NRS proceeds by postulating more restricted types – think of them as the standard properties indexed to a species – and these more narrow items appear to be better candidates for reduction. Hence, whereas pain is multiply realized in the way mentioned, yet *human* pain is certainly not. Rather, human pain is lawfully coextensive with human neuron-firing, and the appeal to other nonhuman cognitive systems with distinct physical constitutions is simply irrelevant. In short, *nothing about multiple realization across species will prevent the reduction of a species-specific property*. As Jaegwon Kim, who first suggested the view, put it:

Let us assume that the brain correlate of pain is species-dependent, so that we have generalizations like “Humans are in pain just in case they are in brain state A”, “Canines are in pain just in case they are in brain state B,” and so on. These species-dependent correlations do not of course warrant the species-independent blanket identification of pains with a “single” brain state . . . But they clearly do warrant – at least they are not inconsistent with – the identification of *human pains* with *human brain state A*, *canine pains* with *canine brain state B*, and so on. That is to say, *species-specific correlations warrant species-specific identities*.⁷

Others have followed Kim in this regard. David Lewis, for example, appears to endorse a version of this strategy when he relativizes the causal role of mental types to a “population”, which he says is “a natural kind – a species, perhaps”.⁸ Also, D. M. Armstrong embraces the NRS after observing that what plays the causal role of pain may differ from one kind of creature to the next. For he then says:

It may be granted, for the reason just discussed, that it is impossible to identify the type *pain* with a certain neurophysiological process. But what about the more narrowly conceived type: *pain in human beings*? It is quite plausible that it can be identified with some single sort of neurophysiological process.⁹

Finally, Robert Causey, Berent Enc, and others have defended the NRS by viewing it as an instance of a more general point about how scientific reduction may often proceed.¹⁰ The paradigm is the reduction of the thermodynamic property of temperature. As it turns out, temperature is realized by various microphysical states. In ideal gases it is the mean kinetic energy of the molecules. But, as Churchland points out, in solids the correlation with mean kinetic energy is more complicated since the molecules do not have the free movement enjoyed within the gases, but are confined to certain vibrational motions.¹¹ Moreover, what realizes temperature in a plasma is something entirely different, since a plasma has no constituent molecules which remain intact. Indeed, Churchland notes that even a vacuum void of any particles is said to have a “blackbody” temperature. But none of this prevents the identification of *temperature in gases* with mean kinetic energy, or *temperature in a vacuum* with the blackbody distribution of radiation.

Thus, the strategy seems clear: relativize or index standard mental properties to a restricted domain of objects, like the human species, as we relativize temperature to a restricted set of objects, like the gases, and the reduction to a more basic physical theory will presumably follow.

2. THE LOGIC OF THE NRS: REPLACEMENT VS. REDUCTION

But how does this reduction proceed? And more importantly, *what* exactly is reduced? For we have three theories: the more general psychological theory which employs a taxonomy of kinds that cuts across various species; a set of species-specific psychologies, each employing the more narrow properties and each having as its goal the explanation of behavior in more restricted domains; and finally, some physical theory to which the psychological theories must ultimately reduce. Our question, then, can be put as follows: Is general psychology reduced *via* the reduction of species-specific psychology, or is it merely the latter which is reduced? Put in terms of the properties countenanced by these differing theories, does the NRS allow us to say that *standard* psychological properties are identical with physical properties *in addition to those of the species-specific variety*?¹²

At first glance, we might think that the answer should be affirmative. After all, the purpose of the identity theory was originally to provide a reduction of *all* mental phenomena, with standard types being our primary concern. Moreover, this would seem to be required if the present strategy is patterned after the reduction of temperature, a *general* property of thermodynamics. Nevertheless, I think there are serious problems with the idea that standard properties could be reduced in this fashion, problems that defenders of the NRS have not, in my view, sufficiently stressed.

Let us begin by following Kim's earliest suggestion and speak about psychophysical laws which ground "the identification of *human pains* with *human brain state A*, *canine pains* with *canine brain state B*, and so on".¹³ The envisioned bridge laws would be something like:

(NRS1) "for every *x*, *x* has *human pain* if and only if *x* has human brain state *A*",

with a number of such laws for each mental type in the restricted domains. Are there any untoward consequences if we take laws of this kind as the means by which psychophysical reduction may proceed? Recall the fact that there are three theories (and three sets of properties): general psychology, the set of species-specific psychologies, and the physical theory. This being so, it becomes evident that laws which take the form of (NRS₁) will *only reduce species-indexed properties* since (NRS₁) concerns *human pain*, not pain *per se*. Hence, given that laws of this kind only connect physical theory to the items of species-

specific psychology – not general psychology – they leave all the standard properties which belong to the general theory completely untouched.

Of course, standard properties could be reduced if we assume they are identical to a *combination* of the more narrow properties which presumably are reduced in this fashion, specifically, a disjunction of all species-indexed properties. (I ignore their conjunction since, unconstrained mereology notwithstanding, nothing has the conjunctive property of being a human pain *and* canine pain *and* extraterrestrial pain, etc.) But this means that we must also accept disjunctive laws connecting general psychology to the species-specific theory, such as “for every x , x has pain if and only if x has human pain *or* x has canine pain *or* x has extraterrestrial pain . . . ,” where the right-hand side of this biconditional expresses the perhaps infinite disjunction of all nomologically possible types of species-specific pain that we are now assuming to constitute the standard, more general type *pain*.

It initially seems, therefore, that if the present strategy provides a reduction of standard psychological types, then it must be committed to the idea of infinite or indefinite disjunctive properties. This result, however, ought to be disheartening for two reasons. First, if we must appeal to disjunctive properties, the NRS is in fact *superfluous*. For we might as well dispense with all this talk about “species” and “more narrow psychological types” and straightway identify mental properties with the disjunction of all their physically possible realizations *regardless of whether each realization happens to be the exclusive property of its own separate species*. In other words, simply omit the step which postulates the more narrow properties since the opposite strategy, according to which we widen our notion of a property by means of disjunction, appears inevitable anyway.

But second, the need for infinite disjunctive properties can only detract from any appeal which the NRS might have had, since the postulation of such properties for the purposes of reduction has not been favorably received. It has been argued, for example, that disjunctive properties violate certain criteria for propertyhood inasmuch as they do not count towards the similarity of the objects having them, that they are not genuine nomic properties, or that they do not contribute to an object’s causal powers.¹⁴ I do not say these objections are absolutely decisive. I wish only to point out that if we view the NRS as employing the laws previously mentioned, and *if* these laws are thought to provide

a reduction of the standard psychological types, then we are likely to find ourselves in the midst of a number of these other controversial issues, with the overall strategy having no clear advantages over its competitors.

Perhaps, then, the NRS will fare better if we consider a different kind of law. We might, for example, follow Kim's most recent suggestion and appeal to laws of the form:

(NRS₂) 'for every x , if x is human, then x has pain if and only if x has human brain state A .'¹⁵

Formally, the difference comes to this: (NRS₁) is a simple biconditional employing a species-indexed mental type, in this case *human pain*; (NRS₂), however, is a conditional whose consequent is a biconditional employing the more general type *pain*. In roughest terms, (NRS₁) relativizes the mental type to a species, while (NRS₂) relativizes the entire bridge law to a species.

Does this second kind of law provide a reduction of standard psychological properties? Admittedly, (NRS₂) seems more promising in this regard since it mentions the standard type directly: "for every x , if x is human, then x has *pain* (not human pain but *pain*) if and only if x has brain state A ." However, Kim actually refrains from any claim that the properties of general psychology can be reduced. Rather, he says:

What we could more reasonably expect is this: as science makes progress, it will succeed in identifying an increasing number of *local* physical coextensions for psychological properties, that is, physical coextensions *restricted to specific domains* (e.g., particular biological species); and a sufficiently broad system of such local coextensions can serve as a base for "local reductions" of psychological theories.¹⁶

And again:

Unlike species-independent laws, these laws cannot buy us a *uniform* or *global* reduction of psychology, a reduction of every psychological state to a uniform physical-biological base across all actual and possible organisms; however, these laws will buy us a series of *species-specific* or *local* reductions.¹⁷

A "local" reduction, according to Kim, is the reduction of a theory like *human* psychology in virtue of the species-relative coextensions that we are assuming to obtain in the form of (NRS₂). So the pivotal issue is whether a series of local reductions will amount to a uniform or global reduction of the general theory. The answer is, I think, negative.

For let T be a psychological theory with predicates M_i, \dots, M_n satisfied by some species S , and let T^* be the more general theory with predicates M_{i^*}, \dots, M_{n^*} satisfiable by a broader range of cognitive systems outside S (intuitively, M_{i^*}, \dots, M_{n^*} pick out the standard mental properties). Now if L is a law of T , Kim has suggested that " $S \Rightarrow L$ " is derivable from the physical theory by means of (NRS₂) bridge laws, thus providing a local reduction of mental phenomena.¹⁸ Specifically, given predicates P_i, \dots, P_n of our physical theory, and given the relativization to a species S , then the laws of T can be derived by means of species-relative biconditionals: $(x) [Sx \Rightarrow (M_i x \Leftrightarrow P_i x)], \dots, (x) [Sx \Rightarrow (M_n x \Leftrightarrow P_n x)]$. Nevertheless, it is clear that these relativized biconditionals will not reduce the laws of T^* since, being laws of a more general theory, they contain the different predicates M_{i^*}, \dots, M_{n^*} satisfiable by systems across the several species. Consequently, the properties picked out by these terms will remain unreduced.

As a final attempt to reduce general psychology along these lines, suppose we construe the NRS as an instance of *approximate reduction*. Using the model Kenneth Schaffner first proposed, we might claim that general psychology approximately reduces to physical theory in virtue of the straightforward Nagelian reduction of its close analogue, the species-specific theory.¹⁹ Unfortunately, I doubt that we can view the NRS in this way. For it is an essential feature of approximate reduction that the reduced theory be closely similar to the original, otherwise the reduction of the former could not be viewed as an approximate reduction of the latter. Yet assuming that the properties of species-specific psychology are lawfully coextensive with physical properties, as proponents of the NRS maintain, then *species-specific theory is no more similar to general psychology than the neurophysical theory* (which, on all accounts, is radically incommensurate with respect to general psychology).

In summary, then, whether the preferred form of bridge law is (NRS₁) or (NRS₂), or whether the proposed reduction be precise or approximate, the NRS simply does not appear to reduce general psychology, and hence does not licence any claim to the effect that standard mental properties are identifiable with physical properties. Of course, one could always analyze the standard types into second-order properties, here the property of having any first-order species-specific property. But, as Armstrong points out, if first-order properties play the

causal roles associated with mental types, then second-order types could never be considered as causes.²⁰ And, in any case, this move to higher-order properties is an altogether different reductive strategy, one that can be pursued independently of any concerns over species-specificity or more narrow properties.

So perhaps the surprising moral is this – as far as standard mental properties are concerned, we should not look on the NRS as a reductive strategy at all, but as a form of *eliminativism*. That is to say, the NRS requires that general psychology be *replaced*, not reduced, by species-specific psychology, and so ultimately *replaced*, not reduced, by physical theory. Even so, it is not a radical form of eliminativism. The NRS does not eschew the intentional or folk psychological altogether; rather, it views such phenomena from within the confines of each species, and from the vantage point of each one offers a reduction to physical theory.

3. THE ISSUE OF EXPLANATORY ADEQUACY

Some need hear no more. The fact that the NRS cannot capture standard mental properties is sufficient to reject it out of hand (which might explain why such rejections often occur in the space of one or two sentences). Thus, Ned Block remarks simply that the appeal to species-specific properties requires that we “give up saying what property it is in *virtue of which* Martians and humans can *both* be in pain”.²¹ And in another place he says:

Kim . . . and Lewis . . . propose species-specific identities: pain is one brain state in dogs and another in people. As should be clear from this introduction, however, this move sidesteps the main metaphysical question: “What is common to the pains of dogs and people (and other pains) in virtue of which they are pains?”²²

David Wiggins, in a footnote, makes a similar point; and Kim Sterelny insists more recently that we need an explanation of why species-specific types are instances of a more general phenomenon.²³

Contrary to popular lore, however, this loss of generality across species is not a foregone conclusion. It can only be arrived at after a careful examination of the logic of the NRS, as we have attempted here, an analysis of the concept of local reduction, skepticism about the application of approximate reduction, resistance in this context to any analysis of standard types into second-order properties, and a

rejection of any disjunctive strategy by which one could construct standard types out of species-specific properties.

Be that as it may, is the fact that the NRS cannot capture standard mental properties a fatal defect? Perhaps not. For in the last section I argued that we best view the NRS as a form of eliminativism, that is, as a replacement rather than reduction of general psychology. *But theoretical replacement does not require that the new theory be saddled with all the explanatory work of the old, now defunct theory.* Hence, those who argue like Block must show that standard psychological properties and the cross-species similarities they explain are indeed *irreplaceable* features of our best psychological theory. Though I am sympathetic, the point is difficult to establish.

First, a defender of the NRS might claim that it is sufficient for species-specific psychology to explain human behavior in terms of human mind/brain states, canine behavior in terms of canine mind/brain states, and the like, without explaining the alleged similarities between the respective domains. For any such loss in explanatory power might be compensated by the theoretical gains achieved through the reduction of species-specific psychology, namely, simplicity, ontological economy, and the additional explanation of psychophysical laws by virtue of the identities thought to obtain.²⁴

Second, a defender of the NRS could point out that there may be *no* interesting cross-species generalizations of the kind Block and company allude to, which is to say, for example, there may be no psychological property that humans and canines have in common when they suffer their respective pains. Block himself suggests that this might be true if we accept what he calls 'psychofunctionalism', whereby mental types are defined in terms of whatever causal role is discovered by empirical investigation (this was the point behind the charge that psychofunctionalism also falls prey to chauvinism).²⁵ Moreover, that empirical investigation should uncover differences in causal role seems likely. That is, the different environmental facts, selective pressures, and genetic endowments which serve to generate a difference in species might also serve to generate a difference in the psychologically relevant functional organization between the species: for example, a difference which would manifest itself somewhere in the perceptual abilities, cognitive skills, or behavioral repertoire (just think of the different ways humans and canines respond to pain!).

On the other hand, if mental types are indeed functionally construed,

whether empirically at the end result of scientific investigation or analytically from the meaning of our commonsense folk psychology, they would nevertheless seem to support counterfactuals inconsistent with the type identity theory *even when relativized to restricted domains*. It is nomically possible, for example, that the causal/functional role of human pain be realized in humans who have changed in some neuro-physical respect (worse, cp. the variability in function within the domain of artificial systems). But this is a point we shall return to in the next section.

What seems uncontroversially right about Block's original criticism, in any case, is simply this. It would seem to be a desideratum of any scientific psychology that it be able to capture interesting generalizations that might obtain. Yet cross-species generalizations, if there be any, must *in principle* lie outside the purview of a species-specific psychology. Good scientific methodology, then, should favor the more general theory (weighed against, remember, the theoretical gains provided by reduction). Nevertheless, this point concerns methodology, not ontology, and it may well be that the facts preclude any cross-species psychological generalizations.

4. PLASTICITY AND MORE NARROW TYPES

In my view, the most interesting problem for the NRS arises not from outside human psychology, but from the way our own biological species happens to instantiate mental properties. Here I refer to the well known problem created by the plasticity of the brain, and, though defenders of the NRS have addressed themselves to the issue, tracing out this particular dialectic will, I trust, lead to more serious difficulties.

Thus, to begin, the appeal to species-specific properties seems unsuccessful because the phenomenon of multiple realization can occur *within* our species. That is, any number of human brain structures can subserve the same type of psychological function.²⁶ Of course, there are well known cases of "localized" cognitive functioning, for example, linguistic representation in the left hemisphere, or Hubel-Wiesel cells that respond to lines at particular orientations in the visual field. But this kind of localization is insufficient to ground law-based coextensions between species-specific mental properties and neurophysical types for three reasons.

First, the aforementioned localization only obtains for the relevant

input systems, not for any higher-level processing which might be involved. As Fodor observes, “*all* the cases of massive neural structuring to which a content-specific cognitive function can confidently be assigned appear to be associated with input analysis, either with language or perception. There is, to put it crudely, no known center for *modus ponens*.”²⁷ Second, this localization is not universal across the human species, as witnessed, for example, by the fact that a percentage of adults have linguistic representation in both hemispheres while children have bilateral representation until about the age of five years.²⁸ Third, the physical basis for mental properties may change within the same individual over time when cognitive functions have been transferred to a different area of the brain because of some neurophysical damage.²⁹

In fact, we can demonstrate the problem of multiple realization for species-specific properties *without* relying on any facts about the plasticity of the brain. Remember the commonplace observation that general psychology and physical theory will taxonomize behavior in different ways. Signing a check and paying cash are physically distinct, to use Fodor’s example, yet general psychology might count them the same if the subject were in each case exhibiting the same behavior as intentionally described, that is, paying one’s bills.³⁰ So consider, not the general type “*paying one’s bills*”, but the species-specific analogue “*human paying one’s bills*”. It is still true that the human paying of one’s bills can require distinct bodily movements and differing neurophysical explanations, and hence it is still true that species-specific psychology will type behavior in ways significantly different than the neurophysical theory.

The net result is that the differing taxonomies create the same problem of incommensurability with respect to their generalizations, the same problem of multiple realization with respect to their properties and kinds, as we find between general psychology and the physical theory. Such is the problem facing species-specific psychology.

Having said all this, however, those who defend the NRS have a ready answer: *multiple realization can be circumvented by the introduction of even more narrow properties*. Thus, after appealing to the property of *pain in human beings*, Armstrong says:

And if even that identification turns out to be too optimistic, it will presumably be possible to find still narrowly conceived sub-types: pain in human beings of the sort *X*, in human beings of the sort *Y*, . . . and so on, where the identification can finally be effected. For, after all, the idea that the physiological nature of pain in human beings

changes from occasion to occasion, or even from person to person, seems truly bizarre, although it may be a logical possibility.³¹

As a quick response, what Armstrong finds as “truly bizarre” and a mere “logical possibility” are precisely the facts to be derived from the empirical data concerning individual differences in how psychological functions are realized. The physiological nature of pain *may* change from occasion to occasion, depending on the development and circumstances of the individual. In any case, what interests us here is the appeal to “more narrowly conceived sub-types”.

And Jaegwon Kim has also made a similar suggestion. Speaking of psychophysical coextensions, Kim says:

In order to generate laws of this kind, biological species may turn out to be too wide; individual differences in the localization of psychological functions in the brain are well known . . . What is important then is that these laws are relative to physical-biological structure types, although for simplicity I will continue to put the matter in terms of species.³²

But what, exactly, are these more narrow physical-biological structure types? Important metaphysical issues lie in wait.

5. OBJECTIONS TO MORE NARROW PROPERTIES

For domains more restricted than species there are obvious candidates in the offing – subspecies, individuals, temporal slices of individuals. But my concern is that, when carried to its logical conclusion, the NRS will require an item so narrow that it no longer counts as a form of *type reduction*. What I have in mind is the following: In light of the individual differences within a species, a defender of the NRS should find it necessary to relativize mental property *M* to an individual subject *S*, creating, as it were, the property *M of S* to be identified with some physical property (e.g., not just *human* pain but *Sally’s* pain). But this will not do for the purposes of reduction since, as we know, the physical realization may change within an individual due to brain injury and the like. Thus, in light of the differences in *S* over time, the next step is to relativize property *M* to a particular time *t*, creating the even more narrow property *M of S at t* (*Sally’s pain at 2 a.m., April 27, 1991*), again to be identified with some physical property. We are thus led to postulate, not species-indexed properties, but *individual-time-indexed properties*.

Indeed, some philosophers have suggested just such a view. In his book *Mind and Meaning*, Brian Loar appeals to “psychophysical type-type correlations relativized to individuals at times”.³³ And Frank Jackson, Robert Pargetter, and Elizabeth Prior defend the view that a functionalist may accept type physicalism by endorsing the reduction of mental state types relativized to particular organisms at definite times, types picked out by terms such as “pain for an organism *O* at a time *t*”.³⁴

What can be said about this narrowest version of the NRS? Granted, only properties relativized to individuals and times can avoid multiple realization at the intrapersonal level. Yet the problem is that, for all intents and purposes, the proposal appears indistinguishable from a *token identity thesis*. Why? Because relativizing a mental type *M* to a subject *S* at a time *t* seems very much like talking about *S* having *M* at *t*, which philosophers have recognized as a dated particular, specifically, a token structural event.³⁵

Three arguments are worth considering here. First, *linguistic precedent*. Descriptions such as “the pain of *S* at *t*” or singular terms like “*S*’s pain at *t*” were taken to pick out token states or events. To cite one famous example, in *Naming and Necessity* Saul Kripke uses such locutions to effect a contrast with type identity claims:

Identity theorists have been concerned with several distinct types of identifications: of a person with his body, of a particular sensation (or event or state of having the sensation) with a particular brain state (Jones’s pain at 06:00 was his *C*-fiber stimulation at that time), and of *types* of mental states with the corresponding *types* of physical states (pain is the stimulation of *C*-fibers).³⁶

More importantly, however, assuming we can say that properties or types are expressed or designated by these terms, precedent had it that *any properties so expressed were general features*, what Kim called the “generic event type” determined by the constitutive property of the structural event (see again fn. 35). Hence we can say, and people who wrote on events did say, that “the pain of *S* at *t*” and “*S*’s pain at *t*” serve to designate a token event and express a more general property, not an individual-time-indexed one.

On the other hand, could a defender of the NRS just *stipulate* that the reference is a more narrow type? No. For the second argument is that *one cannot create narrow properties by fiat*, or by employing certain narrowly construed linguistic expressions. After all, the proper use of

these terms may only involve a narrow *concept*, with no objective property (of the individual-time-indexed variety) answering to them. This is possible, for example, if we are “scientific” or “*a posteriori* realists” about properties, that is, if we reject the view that there is an exclusive property determined by every meaningful predicate (or corresponding singular term) of our language, and, instead, let the appropriate science determine what properties exist. My suspicion is that cognitive science has no need for properties restricted to individuals and times. Indeed, the issue of explanatory inadequacy now returns with a vengeance! What explanatory power or predictive success could accrue to our psychological theory if it is reduced to properties that will not generalize over individuals and times?

Finally, the third argument concerns the *semantic contribution* of the crucial linguistic element “*S* of *t*” which is annexed to the original mental term. Suppose it is treated as a direct referring expression which has the object *S* (or a temporal part of *S*) as its semantic value. Then the entity designated by the containing expression “the *M* of *S* at *t*” or “*S*’s *M* at *t*” would seem to have the same constituents as the token event I mentioned, namely, the *concrete* object *S*, the *abstract general* *M*, and the time *t*. Defenders of the NRS did, after all, talk of relativizing to ‘individuals’, not any properties used to pick out individuals (and perhaps this was incautious on their part – cp. relativizing to a species, which *is* an abstract object).

Hence suppose, on the other hand, “*S* at *t*” is treated in the manner of a descriptive theory of names so that it expresses a condition or property *F* which, we may presume, *S* uniquely satisfies at the time. But then *someone else could have satisfied it*, barring haecceities and their ilk, from which it follows that the containing expression could have been satisfied by another individual (or even the same individual) with a distinct physical constitution – the inimical point that our NRS attempts to avoid. For instance, if the causal role analysis yields: “the state type which occupies the pain role for Sally at *t*”, then the point is that it should be nomically possible for someone fitting Sally’s description (someone who shares the property *F* we associate with the term “Sally”) to have had a different physical type playing that role at *t*.³⁷

Consequently, defenders of the NRS are confronted with a dilemma: either their terms pick out event-like structures with concrete objects as constituents, or else their strategy will succumb to the phenomenon of multiple realization.

Now judging from what Jackson, Pargetter, and Prior have said, I think they would at least respond to the issue of token structural events by noting (a) that the subject *S* need not actually exemplify the mental property at the time in question, meaning that the item designated is an *abstract* entity (cp. in this context Kim's 'existence condition' for token structural events: the event [*S*, *M*, *t*] is not said to exist unless *S* exemplifies *M* at *t*); and (b) a type indexed to a subject at a time simply differs from others inasmuch as it *lacks the generality* afforded by other properties.³⁸

I would counter that if *S* does not exemplify *M* at *t*, the description simply fails to refer. This hardly shows that any type expressed is an individual-time indexed one as opposed to a generic event type. Furthermore, even if the entity in question is abstract, we cannot say it is a genuine property on that account alone. For being abstract, though admittedly necessary, is not sufficient for propertyhood. After all, consider the class of abstract particulars. So in order for a thing to be considered a genuine property, it is also necessary that it be a general feature, that is, a universal and not a particular. (Perhaps this shows that, even on its best construal, the NRS will collapse into the reduction of properties to tropes.)

Finally, the whole rationale for talking about types or properties is that they are *general* features, instantiated or instantiatable on different occasions. Yet Jackson, Pargetter, and Prior's distinction between "types" and their "generality" misses this fact; hence there is no longer any motivation for distinguishing their proposed types (they call them "universals") as entities which are ontologically distinct from tokens or particulars. Put differently, the *M* of *S* at *t* is intended to be a *nonrepeatable* entity, unable to occur apart from *S* at the particular time *t*. But nonrepeatability, we remember, is a mark of tokens, not types, of particulars, not properties or universals.

In my view, the fact that this narrowest version of the NRS turns out to be a theory of mental tokens should not be surprising, given the general nature of properties. Hence, one way to put the moral is this: the more narrow we make our properties, the less general they become, and the less general they become, the more they become like particulars. In any case, I have attempted to show how the logic of the NRS leads to a theory involving particulars. Whether we call them "abstract particulars" or "token structural events" matters not. For only mental particulars are guaranteed to avoid the phenomenon of multiple realiza-

tion by being of such a nature that they cannot have multiple instances and so *a fortiori* cannot have multiple instances by systems with distinct physical constitutions.³⁹

NOTES

¹ The locus classicus is Hilary Putnam's, "The Nature of Mental States", in *Mind, Language and Reality* (London: Cambridge University Press, 1975), pp. 429–440; also Jerry Fodor, "Special Sciences", in *Representations* (Cambridge Mass: M.I.T. Press, 1981), pp. 127–145.

² See Jaegwon Kim, "Phenomenal Properties, Psychophysical Laws, and the Identity Theory", *Monist*, vol. 56 (1972), esp. pp. 190–191; Donald Davidson, "The Material Mind", in *Essays on Actions and Events* (Oxford: Oxford University Press, 1980), at pp. 251–252; and Mark Wilson, "What is This Thing Called 'Pain'? – the Philosophy of Science Behind the Contemporary Debate", *Pacific Philosophical Quarterly*, vol. 66 (1985), pp. 227–267. For a critical discussion, see my "On Physical Multiple Realization", *Pacific Philosophical Quarterly*, vol. 70 (1989), pp. 212–224.

³ Hilary Putnam first made this suggestion in, "On Properties", in *Mathematics, Matter and Method: Philosophical Papers*, vol. 1 (London: Cambridge University Press, 1975), at pp. 313–314; see also Hartry Field, "Mental Representation", *Erkenntnis*, vol. 13 (1978), pp. 9–61. For criticism, see fn. 20.

⁴ Jaegwon Kim, "Supervenience and Nomological Incommensurables", *American Philosophical Quarterly*, vol. 15 (1978), pp. 149–156; and his "Concepts of Supervenience", *Philosophy and Phenomenological Research*, vol. 45, (1984), pp. 153–176. For criticism, see fn. 14.

⁵ Jaegwon Kim, "Phenomenal Properties, Psychophysical Laws, and the Identity Theory", *Monist*, vol. 56 (1972), at p. 190; and the references in fns. 8–11.

⁶ Ned Block, "Troubles With Functionalism", in C. Savage, ed., *Minnesota Studies in the Philosophy of Science*, vol. 9 (Minneapolis: University of Minnesota Press, 1978), pp. 265–266. See also the references in fns. 22 and 23.

⁷ Kim, "Phenomenal Properties, Psychophysical Laws, and the Identity Theory", p. 190.

⁸ David Lewis, "Mad Pain and Martian Pain", in *Philosophical Papers*, vol. 1 (London: Oxford University Press, 1983), pp. 126–127. Let me underscore the rationale for the NRS. For even though, on Lewis's view, "pain" is nonrigid, yet if (1) "pain = the [on some interpretations second-order] type whose instances occupy causal role R"; and (2) "the [first-order] type which occupies causal role $R = C$ -fibers", and (3) "the [first-order] type which occupies causal role $R = X$ -fibers"; then we derive the untoward result that (4) " C -fibers = X -fibers". Hence the NRS – relativize the mental type in (2) to Humans and (3) to Martians, and (4) no longer follows. Cp. Cynthia Macdonald's discussion of nonrigidity and improper descriptions in *Mind-Body Identity Theories* (London: Routledge, 1989), pp. 50–55. I would prefer to finesse the controversial rigidity/nonrigidity issue by casting the entire discussion in terms of predicate expressions rather than singular descriptions, i.e., "is a pain" or "being an instance of causal role R " which, I assume, all parties will agree to be rigid. Note Block's remarks on Lewis in, "Introduction: What is Functionalism?", *Readings in Philosophy of Psychology* (Cambridge Mass: Harvard

University Press, 1980), vol. 1, p. 181. These remarks apply, *mutatis mutandis*, to Jackson, Pargetter and Prior's more narrow version of the causal theory discussed later.

⁹ David Armstrong and Norman Malcolm, *Consciousness & Causality: A Debate on the Nature of Mind* (London: Basil Blackwell, 1984), p. 162.

¹⁰ The NRS is implicit in Robert Causey's remarks about special science kinds being "split up" into different natural kinds which could then be identified with their respective physical correlates. See his *Unity of Science* (Dordrecht, Holland: D. Reidel Publishing, 1977), pp. 147–149; also Berent Enc, "In Defense of the Identity Theory", *Journal of Philosophy*, vol. 76 (1983), pp. 288–290; and Mark Wilson, "What is this Thing Called 'Pain'? – the Philosophy of Science Behind the Contemporary Debate", pp. 228–229.

¹¹ Paul Churchland, *Matter and Consciousness* (Cambridge Mass: M.I.T. Press, 1984), pp. 48–49; also Patricia Churchland, *Neurophilosophy* (Cambridge Mass: M.I.T. Press, 1986), p. 357.

¹² Sometimes I will speak about a reduction of the higher-level theory, other times the reduction of its properties. This will cause no harm if the reduction of a theory will generally proceed in terms of property identities, or at least biconditional laws which ground them. Arguments for the necessity of biconditionals in reductive contexts can be found in Causey's *Unity of Science*, chaps. 4 & 5.

¹³ Kim, "Phenomenal Properties, Psychophysical Laws, and the Identity Theory", p. 190.

¹⁴ See D. M. Armstrong, *A Theory of Universals* (London: Cambridge Press, 1978), esp. p. 20; Paul Teller, "Comments on Kim's Paper", *Southern Journal of Philosophy*, vol. 22 (1983), Suppl., pp. 57–61; David Owens, "Disjunctive Laws", *Analysis*, vol. 49 (1989), pp. 197–202; and Cynthia Macdonald, *Mind-Body Identity Theories*, pp. 36–38. Though no friend of disjunctive properties, I urge caution against some of this criticism in my "Macdonald on Type Reduction via Disjunction", *Southern Journal of Philosophy*, vol. 29, (1991), pp. 209–214.

¹⁵ See Kim's "The Myth of Nonreductive Materialism", *Proceedings and Addresses of the American Philosophical Association*, vol. 63, no. 3 (1989) p. 38; also his "The Disunity of Psychology as a Working Hypothesis?", unpublished manuscript. Parenthetically, I think laws which take the form of (NRS₂) are simply *uninteresting*. Do we gain anything, metaphysically speaking, when we say that roads reduce to bridges relative to rivers?

¹⁶ Kim, "Concepts of Supervenience", p. 173.

¹⁷ "The Myth of Nonreductive Materialism", p. 39.

¹⁸ In his "The Disunity of Psychology as a Working Hypothesis?"

¹⁹ Kenneth Schaffner, "Approaches to Reduction", *Philosophy of Science*, vol. 34 (1967), p. 144; cp. also Paul Churchland, *Scientific Realism and the Plasticity of Mind* (Cambridge: Cambridge University Press, 1979), p. 83, where he speaks about a reduced theory which is "closely similar" to the original and which "finds an appropriate image" within the reducing theory.

²⁰ David Armstrong, *Consciousness & Causality*, at pp. 162–163. Another problem with the second-order strategy is that, though causal roles are often analyzed into second-order properties (roles that first-order types play), yet functionalists have typically wanted to identify each mental type with the first-order functional property associated with such roles, viz., the property of being an instance of a type which plays the causal role. This is the functional property that mental *particulars* have in common. Christopher Hill

clarifies this point nicely in his *Sensations: A Defense of Type Materialism* (Cambridge: Cambridge University Press, 1991), pp. 46–48. Cp. also Ned Block, “Troubles With Functionalism” in *Readings in Philosophy of Psychology*, vol. 1, pp. 296–297, fn. 4.

²¹ Block, “Troubles With Functionalism”, *Minnesota Studies in the Philosophy of Science*, vol. 9, pp. 265–266. The argument is omitted from the version we find in *Readings in Philosophy of Psychology*, vol. 1.

²² “Introduction: What is Functionalism?”, pp. 178–179.

²³ David Wiggins, “Identity, Necessity and Physicalism”, in Stephan Korner, ed., *Philosophy of Logic* (Oxford: Blackwell, 1976) p. 128, fn. 22; and Kim Sterelny, *The Representational Theory of Mind* (Oxford: Basil Blackwell, 1990), pp. 200–201. I should add that Sterelny goes beyond the mere charge of explanatory inadequacy, suggesting in support that cross-species biological phenomena also need explaining in a general way (e.g., mimicry as an adaptive strategy to deceive predators). Sterelny further criticizes the NRS on grounds that there is an disanalogy between domain specific instances of temperature and species-specific intentionality (assuming functionalism, the realization base of the latter is said to be “arbitrarily large and messy”). This latter point, however, I take to be more suggestive than substantive.

²⁴ For this latter point I have in mind Robert Causey’s “Attribute Identities in Micro-reductions”, *Journal of Philosophy*, vol. 69 (1972), pp. 407–422.

²⁵ Block, “Troubles with Functionalism”, in *Readings in Philosophy of Psychology*, vol. 1., pp. 291–293.

²⁶ See, e.g., Howard Gardner, *The Mind’s New Science* (N.Y.: Basic Books, 1985), chap. 9. Note also Block and Fodor’s appeal to Lashleys neurological equipotentiality in “What Psychological States Are Not”, *Readings in Philosophy of Psychology*, vol. 1, p. 238.

²⁷ Jerry Fodor, *The Modularity of Mind* (Cambridge Mass: M.I.T. Press, 1983), p. 98.

²⁸ O. L. Zangwill, *Cerebral Dominance and its Relation to Psychological Function* (Edinberg: Oliver & Boyd, 1960); and R. W. Sperry, ‘Lateral Specialization in the Surgically Separated Hemispheres’, in Schmitt and Worden, eds., *The Neurosciences Third Study Program* (Cambridge Mass: M.I.T. Press, 1974).

²⁹ Gardner, *ibid.*, p. 278.

³⁰ Fodor, “Special Sciences”, p. 134.

³¹ Armstrong, *Consciousness & Causality*, p. 162.

³² Kim, “The Myth of Nonreductive Materialism”, p. 38.

³³ Brian Loar, *Mind and Meaning* (London: Cambridge University Press, 1981), pp. 15–20.

³⁴ Frank Jackson, Robert Pargetter, and Elizabeth Prior, “Functionalism and Type-Type Identity Theories”, *Philosophical Studies*, vol. 42 (1982), pp. 209–225.

³⁵ The most complete account is Kim’s “Causation, Nomic Subsumption, and the Concept of Event”, *Journal of Philosophy*, vol. 70 (1973), pp. 217–236; also Lawrence Lombard, *Events: A Metaphysical Study* (London: Routledge & Kegan Paul, 1986).

³⁶ *Naming and Necessity* (Cambridge Mass: Harvard University Press, 1980), p. 144. Cp. also Richard Boyd, “Materialism Without Reduction: What Physicalism Does Not Entail”, *Readings in Philosophy of Psychology*, vol. 1, p. 83.

³⁷ Jennifer Hornsby made a similar point in “On Functionalism, and on Jackson, Pargetter and Prior on Functionalism”, *Philosophical Studies*, vol. 46 (1984), pp. 83–84. She

argues that such descriptions could have been satisfied at the time in question by individuals with differing physical traits (as the role of Hornsby's cricket player Botham could have been occupied by someone slightly taller).

³⁸ Jackson, Pargetter, and Prior have point (a) in mind when they make the observation: "Similarly when we say that pain for *O* at *t* is what fills . . . the pain-role for *O* at *t*, we aren't saying that *O* is in pain at *t*"; and they explicitly endorse (b) by relying on "a distinction between the generality of an identity claim and whether it concerns types" (ibid., p. 211). For the reference to Kim, see fn. 35.

³⁹ Sections of this paper were read at the central division meeting of the *American Philosophical Association*, 1991. I should like to thank John Post for his exceptionally kind remarks. Michael Burke, Charles Carr, Thomas Grimes, Joseph Sartorelli, Edward Smith, William Taschek, and Stephen Yablo all made helpful suggestions on earlier drafts. Special thanks goes to Jaegwon Kim.

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