Realization, Completers, and *Ceteris Paribus* Laws in Psychology

ABSTRACT

I defend Jerry Fodor's ([1991]) account of the semantics of *ceteris paribus* laws against an

objection raised by Peter Mott ([1992]). In doing so, I clarify certain issues regarding the nature

of realization. I argue that not all things that realize a state or property are realizers of that state

or property: the relation *x realizes y* tolerates the inclusion of gratuitous elements in *x*—elements

that play no particular role in the realization of *y*—whereas the relation *x is a realizer of y* does

not. I then criticize a rejoinder that, in effect, builds such gratuitous elements into the

antecedents of the laws of a science of the realized properties.

If there are laws of psychology, they would seem to hold only *ceteris paribus* (*c.p.*, hereafter),

i.e., when other things are equal. If a person wants that *q* and believes that doing *a* is the most

efficient way to make it the case that *q*, then she will attempt to do *a*—but not if she believes that

a carries with it consequences much more hated than *q* is liked, or she believes she is incapable

of doing *a*, or she gets distracted from her goal that *q*, or she suddenly has a severe brain

hemorrhage, or.... No one can say precisely where the list ends. The idea, however, is supposed

to be clear enough: normally the law holds, but there are many cases, exceptions, one might say,

in which the law does not; the difficulty of characterizing these exceptions invites the qualification '*c.p.*' as catch-all.

Open-ended, all-purpose riders offend the intellectual sensibilities. In the present case, the indeterminate nature of *c.p.* clauses calls into question the very meaningfulness, or at least the value, of *c.p.* law-statements. If the list of allowable exceptions to a given *c.p.* law is unprincipled and cannot be completed, the corresponding *c.p.* law-statement would seem to assert no more than 'A causes B, except when it does not'. If *that* is the correct gloss, *c.p.* laws have no place in a rigorous empirical science. Admittedly, the assumption that there are *c.p.* laws has proven useful; perhaps those working in the social and behavioral sciences should continue to investigate *c.p.* laws, regardless of whether anyone has developed a satisfactory semantics for *c.p.* law-statements. Nevertheless, such a semantics we should want. In this short essay, I consider an account proposed by Jerry Fodor ([1991]), defending it against an objection raised by Peter Mott ([1992]). In doing so, I shall clarify certain issues regarding the nature of realization.

1 Fodor's proposal

Part of what it is to be a *c.p.* law is to admit of exceptions. Taking laws to be universally quantified conditionals,[1] an exception to a law is a case where the antecedent of the law holds but the law's consequent does not. Fodor puts this in terms of realizers: in some cases, the realizer of the antecedent of a *c.p.* law does not cause[2] a realizer of that law's consequent. According to Fodor, so long as there are other circumstances where that antecedent's realizer would have caused the consequent (or its realization—let this be understood), the generalization in question could be a *c.p.* law, even though it admits of exceptions. In other words, if for any realizer of the

antecedent of a law-like generalization, there is some complementary state (a completer) that, together with the realizer of the antecedent, causes the consequent (but which does not alone cause the consequent), that generalization satisfies a necessary condition for being a *c.p.* law. Consider the following candidate law of psychology: if a person wants to get out of bed, then other things being equal, she will try to get out of bed. This is not a strict law; when a person is subject to pathological states or stronger conflicting desires, the antecedent can have a realizer that does not cause a realizer of the consequent. Nevertheless, for any given realizer-type of the desire to get out of bed, there would seem to be a completer. Many overall brain states (subtracting the neural realizer of the desire to get out of bed) of the nondepressed human subject are completers relative to the simple law under consideration. Thus, this candidate law appears to meet Fodor's necessary condition on *c.p.* lawhood.

Fodor would, however, like the semantics of *c.p.* law-statements to accommodate what he calls 'absolute exceptions': cases in which a realizer of the antecedent of a *c.p.* law has *no* completers at all.[3] To allow for absolute exceptions, Fodor invokes the idea of a law-network: the network of *A*-laws is the set of laws each of which has *A* in its antecedent. As Fodor sees things, the truth-conditions of *cp(A → B)* allow absolute exceptions so long as any realizer of *A* that is an absolute exception has a completer relative to many of the other laws in the *A*-network.

According to Fodor, then, a *c.p.* law-statement—say, *cp(A → B)*—is true only if a certain disjunction holds of any given realizer of *A*: either that realizer has a completer relative to *cp(A → B)* or, relative to each member of a set constituting many laws in the *A*-network, that realizer has some completer or other (Fodor [1991], p. 27).

2 Mott's objection

Mott criticizes Fodor's view in two stages, dismissing each disjunct in turn. Mott begins by arguing that Fodor's first disjunct, taken alone, can be reduced to absurdity. Thus, the fate of Fodor's theory rides on that of the second disjunct. Mott then argues that Fodor's second disjunct, too, is subject to damning criticism. In what follows, I respond only to Mott's criticism of Fodor's first disjunct. Discussion of the second disjunct raises a distinct set of concerns that need not be addressed in order to salvage the first; and if the first disjunct can be vindicated, then a substantive—albeit limited—version of Fodor's view survives, regardless of how the second disjunct fares.[4]

Mott argues that virtually any law of psychology satisfying Fodor's first disjunct entails a contradiction, so long as a few reasonable assumptions are in effect. For any candidate *c.p.* law of psychology of the form $cp(M \rightarrow B)$, it seems plausible that there exists some psychological state N such that if it is realized concurrently with M, then, other things being equal, B will *not* occur. Take M to be the desire to go for a walk, take N to be the awareness that one's legs are extremely sore, and take B to be the behavior of preparing for a walk. Perhaps people who desire a walk generally prepare for a walk, but not when they take their legs to be especially sore. Thus, for any proposed psychological law $cp(M \rightarrow B)$, we should accept that $cp((M\&N) \rightarrow \neg B)$. Add the reasonable inference from $cp((M\&N) \rightarrow \neg B)$ to $\neg cp((M\&N) \rightarrow B)$, and Mott has the makings of a serious problem. To generate an actual contradiction Mott assumes the principle he labels (P3): 'If R realizes $M\&N$, then R realizes M' (Mott [1992], p. 338). Given that $cp(M \rightarrow B)$ is assumed to be a law, Fodor's first disjunct entails that any realizer of M has a completer relative to B. Therefore, given (P3), any realizer of $M\&N$ has a completer relative to B.[5] Therefore, $cp((M\&N) \rightarrow B)$,[6] contradicting $\neg cp((M\&N) \rightarrow B)$.

3 Conjunctive states, realization, and minimal realization

Mott's *reductio* founders on (P3). Mott worries about the obscurity of the notion of realization, claiming that if one denies (P3), the notion of ' "realization" becomes so obscure as to be useless for expounding anything' (Mott [1992], p. 338). One should sympathize with Mott's desire for clarity yet insist on an account of realization that legitimates (P3), if (P3) is to be granted the role Mott assigns to it. After all, merely accepting (P3) does little to clarify the notion of realization. The search for a plausible and more detailed account of realization would, however, seem either to end in the rejection of (P3) or to suggest a natural and compelling way of insulating Fodor's proposal from Mott's criticism.

Consider a fairly standard functionalist account of realization, beginning with a functionalist account of mental states.[7] On this view, a subject is in mental state *M* iff that subject instantiates the property[8] that plays *M*'s causal-functional role. The general idea is that to be in a given mental state is nothing more than to be in a state that bears the appropriate causal relations to inputs, outputs, and other mental states: wanting apple juice *just is* whatever mental state combines with the belief that there is apple juice in the refrigerator and the perception of the refrigerator in a certain location to cause the appropriate output commands—the ones that will move the subject's body towards the refrigerator. This is a greatly simplified account of the desire for apple juice, and even so, it is schematic in certain respects. Nevertheless, the functionalist approach holds that if all of the relevant details were to be filled in, the state playing the causal role thereby characterized would in fact be the mental state of wanting apple juice. This can be expressed more formally using a variation on a method developed by Frank Ramsey and David Lewis ([1970]),

$$(x)\{x \text{ is in } M \text{ iff } \exists F_1 \dots \exists F_n[\mathbf{T}(F_1 \dots F_n, I_1 \dots I_m, O_1 \dots O_l) \& F_i x]\}$$

where the various I's and O's are antecedently understood predicates, typically taken to express input and output properties, and where $\mathbf{T}(F_1...F_n, I_1...I_m, O_1...O_l)$ represents the best theory of the constitutive causal relations that obtain between various mental properties and input- and output-properties (sensory inputs and behavioral outputs on most functionalist accounts of mental properties). In the example given above, the Ramsey-Lewis method was used to characterize only M. Assuming, though, that $\mathbf{T}$ represents the best theory of mental properties (a completed scientific psychology or fully refined folk psychology, depending on one's brand of functionalism), $\mathbf{T}$ implicitly characterizes all of the other mental states as well, each corresponding to the value of a distinct F.

This characterization of mental states does not entail materialism, a fact that many take to be a shortcoming of the bare functionalist approach. Of greater concern is that the view allows for unacceptably flexible (i.e., unfalsifiable) functionalist theorizing. As stated, the attribution of mental states is constrained only by relations to input and output states; given that innumerable structures of interrelated F's are consistent with the same observed pattern of input and output states, one should want some further constraint on the positing or attribution of functional states.[9] A common solution requires that for F_ix to be true, F_i and the other functionally characterized mental states must be realized in a corresponding network of x's nonmental states—physical states of x's brain, for instance. Put formally,

$$(x)\{F_ix \text{ iff } \exists P_1...\exists P_n[\mathbf{T}(P_1...P_n, I_1...I_n, O_1...O_n) \& P_ix]\}$$

where the right-hand side of the biconditional results from the above characterization of M by systematic substitution of variables $P_1...P_n$ that range over nonmental properties for the property variables $F_1...F_n$, together with corresponding changes in quantifiers.[10]

This view of realization speaks against (P3). Assume that *M* and *N* are characterized by our best psychological theory, as, say, F_{22} and F_{40}, respectively. Thus, state P_{22} is a realizer of F_{22}, P_{40} of F_{40}. Now, recall that Mott's argument depends on the inference from '*R* realizes *M&N*' to '*R* realizes *M*'. *Qua* a state that realizes the single compound state *M&N*, *R* is the single compound physical state $P_{22}\&P_{40}$. I maintain that *R* is not a realizer of *M*, contrary to (P3). Admittedly, the presence of the conjunctive state $P_{22}\&P_{40}$ entails the presence of P_{22} in the subject. Furthermore, that *M&N* is realized entails that *M* is realized. These entailments do not, however, show that the realizer of *M&N* is identical to the realizer of *M*. Consider other functional categories, e.g., those of automotive mechanics. Imagine that there, on the garage floor, lie a carburetor and a drive shaft. The assembly that we call the 'carburetor' is a realizer of *carburetor*, and the assembly we call the 'drive shaft' is a realizer of *drive shaft*. One *might* say that the space-time chunk constituted by the two assemblies realizes *carburetor*, but only in the sense that the existence of the space-time chunk entails the presence of a realizer of *carburetor*. It would, however, be misleading—in fact, semantically deviant—to collect together the two items and claim that, taken together, they are a realizer of *carburetor*. Normally, '*x* is a realizer of *y*' licenses, at least informally, the statement of a token identity, '*x* is *y*'. Here, however, there is no sense, not even an informal one, in which the conglomeration of the two assemblies *is* the carburetor.[11]

Plausible theories of the nitty-gritty details of realization also impugn (P3). Although neuroscience is complicated business, I know of no serious proposal according to which the same neural structure that plays the role of *M*, say, a desire for beer, plays, *on the very same occasion*, the role of *N*, say, a belief that abstaining would be best. (P3) implies the opposite, however, for if a realizer of *M&N* is a realizer of *M*, then, given the generality of (P3), a realizer

of *M&N* is also a realizer of *N*. By the transitivity of identity, we arrive at a further unacceptable

result: if (P3) is true, *M* and *N* have the same realizers on occasions when both are realized. I

conclude, then, that Fodor's first disjunct survives Mott's attempted *reductio*.

   Might someone insist, though, that there is a sense in which $P_{22}\&P_{40}$ is a realizer of *M*

(and of *N*, for that matter), at least in whatever sense is entailed by the fact that if $P_{22}\&P_{40}$ is

instantiated, then *M* is realized? Capitulation here need be accompanied only by a

straightforward amendment to Fodor's view. Here is my proposed amendment, put in

biconditional form (with the second disjunct excluded):[12]

   $cp(M \rightarrow B)$ iff $(R)(R$ is a minimal realizer of $M \rightarrow$ [either $(\exists C)nn((R\&C) \rightarrow B)$
   or...])

where *nn* indicates that an implication holds by natural necessity and where being a 'minimal

realizer' is defined in the following way:

   A *minimal realizer* of state F_i (and thus of the relevant mental state *M*) is the corresponding state

   P_i, appearing in the Ramsified realization formula, that does not comprise any distinct state P_j

   also appearing in the Ramsified realization formula of the theory in which F_i appears.

This definition renders the notion of a minimal realizer theory-relative, in that whether P_i and P_j

are distinct for our purposes depends on the characterization of F_i and F_j as distinct states. This

is unobjectionable, though, for Mott's *reductio* must be couched in the vocabulary of a theory

that treats *M* and *N* as distinct states. Once we have formulated a psychological theory in which

M and *N* appear and have spelled out our theory of realization, *M* and *M&N* will almost certainly

not have common minimal realizers. Thus, the realizer of *M&N* will almost certainly not be a

minimal realizer of *M*. In consequence, Mott cannot take *M&N* as the value of *R* when applying

the revised version of Fodor's first disjunct. Therefore, $cp((M\&N)\rightarrow B)$ does not follow from the realization of *M&N*.

4 Mixed antecedents

Thus far, I have assumed that a law-statement must be framed in the vocabulary of the science of which the law-statement is a part, together with logical and mathematical terms. This is a widely held assumption,[13] although it might be a relic of positivist philosophy of science. Regardless, I have not been unfair to Mott in assuming that laws must be stated in the proprietary vocabulary of the science of which the laws are a part, for Mott would seem to agree. Of greatest importance is the way he describes values of *N*: 'Intentional laws can be intentionally overridden', he claims, and *N* represents the intentional state doing the over-riding.[14] Nevertheless, if Mott were to allow the values of *N* to be something other than intentional states, say, brain states or environmental conditions characterized nonintentionally, perhaps the preceding criticisms of Mott's *reductio* would lose their force.

Let us provisionally allow law-statements with what I shall call 'mixed antecedents', where a mixed antecedent is one couched partly in the proprietary vocabulary of the science that includes the law-statement in question and partly in terms of other sciences. Now reconceive of Mott's *reductio* on a mixed-antecedents model, where *N* can be something other than an intentional state, even though the laws at issue are thought to be laws of psychology. Candidate nonintentional values of *N* abound. Assume that, as a law of psychology, feeling thirsty leads to drinking behavior, *ceteris paribus*. Many neural states or environmental conditions would, if realized, stop one from exhibiting drinking behavior when thirsty: one might be paralyzed or bound. What is more, these states would *seem* to count as minimal realizers: such a state neither

includes, nor is included as part of, a state corresponding to the value of a property-variable in the satisfied realization-formula. My earlier appeal to minimal realizers succeeded as a defense of Fodor's view partly because *M* and *N* corresponded to values of distinct *F*s and thus to values of distinct property-variables in the Ramsified realization formula. Since, however, our current *N* is not an intentional state, it does not correspond to the value of a property-variable in the Ramsified realization formula.[15] Thus, one might pursue Mott's criticism of Fodor's first disjunct by arguing that the realizer of the mixed antecedent *M&N* is, after all, a minimal realizer of *M* relative to the Ramsified realization formula. The realizer-state in question is not a complex of the values of two or more distinct *P*s appearing in the Ramsified realization formula, yet the state can still play the role of *N* in Mott's *reductio*.

The move to mixed antecedents does not advance Mott's cause. The proponent of the mixed-antecedent approach holds that there is a state, call it *R*, that realizes both *M* and *M&N*. Furthermore, the part of *R* in virtue of which it realizes *N* alone—i.e., the part that would be a realizer of *N* even if *M* were not instantiated—is not psychologically significant; it does not realize any intentional state and is not recognized by psychology as a state worthy of inclusion in the Ramsey sentence of psychological theory. As such, however, *R simply is not a minimal realizer of M*. Per the definition given above, a '*minimal realizer* of state F_i (and thus of the relevant mental state *M*) is the corresponding state P_i, appearing in the Ramsified realization formula...' The state *R*, however, is not any *P* corresponding to any *F*. As a realizer of *M&N*, the state *R* is a single compound state the components of which are (a) a physical state that is the value of a state-variable in the Ramsified realization formula and (b) some other physical state playing no distinct role in the Ramsified realization formula (if it does play a distinct role, then *N* would be an intentional state after all—see note 15). As such, the compound physical state in

question is not the value of any variable in the Ramsified realization formula.[16] The functionalist approach to realization should be guided by some notion of simplicity; such considerations prohibit the expansion of a satisfactory value of some P when that expansion results in a more complex value the added complexity of which contributes nothing to its status as a realizer of the corresponding F. Thus, the inference from 'R realizes M' to '$M\&N$'s realizers have completers relative to $(M\&N)\rightarrow B$' fails, even on the mixed-antecedents approach. Given that R, as the realizer of a mixed antecedent, is not a minimal realizer of M, the revised formulation of Fodor's first disjunct does not entail that R has a completer relative to a *c.p.* law with M as antecedent. This of course blocks the further inference to '$cp((M\&N)\rightarrow B)$', without which Mott's proposed *reductio* wants a contradiction.

In fact, matters are worse for the mixed-antecedents approach than I have made them out to be. It is not merely that R fails to be a minimal realizer—although of course that does the trick for present purposes; R is not a realizer of M *at all*. The root of the problem lies in (P3). Recall that minimal realizers were introduced on the assumption that Mott could somehow turn the straightforward objection to (P3), a concession made only for the sake of argument. The initial objection to (P3) stands, however: the mereological sum of the carburetor and the drive shaft is not, in fact, a realizer of the property *carburetor*, for one cannot felicitously say that the carburetor *is* the combined physical chunk constituting the carburetor and the drive shaft together. This intuition applies equally in the present case, especially clearly where our nonintentional N is an environmental condition. Take a mental state, the feeling of thirst. Assume that its neural realizer in some particular subject is P_{28}. Now consider an environmental condition, say, the presence of a small locked cell surrounding the subject, which might interfere with the subject's drinking behavior. We should not accept that the physical assemblage of the

small locked cell surrounding the subject, taken together with P_{28}, *is* a realizer of *thirst*, regardless of whether the existence of the conglomeration of the cell and P_{28} entails that *thirst* is realized; for such a view entails that the conglomeration in question—the neural state together with the locked cell—*is* the subject's thirst.

Consider a final concern. The mixed-antecedent approach seems to make a mess of the realization relation. Assume that *M* is a mental state realized by a neurological state P_1. Assume also that neurological state P_2 constitutes the state appearing in a mixed antecedent alongside *M*. Application of (P3) requires that a single, compound neurological state realize the conjunctive state *M*&P_2. On this approach, a single neurological state partly realizes a higher-level state while at the same time realizing a state at the same level as itself. In fact, the consistent application of (P3) to our mixed antecedent requires that the single state P_1&P_2 realize three states: *M* alone, P_2 alone, and the compound state *M*&P_2. One might reasonably hold that talk of realization is supposed to clarify relations between levels in nature or between scientific domains; however, the application of (P3) to mixed antecedents seems only to muddy the waters in this regard, given the range of intra- and inter-level realization-relations into which one and the same realizer must enter. What is perhaps more troubling, the thoroughgoing application of (P3) entails that the realizer of *M* alone is identical to the realizer of P_2 alone, even though *M* is a mental state and P_2 is a physical state not related to *M* in any very direct way. What sort of independently motivated theory of realization allows for such complex patterns of both intra- and inter-level realization, not to mention such highly counterintuitive identity relations among realizers? I shall not argue that no model of realization can accommodate all of these relations; nevertheless, the advocate of the mixed-antecedent approach would seem to have her work cut out for her. I doubt that the mixed-antecedent approach can stand up to the first two objections

raised above. If it somehow does, we should bear in mind that the ultimate success of the mixed-antecedents approach depends on a theory of realization meeting these stringent, apparently unmotivated demands.

The nature and existence of *c.p.* laws remain open questions. Fodor's completer-based semantics for *c.p.* law-statements might help to resolve some of these questions. At the very least, I have shown that Mott's criticism of Fodor's first disjunct does not block this path forward.

Acknowledgements

University of Colorado, Boulder

Department of Philosophy

Campus Box 232

Boulder, CO 80309-0232

robert.rupert@colorado.edu

References

Block, N. [1980]: 'Introduction: What is Functionalism', in N. Block (*ed.*), 1980, *Readings in the Philosophy of Psychology*, Volume one, Cambridge, MA: Harvard University Press, pp. 171-84.

Fodor, J. [1981]: *Representations*, Cambridge, MA: MIT Press.

Fodor, J. [1991]: 'You Can Fool Some of the People All of the Time, Everything Else Being Equal; Hedged Laws and Psychological Explanations', *Mind*, **100**, pp. 19-34.

Lewis, D [1970]: 'How To Define Theoretical Terms', *Journal of Philosophy*, **67**, pp. 427-46.

Mott, P. [1992]: 'Fodor and Ceteris Paribus Laws', *Mind*, **101**, pp. 335-46.

Schiffer, S. [1991]: 'Ceteris Paribus Laws', *Mind*, **100**, pp. 1-17.

Shoemaker, S. [1981]: 'Some Varieties of Functionalism', *Philosophical Topics*, **12**, pp. 93-118.

Shoemaker, S. [2003]: 'Realization, Micro-Realization, and Coincidence', *Philosophy and Phenomenological Research*, **67**, pp. 1-23.

---

[1] I will often treat law-statements and laws themselves as equivalent where nothing in the argument turns on a careful observation of the distinction between the two. Also, the quantificational structure of law-statements will be of no particular relevance in what follows and thus, as in the practice in much of the current literature, I frequently omit reference to it, employing instead the bare conditional form $A \rightarrow B$.

[2] Or is not causally sufficient for; these will be used interchangeably.

[3] Here Fodor is responding partly to arguments in (Schiffer [1991]).

[4] Furthermore, one might wonder how plausible it is that *c.p.* laws have absolute exceptions, and thus how important it is to save Fodor's second disjunct. (Note that Fodor expresses doubt about the case of psychological laws—[1991], pp. 25-26.) Schiffer claims that some realizer of a given mental state *A* might consist in a defeating condition for the causation of *A*'s supposed nomological consequence *B* (Schiffer [1991], p. 7). That there are such realizers is certainly conceivable in the weak sense entailed by Schiffer's having described it. This kind of conceivability does not, however, show that our semantics for *c.p.* law-statements must give determinate answers about the cases so conceived. In respect of the actual world and ones

nomologically like it, it is plausible that there are neurological realizers of *A* that would, under

many conditions in the actual world, interfere with or inhibit the production of a realizer of *B*.

This, however, is a far distance from the claim that it is *nomologically impossible* to rig up the

subject's brain so that the realizer of *A* in question causes a realizer of *B*. So long as our realizer

of *A* has any causal powers at all, one suspects that they could be exploited to bring about a

realizer of *B*. Perhaps this shows that more powerful constraints than mere nomological

possibility should be placed on completers, but I leave that question for another day.

[5] Cf. Schiffer's concern ([1991], pp. 7-9) mentioned in note 4.

[6] The inference from '*(M & N)→B* satisfies a necessary condition for *c.p.* lawhood' to '*cp((M &*

N)→B)' is invalid, and this might seem reason enough to resist Mott's *reductio*. All the same,

Fodor sometimes suggests that he is stating necessary and sufficient conditions for the truth of a

c.p. law-statement (i.e., necessary and sufficient conditions for something's satisfying the

distinctively c.p. aspect of a claim to *c.p.* lawhood; other conditions must be met for the law-

statement to be true, general conditions pertaining to its being a *law*—Fodor [1991], p. 22).

Furthermore, it is clear that Mott is here operating under a biconditional interpretation of Fodor's

view. Thus, I make no more of this objection to Mott's argument.

[7] For more details, see (Block [1980]; Shoemaker [1981]).

[8] For ease of exposition, I shift freely between talk of states and properties; substantive issues

lurk here, but nothing in the present discussion turns on a choice of states over properties or vice

versa.

[9] Cf. (Fodor [1981], pp. 12-4).

[10] See (Shoemaker [1981], especially sections I and II, [2003], pp. 14-5). Note that the account

of realization given in the text does not require type-type reduction of mental states to physical

states. It need not be the case that the same physical state play the role of, for example, P_2 in all subjects; so long as the subject is in a properly interrelated collection of physical states, the realization formula holds and, at least on the functionalist view, F_2 is true of the subject—and thus the subject is in the corresponding mental state, say, M_2.

[11] It might be worth noting that, although Fodor ([1991], p. 27) states his view using the nominal 'realizer', Mott ([1992], p. 336) formalizes Fodor's approach using the verb-form 'realizes'. This kind of shift normally does no mischief. In the present case, however, it makes a difference; the argument in the main text shows that not everything that realizes M is a realizer of M.

   In my example, the carburetor and drive shaft are detached from any working automobile; this might make some readers uneasy, for only when attached to a working vehicle do the parts in question actually play their causal-functional roles. To alter the example accordingly would not, however, weaken my argument; even when properly attached to a functioning vehicle, the combined chunk of physical stuff that makes up the carburetor and drive shaft no more counts as the carburetor than does the collection of parts lying on the garage floor.

[12] For the un-amended formal statement after which this is patterned, see (Mott [1992], p. 336).

[13] Cf. Fodor's ([1991], p. 30) discussion of special-science laws. This should not, however, be conflated with a contrasting point: it need not be possible to describe completers in the proprietary vocabulary of the special science whose *c.p.* laws are at issue (Fodor [1991], pp. 23-24).

[14] See (Mott [1992], p. 338 and also p. 336, where Mott first introduces M and N).

[15] On reasonable assumptions concerning the nonredundancy among the values of the relevant variables, P_j's appearing in the realization formula entails that P_j's value corresponds to the value

of a functional state F_j distinct from the value of any other functional state-variable F_i appearing in the Ramsification of our psychological theory, and thus the value of P_j corresponds to a mental state M distinct from any other mental state recognized by our psychological theory. [16] Similar remarks would apply if N were a psychological state but not one important enough to appear in the Ramsification of psychology (I am not convinced, though, that there are states so lacking in importance yet still having the power to alter M's effects in the manner under consideration).