Jerry Fodor and his “Special Sciences”

So, what are “special sciences?” – ones that are particularly dear to the author? (“Oh dear. I am touched. Psychology is just, so, well, special!”)

The use of “special” in this context should be understood in contrast with “general,” in the very same sense that distinguishes Einstein’s “Special Theory of Relativity” from his “General Theory.” The intended contrast here (to reverse the order) is between a generalization and specific or “special” instances of it. Consider Einstein’s Relativity Theory. His first work on this subject, the “Special Theory of Relativity,” dealt only with objects moving at constant velocities (i.e., whose direction and speed of motion did not change). But, of course, not all objects move at a constant velocity, so this theory was not perfectly general, but applied only to a limited class of cases. Later, Einstein extended his theory to include objects in all kinds of motion, both constant velocities, and those undergoing acceleration. This is his “General Theory of Relativity.” This is the use of “special” in Fodor’s discussion of “special sciences.” They are “sciences,” or sets of laws, that are seen as “special cases” of some more general set of laws. Just as Einstein’s Special Theory is consistent with and implied by his General Theory, so should Fodor’s special sciences be consistent with and implied by some more general science.

Physicalism is (or entails) the view that everything is physical and falls under physical laws. So if physicalism is true, then physics is the “final” or “most general” science, and so all the “other” sciences (e.g., chemistry, biology, physiology, etc.), since the domains they describe are ultimately comprised of physical things bound by the laws of physics, should turn out to be just “special cases” of the more general laws of physics, in just the way that special relativity is a “special case” of general relativity. And so these sciences (or, the laws which comprise them) should all turn out to be consistent with and entailed by the laws of physics. The belief that this can (in principle) be carried out (or the program of trying to explain this) is known as “reductionism.” So, is it true that, for example, chemistry can be reduced to physics? Can biology? Whatever difficulties may arise in these sorts of cases, things get dicey-er still when we get to psychology, as we then confront, in addition, all the myriad of philosophical issues connected with the “mind-body” problem. The difficulties in describing just what such a “reduction” (of the special sciences to physics) actually amounts to, is the subject matter of Fodor’s essay. And he is none too optimistic about the prospects of success.

Fodor begins by looking at what, exactly, such a reduction of the laws of the special sciences to physics must mean. He considers a purported law in such a special science:

\[(1) \quad S_1 x \rightarrow S_2 y\]

\(S_1\) and \(S_2\) are understood to be predicates in the science we wish to reduce to physics, and so what this formula says is that \(x\) having property \(S_1\) brings it about that \(y\) has property \(S_2\). Now if reductionism is correct, then whatever is a law in a special science must be a special case of a law in physics, so if the above is a law in some special science, \(S\), it must then be reducible to some law in physics, such as,
where \( P_1 \) and \( P_2 \) are predicates in physics.

Of course, \( P_1 \) and \( P_2 \) can’t be just any old predicates in physics: they must themselves, at the very least, be extensionally equivalent to (i.e., true of exactly the same things as) predicates \( S_1 \) and \( S_2 \) in the special science. And so, not only must the formula above be a law of physics, it must also be a law that

\[
(2a) \quad S_1x \leftrightarrow P_1x
\]

and

\[
(2b) \quad S_2y \leftrightarrow S_2y.
\]

That is, it must be a law that a thing has property \( S_1 \) (i.e., that it “satisfies” \( S_1 \)) if and only if it also has (satisfies) \( P_1 \), and that a thing satisfies property \( S_2 \) if and only if it also satisfies property \( P_2 \). These latter two formulae Fodor calls “bridge laws,” since they bridge the two sciences. They say that it is a law that something has a property of the special sciences when and only when it likewise has a given physical property.

The question then arises as to how we should understand \( \leftrightarrow \). I said above that, at the very least, it must mean that the special science predicate \( S \) and its physics predicate counterpart \( P \) be extensionally equivalent, i.e., that they be true of all and only the same things. But this, Fodor says, is not strong enough. According to Fodor, formulae like \( S_1x \leftrightarrow P_1x \) and \( S_2y \leftrightarrow S_2y \) must be (contingent: I guess Fodor hasn’t read Kripke!) identity statements. That is, they must say x’s having property \( S_1 \) is the very same thing (event) as x’s having \( P_1 \). If this were not the case, that is, if \( S_1 \) and \( P_1 \) are merely extensionally equivalent but not identical, it could be the case that \( S_1x \) and \( P_1x \) are different events. It could be that even though x having \( P_1 \) is a physical event, x having \( S_1 \) is a non-physical event. As Fodor claims:

If bridge laws are not identity statements, then formulae like (2) claim at most that, by law, x’s satisfying of a P predicate and x’s satisfying of an S predicate are causally correlated. It follows from this that it is nomologically necessary [i.e., that it is a law] that S and P predicates apply to the same things …. But, of course, this is compatible with a non-physicalist ontology, since it is compatible with the possibility that x’s satisfying S should not itself be a physical event. On this interpretation, the truth of reductionism does not guarantee the generality of physics vis-à-vis the special sciences, since there are some events (satisfaction of S predicates) which fall in the domain of a special science (S), but not in the domain of physics…. The upshot would be a kind of psychophysical dualism of a non-Cartesian variety, a dualism of events and/or properties rather than substances. [p. 505]

O.K., there are a number of points in this that we need to explain. First, there is the claim that if \( S_1x \leftrightarrow P_1x \) is not understood as an identity statement, then \( S_1x \) and \( P_1x \) might
constitute different events. Keep in mind that “x” here stands for the same entity in each S1x and P1x, so we are talking about one and the same thing satisfying an S predicate and satisfying a P predicate. Now, if S1x ↔ P1x is not an identity statement but merely says S1 and P1 are extensionally equivalent, it is still possible that S1 and P1 are different properties that x might have, or, alternately, that x being S1 and x being P1 are different events.

Let’s consider an example: Suppose that whenever someone thinks “Metaphysics is harder than I thought it would be!” they have a particular brain state, say, BS1. Likewise, whenever they have BS1 they are thinking “Metaphysics is harder ....” This scenario is possible even if, as the dualist believes, thinking “Metaphysics is hard” is not the same thing as being in BS1. The (Cartesian, i.e., substance) dualist believes that it is one thing that does the thinking (i.e., the mind) and another thing that has BS1 (i.e, the body), even though the two (distinct) events are universally correlated.

But, of course, we said that it was the very same thing, namely, x, that does the thinking and has the brain state. This implies a rejection of substance dualism, which claims that the mental substance (which has the thought) is not identical to the physical substance (that has the brain state). If x is the very same thing that has the thought and has the brain state, then there is only one substance involved here, contrary to what the substance dualist says.

This, however, still leaves open the possibility that the S property and the P property are different properties, but that happen to be nomologically related (i.e., it is law that we have the S property when and only when we have the P property). Using our example above, we might say that even though having the property of thinking “Metaphysics is hard” is a different property than being in BS1, they are properties had by one and the same thing—me (or, my brain). This amounts to what in known as property dualism, i.e., that while there is only one fundamental kind (presumably physical) of substance, there are, nevertheless, two fundamentally different kinds of properties, physical properties and mental properties, which these (physical) substances might have. (And, since “a thing having a property” is an event, if there are two fundamentally distinct kinds of properties a thing might have, there are likewise two fundamentally distinct kinds of events it might occur in.)

On this view, even though all things are physical things, it is not the case that all properties are physical properties or that all events are physical events. But this is contrary to what reductionism claims. Reductionism claims that, ultimately, all things are physical things, all properties (and events) are physical things (and events) and that all laws are physical laws. Consequently, if the bridge laws that we are considering are laws that allow us to reduce a special science to physics, then they must be understood as identity statements. It must be that the special science predicates and the physical predicates be identical and not merely extensionally equivalent. Anything short of this is inconsistent with the belief that physics is the ultimate science.

Fodor summaries these conclusions thus:

Given these sorts of considerations, many philosophers have held bridge laws like formula (2) ought to be taken to express contingent event identities, so that one would read formula (2a) in some such fashion as ‘every event which consists of x’s satifying S1 is identical to some event
which consists of $x$’s satisfying $P_1$ and vice versa’. On this reading, the
truth of reductionism would entail that every event that falls under any
scientific law is a physical event, thereby simultaneously expressing the
ontological bias of reductionism and guaranteeing the generality of
physics *vis-à-vis* the general sciences. [p. 505]

We are almost to the point where we can explicitly formulate Fodor’s thesis, but we still
need a bit more terminology. We need to compare reductionism (which we have just
clarified) with “token-physicalism, type-physicalism, and materialism.

First, recall the distinction we made in our discussion of universals, between
tokens and types. Consider, again,

A     A

How many letters do we have here? Both “One” and “Two” are appropriate answers.
There are two letter *tokens*, i.e., individual, spatiotemporally located marks, but only one
letter *type*, i.e., capital “A.” So we have, two tokens, but one type.

Contrast the above with:

A     B

Here we have two tokens but also have two types. Now consider:

*play*

How many words do we have here? Clearly there is only one token, but this single group
of letters has two different meanings—it spells out two different words, “something we
do for fun” and “something we watch at a theatre.” So, although we have but one word-
token, we have two word-types. We this we can define these concepts:

**Token physicalism:** this is the view that all things (all particles and all events)
are physical things (physical particles and physical events). As Fodor says, “… classical
reductionism … entails the truth of what I shall call ‘token physicalism’. Token
physicalism is simply the claim that all the events that the sciences talk about are physical
events.” [pp. 505-506]

Token physical must be distinguished from:

**Materialism:** “Materialism claims *both* that token physicalism is true *and* that
every event falls under the laws of some science or other.” [p. 506] So, as far as
reductionism is concerned, materialism entails token physicalism plus the claim that what
we have called “bridge laws” are indeed scientific *laws.*

Finally, we have:

**Type physicalism:** This is the claim that not only are all tokens (all individuals)
physical tokens, but all types (all properties) are physical types (are physical properties).
So, type physicalism is stronger than token physicalism: type physicalism implies token physicalism, but token physicalism does not imply type physicalism.

(Recall the example of “play” above. Here we have token-identity (one token) but type diversity (two types). So, token identity does not imply type identity. Hence, token physicalism does not imply type physicalism.)

Back to Fodor:

It will be one of my morals that reductionism cannot be inferred from the assumption that token physicalism is true. Reductionism is a sufficient, but not a necessary, condition for token physicalism. [p. 506]

What he is saying here is that reductionism requires not only that all individual things are physical things (i.e., token physicalism), but that all properties and laws are physical properties and laws (type-physicalism). His view is that type-physicalism is too strong, or, at least, that it is inconsistent with our understanding of the way the sciences actually work. So, he will reject reductionism in its classical form (the form in which we have been considering it). But he also claims that we don’t need reductionism in order to understand the “unity of science.” For that, we need only token, not type physicalism:

I now want to argue that reductionism is too strong a constraint upon the unity of sciences, but that, for any reasonable purposes, the weaker doctrine will do. [p, 506]

O.K., enough for today. That gives us the problem and Fodor’s thesis. Next time we will look at his defense of this thesis.
So, let us summarize what we have covered thus far. Fodor is discussing the thesis that physics is the ultimate science. If we believe that everything there is is physical, and that science can, in principle, describe and/or explain everything there is, then we are apparently committed to the belief that everything there is can, in principle, be described and/or explained by physical science. Furthermore, it looks as if the explanations and descriptions of physics should be fundamental, in the same sense that the particles it postulates are fundamental. If the objects that other sciences talk about are ultimately composed of the objects that physics talks about, then it should be the case that the laws of these “higher level” sciences ought to be implied by the laws of physics. In the words that Fodor uses, these “higher level” laws ought to be special cases of the (more general) laws of physics. And so, these “higher level” sciences are referred to as “special sciences,” with the understanding that physics is the (most) general science. And so the question that Fodor is addressing is whether or not these special sciences can in fact be understood in this way. Can they, Fodor asks, be reduced to nothing but special cases of physics?

Although Fodor believes in what he calls “the generality of physics vis-à-vis the general sciences,” he does not believe that this reduction, as it is normally understood, can be carried out. To get ahead of ourselves a bit, he thinks this would be too restrictive, for reasons I will discuss later. His view is that classical reduction requires type physicalism, but he finds problems with this view, and thinks that we can justify only the weaker token physicalism, which, he claims, is sufficient for “the generality of physics.”

The terms token physicalism (or token identity) and type physicalism (or type identity) usually occur in the mind body debate. By way of contrast, note that in Cartesian (i.e., substance) dualism, what we have is token diversity and type diversity (i.e., no identity at either level). That is, we have physical objects (physical tokens) having physical properties (physical types), and we also have mental objects (mental tokens) having mental properties (mental types). So, physical tokens are not identical to mental tokens, and physical properties are not identical to mental properties: hence, both token and type diversity (non-identity).

But, as I have said throughout this course, substance dualism is simply a non-starter in most contemporary discussions. There is a presumption that we can get by with one substance, rather than two, and that this substance is physical substance. But there are (at least) two varieties of (what has come to be called) the “identity theory.” One can claim both that (so-called) mental objects and mental properties are really identical to physical objects and physical properties (this is called the “type identity theory,” or, simply, type physicalism), or one can claim that while (so called) mental objects are really physical objects, mental properties are not identical to physical properties. Here we have token identity and type diversity. This is the position known as token physicalism. It denies that there is any mental substance (any fundamentally mental, non-physical, things), but it rejects the claim that all properties are identical to physical properties. So, type physicalism is the stronger view: it implies token identity, whereas we use the term token physicalism to imply token identity without type identity.
But while these terms (type and token physicalism) generally occur in questions about the mind and body (or, if you will, questions about how psychology relates to physics), they have an equally appropriate application with respect to all the special sciences. To the extent that a science talks about entities (for example, cells, molecules, living organisms, etc.) it understands to be composed of the ultimate particles of physics (i.e., electrons, quarks, etc.), that science is committed to (at least) token physicalism. Biology doesn’t claim, for examples, that cells are really non-physical substances. Cells may be the ultimate entities within the domain of biology, but biology understands that these entities are composed of simpler entities that are ultimately within the domain of physics. Likewise for other physical sciences such as chemistry, physiology, zoology, etc.

So, the (physical) special sciences are all committed to token physicalism. But what about type physicalism? According to Fodor, classical reductionism entails not only token but type physicalism. What would that mean?

To endorse type physicalism is to claim that not only are all objects (tokens) ultimately physical objects (tokens), but that all properties and kinds (types) are physical properties and kinds (types). (“If reductionism is true, then every kind is, or is coextensive with, a physical kind.” p. 507) Now, certainly some of the properties of “higher level” sciences are identical to the properties that physics talk about (mass, size, etc.); But are all of them? What about the property of “being alive?” (I don’t know if this occurs as a primitive property in biology, or somewhere else, but, it occurs as a primitive property somewhere.) This is a property (or kind) that occurs in the laws of some special, higher level, science. So, if reductionism is correct, then this property ought to be identical to, i.e., the very same property as, some physical property (or collection of physical properties). So, is “being alive” simply identical to being composed of a set of particles that have a certain charge, spin, mass, etc? This seems implausible.

Here is how Fodor describes the situation:

The reason it is unlikely that every kind corresponds to a physical kind is just that (a) interesting generalizations (e.g., counterfactual supporting generalizations) can often be made about events whose physical descriptions have nothing in common; (b) it is often the case that whether the physical descriptions of the events subsumed by such generalizations have anything in common is, in an obvious sense, entirely irrelevant to the truth of the generalizations, or to their interestingness, or to their degree of confirmation, or, indeed, to any of their epistemologically important properties; and (c) the special sciences are very much in the business of formulating generalizations of this kind. [p. 507]

So, consider a purported law in some special science: all toves are slithy. (‘‘Twas brillig, and the slithy toves did gyre and gimble in the wabe; All mimsy were the borogoves, and the mome raths outgrabe.”—Lewis Carol). This is a proposed law of nature within the “science” (I am now making up) of “Jabberwock.” Within this science, suppose this looks like a good law: we find evidence for it, it explains other things, etc. Now, if reductionism is true, then the property of being a tove and the property of being
slithy must be identical to various physical properties. But, Fodor notes, it seems that the predicates in the special sciences simply do not pick out sets of entities that have any physical properties in common (as a set).

Fodor’s own example concerns “Gresham’s Law” in economics. The details of the law don’t matter for us here. It simply postulates as a law of economics that certain things will happen in certain monetary exchanges. Now, if this is a law, and if reductionism is true, then there must be a law of physics that relates the very same two classes of events. Laws, recall, are not just true generalizations, but relate (what Quine called) “projectible” predicates. It may be true that all emeralds are grue, but, because “grue” is not projectible, this true generalization cannot be understood as a law. (The fact that, as of today, all observed emeralds are grue does not give us reason to believe that the emeralds we discover tomorrow will also be grue. This is what it means to say that “grue” is not projectible.) Alternately put, laws of nature concern only natural kinds—not just any arbitrary, “merely conventional” kinds, but kinds that occur in nature—kinds that “carve reality at the joints.” So, if reductionism is true and if Gresham’s Law is really a law in economics, then the economic “kinds” that Gresham’s Law relates (certain “economic conditions” and “monetary exchanges”) must be identical to or coextensive with certain natural kinds in physics. But what fundamental property in physics do all monetary exchanges have in common? It seems clear that there aren’t any.

(Here’s another way of thinking about it: What fundamental physical properties do all pawns have in common? Some are made of plastic, some of wood, etc. Some of have one shape; some have another. Some are nothing “really” but program states of a computer. It seems clear that there is no natural kind in physics that is coextensive with the set of things which function as pawns in chess. Fodor is making the same kind of point regarding monetary exchanges.)

So, Fodor concludes, if reductionism were true, then all the kinds that the special sciences talk about would have to be identical to or coextensive with the fundamental, natural kinds that physics talks about, and it seem obvious that this is just not the case. Actually, Fodor continues, reductionism requires even more than this. It requires not only that the kinds in the special sciences be identical to or coextensive with the kinds we find in physics, it must also be a law of nature that these kinds are identical or coextensive. So, not only must it be true, for example, that all monetary exchanges are coextensive with sets of objects all sharing some fundamental property of physics, it must be a law of nature that this is the case. So, Fodor concludes, classical reductionism is simply not adequate to explain the relation of the special sciences to physics.

Of course, thus far we have been talking about the difficulties in reducing a “law” in economics to physics. One might think the problems we have seen arise not from reductionism per se, but from economics: who really thinks, after all, that economics is a “science”? If it is a “science,” one might think, it isn’t so in the same sense that physics is a science. If anything, it is a “soft” science, not a “real” science like physics.

But whatever validity there is in this response, the same sorts of remarks should apply to psychology: if economics is a “soft” science, then so is psychology. Why?—Because the same sort of problems arise in trying to reduce psychology to physics that we have seen in trying to reduce economics to physics. Just as it seems highly unlikely that “being a monetary exchange” is coextensive with any fundamental property in physics, it seems just as unlikely that “thinking that 2+2=4,” or “thinking oh, what a lovely day” are
coextensive with any sets of objects sharing any single neurological property (much less any single property of fundamental physics). Even if, as Fodor accepts, all psychological states are *token identical* to neurological states (i.e., even if mental states are always, numerically, *the very same events* as certain neurological states), there is little reason to think that these states are *type identical* to neurological states (i.e., that the *property* of being in a certain mental state is *the very same property* as the property of being in some neurological state). The trouble with reductionism is that it requires both token and type identity between the special sciences and physics, whereas it seems that scientific practice is, at best, consistent with token, not type, identity:

It seems to me … that the classical construal of the unity of science has badly misconstrued the goal of scientific reduction. The point of reduction is not primarily to find some natural kind predicate of physics coextensive with each kind predicate of a special science. It is, rather, to explicate the physical mechanisms whereby events conform to the laws of the special sciences. [p. 509]

This concludes Fodor’s criticism of classical reductionism. I am not going to discuss in detail the remainder of Fodor’s essay, where he offers his own more positive view of how we should in fact understand the “unity of science.” In a nutshell, his view is that the unity of science requires merely token physicalism, not type physicalism. Thus, the only kind of *stuff* in the world is *physical stuff*—contrary to what the Cartesian (i.e., substance) dualist claims. This is what token physicalism says: everything that exists is the very same thing as some physical thing. But in rejecting type physicalism (i.e., the view that every property talked about by a special science is the very same *property* as one talked about by fundamental physics), he has embraced what some have called a kind of “property dualism,” i.e., the view that even though all things are identical to physical things, it is not the case that all properties are identical to physical properties.

But while this view may seem to better “fit the bill” for an account of the relation of the special sciences to physics (and it may seem more plausible in the philosophy of mind), it has its own philosophical problems. If (merely) token physicalism is true, then even though all mental states are token identical to brain states, it seems they *might not have been*, because (if we don’t also accept type physicalism), if mental properties are not identical to physical properties, then they *might* have been satisfied by different sets of things. (Consider: while it is true that all rational animals are token identical to featherless bipeds, since the property of being a rational animal is not type identical to the property of being a featherless biped, there *might* have been rational animals that were not featherless bipeds.) Token (without type) physicalism, that is, seems to commit us to certain *contingent identity statements*.

We didn’t talk much about the latter portions of Kripke’s essay, but this is precisely the issue he raises: if we reject contingent identity statements, then we reject the separability of token and type physicalism. That is, it seems that that if we reject substance dualism and thus claim that mental states are token identical to brain states, we must go all the way to claiming that mental states are *necessarily* brain states, and so that
the property of being in a given mental state is the very same property as the property of being in some brain state. If we want token physicalism (which we get if we reject substance dualism), then we must embrace type physicalism too. So, if Kripke was right, then there is no “middle road” between substance dualism and type physicalism. And it was just this “middle road” that Fodor has been advocating.