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 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
slightly 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 \textit{token identical} to neurological states (i.e., even if mental states are always, numerically, \textit{the very same events} as certain neurological states), there is little reason to think that these states are \textit{type identical} to neurological states (i.e., that the \textit{property} of being in a certain mental state \textit{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 \textit{goal} of scientific reduction. The point of reduction is \textit{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 \textit{token} physicalism, not \textit{type} physicalism. Thus, the only kind of \textit{stuff} in the world is \textit{physical} \textit{stuff}—contrary to what the Cartesian (i.e., substance) dualist claims. This is what \textit{token} physicalism says: everything that exists is the very same thing as some physical thing. But in rejecting \textit{type} physicalism (i.e., the view that every property talked about by a special science is the very same \textit{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) \textit{token} physicalism is true, then even though all mental states are \textit{token} identical to brain states, it seems they \textit{might not have been}, because (if we don’t also accept \textit{type} physicalism), if mental properties are not identical to physical properties, then they \textit{might} have been satisfied by different sets of things. (Consider: while it is true that all rational animals are \textit{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 \textit{might} have been rational animals that were not featherless bipeds.) \textit{Token} (without \textit{type}) physicalism, that is, seems to commit us to certain \textit{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 \textit{token} and \textit{type} physicalism. That is, it seems that that if we reject \textit{substance} dualism and thus claim that mental states are \textit{token} identical to brain states, we must go all the way to claiming that mental states are \textit{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.