Rigidity for the Common Noun

The question of whether general terms are rigid is vexed, in large part because there is widespread disagreement over, and confusion concerning, what rigidity for general terms amounts to. According to Nathan Salmon, Kripke himself vacillated on the question (2005a p. 366 n. 22).

Kripke defined the notion of rigidity for singular terms as follows: "Let's call something a *rigid designator* if in every possible world it designates the same object" (*Naming and Necessity*, p. 48). But he never provided a definition of rigidity for general terms[1], and we can't simply apply the definition as-is. Natural kind predicates in the main are not singular terms, that is, their semantic values aren't objects or individuals.

Several considerations speak to the importance of answering these questions. We can see this by considering why Kripke's discovery that *names* were rigid designators is philosophically significant. First, only if variables are rigid designators can we hope to validate Leibniz's Law for quantified modal discourse, i.e. $(x)(y)(x = y \rightarrow (\varphi \leftrightarrow \psi))$, where the (possibly) quantified, (possibly) modal formulae φ and ψ differ at most in that free occurrences of x in φ are replaced by occurrences of y in ψ; and only if all singular terms are rigid designators does every substitution instance of Leibniz's Law, e.g. $a = b \rightarrow (\varphi \leftrightarrow \psi)$, turn out valid. Since intuitively, all identical objects have identical modal profiles, such validation is highly desirable. An immediate consequence is that a modalized Leibniz's Law (plus Rule N) entails the necessity of identities: $(x)(y)(x = y \rightarrow \Box\, x = y)$. Thus the rigidity of names accounts both for our intuition that identical objects have identical modal profiles and for our intuition that if two things are one and the same, they could not have been distinct. In addition to this point, there is a far more straightforward way in which a rigidified treatment of terms simplifies our modal logic, as terms need not be assigned semantic values (individuals) relative to a world parameter, but may be assigned such values *simpliciter*.

The philosophical significance of Kripke's account would carry over quite directly in the case of general terms. For Leibniz's Law for general terms seems as transparently true as Leibniz's Law for singular terms: numerically identical properties have numerically identical modal profiles, or[2] $(X)(Y)(X \equiv Y \rightarrow (\Phi \leftrightarrow \Psi))$, where X and Y range over properties, and Φ and Ψ differ at most in that open occurrences of X in Φ are replaced with Y in Ψ. And Leibniz's Law + N entails $A \equiv B \rightarrow \Box\, A \equiv B$, e.g. if water is H_2O, then water is necessarily H_2O.

Resolving this issue is especially important in light of the use Kripke makes of this principle. For in the third lecture of *Naming and Necessity*, Kripke uses the claim that

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[1] Soames makes this point on p. 245 of *Beyond Rigidity*. At that time, he says, the point was "not widely appreciated," though the subsequent literature seems to have heard him. For an alternate view, Salmon (2005b, p. 120 n. 6) says "I believe Kripke intended his definition of rigidity to apply to general as well as singular terms."

[2] I here use the symbol '≡' for property-identity.

'pain' and 'C-fiber stimulation' are rigid designators to argue that if pain is actually identical to C-fiber stimulation, then it must be necessarily identical to C-fiber stimulation. On at least one popular account of rigidity for general terms (Rigid Application, considered below in Section I), this argument form is invalid. Thus, if we're to know how to evaluate Kripke's argument, we must first know what rigidity for general terms amounts to.

Finally, although names seem so different from common nouns in English, in that they don't typically co-occur with determiners, aren't typically modified by adjectives, etc., there's some reason to suppose that they might nevertheless be general terms (Burge, 1973). After all, in some languages, such as Greek, names do co-occur with determiners. Furthermore, even in English they sometimes co-occur with determiners ("Every Fred in the class," "The London of my youth") and sometimes co-occur with adjectives ("Poor, sad, unfortunate George"). To the extent that this is a plausible thesis, we have that much more reason to want an account of rigidity for general terms.

The striking results we want to capture with our notion of rigidity for general terms are that certain theoretical statements like 'water is H_2O' and 'tigers are animals' are necessary, if true. This suggests two desiderata on an account of rigidity. First, it must be the case that these statements fall under the purview of the account: that 'water,' 'H_2O,' 'tiger' and 'animal' all turn out to be rigid. Second, it must be the case that the account entails that the rigidity of these expressions explains why, for example, it's necessary that tigers are animals. We can summarize this by saying that such an account must be both ADEQUATE and EXPLANATORY:

> ADEQUATE: The account should count as rigid all or most of the paradigm cases of rigid predicates—substance kind terms, secondary quality predicates, natural phenomenon terms, and biological species terms.
>
> EXPLANATORY: The account should explain the necessity of theoretical identities (like 'water is H_2O') and other a posteriori theoretical statements (like 'tigers are animals').

A third desideratum suggests itself when we consider Kripke's definition of singular term rigidity. His definition, when the object designated is made explicit, takes the form of a "semantic persistence claim": a singular term S is rigid iff *if* S designates some object O relative to the actual world, *then* S designates O relative to every other world[3]. That is, what it is for a singular term to be rigid is, first, for it to bear a certain semantic relation (in this case, designation) to a thing (in this case, an object) in the actual world, and second for this semantic relation to persist across worlds: for it to bear that selfsame relation to that selfsame thing relative to non-actual worlds.

[3] Here I assume that a term can designate objects relative to worlds in which those objects don't exist. Nothing I say shall hinge on this assumption.

If a concept in our explanatory repertoire is to deserve the name 'rigidity,' it should naturally extend Kripke's notion of singular term rigidity, and be some form of semantic persistence, as it is for singular terms[4]:

> DESERVING: The account should make rigidity a form of semantic persistence.

This desideratum is powerful, because it entails that there are exactly as many candidates for general term rigidity as there are semantic relations R that general terms can bear to things. A general term is a rigid R-er iff *if* it bears semantic relation R to thing T relative to the actual world, *then* it bears R to T relative to every other world.

Since I'll be using the terminology with some care, I want to lay out the different semantic relations general terms can bear to things. There are three basic categories of semantic relations, and not everyone believes in all of them. The first category I'll call 'referential' relations. Here, it is assumed that general terms bear a reference-like or naming-like relation to things like properties, which are construed as neither set-theoretic constructs, nor third-realm Fregean senses. A referentialist (e.g. Fodor in his 2008) would simply call this relation 'reference,' but to be neutral as to whether general terms bear a reference relation or merely a reference-like relation to their semantic values, I'll call it here 'expression.' A general term like 'blue,' for example, expresses the property of being blue.

For my purposes here, I'll distinguish *expression* from *designation*. Expression and designation are entirely coincident for simple general terms, but they can (depending on your view) come apart in the case of complex general terms. Here's the difference at issue. On a Fregean treatment of descriptions, the semantic value of a description is the unique thing (if there is one) that satisfies the NP complement to 'the.' So, for example, 'the president of the U.S. in 2013' has as its semantic value (refers to) Obama and also designates Obama. But on a Neo-Russellian treatment, the semantic value of the description is a property of properties (the property P a property Q has when Q is instantiated by the president of the U.S. in 2013). Thus 'the president of the U.S. in 2013' on a Neo-Russellian treatment either does not refer, or refers to a property of properties (its semantic value), depending on how we choose to use 'refer.' It does, however, still designate Obama. Thus, in the context of this paper, if the Neo-Rusellian treatment is correct, we'll say that descriptions like 'the color of the sky' *designate* a property (a color—blue, in the actual world) and *express* a property of properties (the property a property has when it is instantiated by the color of the sky).

In addition to the 'referential' semantic relations, general terms also stand in semantic relations to set-theoretic objects, namely extensions and intensions. A general term that expresses property P, relative to world-of-evaluation w, has as its extension the set of objects x such that x has P in w; it has as its intension the smallest function from worlds to the term's extension at those worlds (construed as worlds of evaluation). There aren't really verbs in the literature analogous to *refer*, *express*, and *designate* for the relation to an extension or intension. With some amount of awkwardness, I'll speak of an

[4] The desiderata that a theory of rigidity for general terms must be ADEQUATE, EXPLANATORY, and DESERVING are roughly analogous to Soames' desiderata (ii), (iii), and (i), respectively on p. 263 of his (2002). They appear here slightly modified, slightly differently motivated, and with more colorful names.

expression *extending* an extension and *intending* an intension. If properties are identified with intensions, then there's no distinction between intending (in this sense) and expressing. I won't assume that properties are intensions, so both terms will appear in what follows.

The third and final type[5] of semantic relation general terms bear to things is application. A general term, relative to a world-of-evaluation w, applies to the objects in the term's extension at w—or, equivalently, the things that possess the property the term expresses relative to w. Application is thus the inverse of satisfaction: term T applies to O (at w) iff O satisfies T (at w).

As I said before, each of these semantic relations R corresponds to a particular thesis about the nature of general term rigidity: the claim that a general term is rigid iff it is a rigid R-er. For example, in the case of extension, a general term G is a rigid extender iff if it extends the extension E relative to the actual world (construed as a world of evaluation), then it extends E relative to all worlds (of evaluation); and Rigid Extension is the thesis that a general term G is rigid iff it is a rigid extender.

Rigid Extension is initially very unintuitive. Extensions are useful for formal modeling, but there is little reason to suppose that they are "real" semantic contents. For, as Sullivan (2007) points out, "the semantics of 'tiger' does not change every time a new tiger is born" (p. 4b). Furthermore extensions don't do many of the things theorists would like to do with semantic values: we don't stand in causal or informational relations to them, and being by definition extensionally individuated, they aren't fine-grained enough to play any serious role in cognitive psychology.

Moreover, Rigid Extension is neither ADEQUATE nor EXPLANATORY. ADEQUACY requires that any account of general term rigidity should count all or most of the paradigm cases of rigid predicates as rigid. But 'water' is not a rigid extender: there could be more or less water than there actually is, and in such worlds the extension of 'water' diverges from its actual extension. Similar remarks apply to the other paradigm cases: there could be more or fewer yellow things; more or less lightning; and more or fewer tigers (this point is made also by, among others, Soames (2002) p. 250 and Devitt (2005) p. 140). In light of this, Rigid Extension is also not EXPLANATORY, in that it doesn't explain why necessarily, water is H_2O. Certainly, if 'water' and 'H_2O' were rigid extenders, it would follow that 'water is H_2O' expresses a necessary truth, if it expresses an actual truth. But neither 'water' nor 'H_2O' is a rigid extender, so this is clearly not the reason that necessarily, water is H_2O[6].

In what follows, I'll be concerned with two particular approaches to rigidity for general terms. The first, Rigid Application, is the thesis that a general term G is rigid iff it is a rigid applier—that is, iff if it applies to the object O relative to the actual world (construed as a world of evaluation), then it applies to O relative to all worlds (of evaluation). Rigid application is endorsed by, among others, Cook (1980), Wiggins (1980), Devitt & Sterelny (1999), Devitt (2005), and Gómez-Torrente (2006). I review

[5] There's obviously a lot more potential semantic relations—it all depends on the particular semantic theory we're looking at. For example, on some views expressions have senses or modes of presentation. Mostly, I'll ignore these other possibilities, as no one has yet proposed that a general term is rigid iff it has the same sense relative to every world of evaluation.

[6] Notice that even though Rigid Extension is false, some terms may well still be rigid extenders. For example, 'prime' (as in 'prime number') likely has the same extension relative to every world of evaluation.

the arguments for Rigid Application in the next section, and argue that in the end, the thesis is no better off than Rigid Extension.

The view I endorse is Rigid Expression. That a general term G is rigid iff it is a rigid expresser—that is, iff if it expresses the property P relative to the actual world, then it expresses P relative to all worlds. Fellow travelers include McGinn (1982), Donnellan (1983), LaPorte (2000), Salmon (2005b), Sullivan (2007), López de Sa (2008), Martí, G. & Martínez-Fernández (2010), though it should be noted that most of these authors endorse Rigid Expression's close cousin Rigid Designation, or don't make the distinction. In Section II, I'll review the arguments for and against Rigid Expression/ Designation, and defend the claim that Rigid Expression is the right account of general term rigidity.

I. Rigid Application

Rigid Application has several appealing aspects. The view says that if a general term G applies to an object O relative to the actual world (or any world for that matter), then it applies to O relative to all other worlds[7]. It certainly seems ADEQUATE. Consider a chunk of gold, X. Could there be a world where X exists, but is, say, composed entirely of plutonium? It seems not. Kripke defended the much broader thesis that even a table composed of wood could not have existed, without being composed of wood. However strong this intuition is, it's certainly no stronger than the intuition that pure instances of chemical substances could not have existed, without being composed of the chemical substance of which they are actually composed. So 'gold' seems to be a rigid applier. Similar reasoning seems to apply to many of the other paradigm instances of natural kind terms—e.g. biological species terms and natural phenomenon terms. If Y is a tiger, it doesn't seem that Y might instead have been an antelope.

Additionally, although we have refrained from making it a desideratum on any account of general term rigidity that it count all or most non-paradigm cases of rigid general terms as non-rigid, nevertheless it might be thought that doing so is a virtue of any account of general term rigidity[8]. And Rigid Application delivers nicely. Terms that aren't paradigm cases of rigid general terms, like 'bachelor,' aren't rigid appliers: My brother is a bachelor, but had things gone otherwise, he would not have been.

Finally, Scott Soames has pointed out that there is textual support for the claim that Kripke thought that general term rigidity was rigid application. For Kripke says "'pain' is a rigid designator of the type, or phenomenon, it designates: if something is a pain, it is essentially so" (Kripke, p. 148; quoted in Soames, p. 252). Although Kripke's beliefs should in no sense be taken as gospel, they should not be ignored either.

In this section, however, I shall argue that the support for Rigid Application vanishes upon closer inspection. In particular, I shall argue that the view isn't ADEQUATE because according to it, *almost no general term is a rigid applier*; and that it isn't EXPLANATORY because as defenders of the view like Devitt (2005) admit, it fails to explain why such statements as 'All and only water is H_2O' are necessary, if true. As

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[7] Henceforth, I will be suppressing the qualification "of evaluation" when talking about worlds of evaluation.

[8] Though see Section II for reasons why this might not be virtuous.

such, Rigid Application is worse off than Rigid Extension, and we have already abandoned the latter as a hopeless non-starter.

The worry that Rigid Application isn't ADEQUATE is one that is at large in the literature. Martí (2004), for example, points out certain adjectives[9] that Kripke took to be rigid, such as 'hot' and 'yellow,' are not rigid appliers: "a yellow dress could be dyed and a yellow house could be repainted" (p. 132). The form of the argument is that dresses and houses are objects to which 'yellow' sometimes applies; yet they persist through changes in color; and thus they *would* persist through such changes in color, that is, they *could* exist in worlds where they were not yellow.

Neither Devitt nor Martí see this objection as damning. Devitt (2005) claims "it is a mistake to think that the primary task of the rigidity distinction is to distinguish natural kind terms from nominal kind terms. The primary task is to distinguish kind terms that are not covered by a description theory from ones that are" (p. 154). I don't think this reply helps.. First, there are seemingly descriptive terms that are rigid appliers. If any general terms are descriptive, mathematical terms introduced by explicit stipulation are, such as 'prime number' which is defined as a natural number whose only divisors are itself and one. And yet, these seemingly descriptive predicates are invariably rigid appliers: no number is prime in this world and composite in some other. Second, there are non-descriptive expressions that are not rigid appliers. Kripke, for example, spent a great deal of time convincingly arguing that secondary quality terms like 'red' and 'hot' are not amenable to a descriptive treatment, yet few such terms are candidates for rigid appliers. If the notion of rigidity is supposed to separate the descriptive from the non-descriptive, then Rigid Application is not the correct notion of rigidity.

Martí suggests taking this tack: "given the wide variety of terms [that Kripke gives as examples of rigid expressions], it would not be surprising if some of them were not to be in the final cut" (p. 132). The idea then is that someone who endorses Rigid Application can simply bite the bullets of 'hot' and 'yellow', while hoping that there aren't many more bullets. But I will argue that no general term is a rigid applier (save again for special cases involving logical or mathematical terms).

Among the paradigm examples of rigid adjectives and general terms are 'hot' and 'yellow'; 'light' and 'lightening'; 'gold' and 'cesium'; and 'tiger' and 'chimpanzee'. The adjectives have already been dealt with (but see fn. 9).

Consider 'light', which Kripke takes to be in a category with 'lightening' and 'heat' (natural phenomenon terms). I assume that 'light' applies to streams of photons, since light *is* a stream of photons, and 'stream of photons' applies to streams of photons. According to Rigid Application, if 'light' is rigid, then nothing that is light (that is, no stream of photons) can persist through a change that would make it not light. However, streams of photons can persist through such changes. For example, the so-called relic radiation of the Big Bang (a.k.a. the cosmic microwave background radiation) consists of light that has been redshifted so much it is now microwave radiation, rather than light.

[9] Our principal concern here is common nouns and mass terms. It need not be the case that a correct theory of rigidity for common nouns and mass terms extends to adjectives, nor need it be the case that there is a correct theory of rigidity for adjectives in order for there to be one for common nouns and mass terms. When I treat of adjectives here, the reader should be aware that they are evidence for the theses under consideration (Rigid Application, for instance) only insofar as it is assumed that the correct theory of rigidity for common nouns and general terms extends, correctly and straightforwardly, to a theory of rigidity for adjectives.

‘Light’ may apply to a certain stream of photons S at one time and yet not apply to that numerically identical stream S at some subsequent time. Thus ‘light’ is not a rigid applier.

It might well be objected that ‘light,’ as used by physicists, applies to microwaves, radio waves, gamma rays, etc., and thus that my supposed counterexample is really no counterexample at all: light cannot become non-light, no matter how redshifted or blueshifted. However, there is certainly a meaning of ‘light,’ the common meaning, which is more or less “visible light.” This sense of ‘light’ seems paradigmatically rigid: “light (in the common sense) is electromagnetic radiation with wavelengths ≈ 390 to 740 nm” is both necessary and a posteriori. This sense seems to have survived the discoveries of physics: indeed, such claims as “microwaves cook with light” and “the Incredible Hulk was the result of an experiment with light gone awry” strike me as patently untrue. So Rigid Application might be able to handle ‘light’ in the scientific sense, but it makes the wrong prediction regarding ‘light’ in the common sense.

The case of the chemical elements is similar. Neutrons are composed of two down quarks and one up quark, protons of one down quark and two up ones. Neutrons bound in unstable nuclei may undergo beta decay, where one (and only one) of their down quarks changes flavor to (i.e. becomes) an up quark through the emission of a W^- boson, thus transforming them into protons. For example, a cesium 137 atom (55 protons + 82 neutrons, for a total of 137 nucleons—at 3 quarks a piece for 411 quarks in total) may release a W^- boson and decay to an atom of barium. To be clear, W^- bosons are force-carriers—all they do is mediate the flavor change. What happens in the interaction is that *just one* of the cesium 137’s 411 quarks goes from flavor = down to flavor = up. This is sufficient to convert the atom from cesium 137 to barium 137.

If ‘cesium’ is a rigid applier, then any object (atom) to which ‘cesium’ is correctly applied cannot persist through beta decay, because that would result in ‘cesium’ *not* applying to it. The thesis that chemical kind terms are rigid appliers i equivalent to a particular thesis about the persistence conditions of atomic nuclei, just as the claim that ‘light’ is a rigid applier is equivalent to a particular thesis about the persistence conditions of photons. And it’s more natural to suppose that atoms can persist through the flavor change of one of their quarks than that cesium 137 atoms regularly pop out of existence, only to be replaced by barium 137 atoms.

The final class of paradigmatic rigid general terms are the names of species and higher taxa. I can do no better here than briefly summarize the points LaPorte (1997) makes on this score[10]. LaPorte reports that “theor[ies] about what determines the boundaries of species… tend to fall into three camps: the interbreeding approach, the ecological approach, and the cladistic approach” (p. 101). He argues that on none of these standard approaches does an organism belong to the species it does essentially. Those who take the interbreeding approach hold that species are reproductively isolated, interbreeding populations of individuals (p. 101). But whether two populations are reproductively isolated, and whether all their past members were reproductively isolated, is clearly in many cases a contingent feature (p. 102). The ecological approach yields a similar conclusion: on this approach, species are populations that occupy their own unique ecological niche (p. 101). This too clearly makes one’s species a contingent

[10] I limit myself here to species, and do not summarize LaPorte’s discussion of higher taxa. Instead, I recommend that you read his paper: “Essential Membership.” (See the Works Cited.)

matter, for those members descended from the ancestral population who came to occupy that niche might never have done so, for instance if the niche were never to have existed (pp. 101-102). I leave aside the case of clades (pp. 102-104), but suffice to say they're no boon to a Rigid Application theorist.

Devitt responds (2005, p. 147) to LaPorte's objections, though not convincingly. First, Devitt claims we have reason to suppose "there is an intrinsic component, as well as a relational one, to the essence of a species; in particular…a species has a genetic essence." This reply only works if having the genetic essence of, say, a tiger, is a *sufficient* condition for tigerhood, and this is denied on all the relationalist approaches. For example, on the interbreeding approach, I might well hold that each actual member of *Pongo abelii* (the Sumatran orangutan) essentially has the genes it does, while nevertheless maintaining that each *would be* a member of *Pongo pygmaeus* (the Bornean orangutan), or of some distinct parent species, had the flooding of Sundaland never occurred after the last glaciation, and had all remained in one interbreeding population.

Devitt also urges that "any member [of a species] has [the relational component of a species' essence] essentially if Kripke is right in thinking that an organism's essence is its relation to a certain sperm and ovum, hence to certain parents, hence to a certain family tree" (p. 147). This again avoids the charge. Both the interbreeding approach and the ecological approach allow that one and the same fixed family tree may contain one species in one world, and two in another—for instance if in one world a certain branch of the tree does not come to occupy a separate ecological niche, and in another world it does. Nor does essential position in a family tree help the essentialist if cladism is true, as LaPorte points out: "according to cladism, a species goes extinct whenever it sends forth a new side species. This is so even if the lineage undergoes no change after sending out the side branch, so that earlier members are indistinguishable from later ones" (p. 103). That is, according to cladism, a thing that is a tiger in this world would not be a tiger in another world, if in that world one of its ancestors had additional offspring that formed a separate, unrelated lineage constituting a different species. This is so even if the organism's entire ancestry, for the past 3.5 billion years of life on Earth, is held constant.

I conclude that LaPorte's objections stand. According to the main classes of contemporary theories concerning the individuation of biological species, no species term is a rigid applier.

It's worth mentioning as well that there are *non*-paradigm cases of (putative) rigid terms that also cause trouble for Rigid Application. Recall Kripke's discussion of Wittgenstein's meter stick (S). There, Kripke argues that it is the rigidity of 'meter' that explains the contingency of 'S is one meter long'. S is only contingently one meter, because 'one meter' rigidly picks out a certain length, which S could have either been longer or shorter than. Yet 'one meter' is not a rigid applier, precisely because things (like S) that are one meter could have been longer or shorter. Furthermore, I take it that Kripke's explanation of the contingency of 'S is one meter long' is, on the whole, the correct one: there *is* an intuitive difference between 'one meter' and 'the length of S at t_0' and it *is* this difference which explains why 'S, at t_0, is one meter' is contingent whereas 'S, at t_0, is the length of S at t_0' is not. If a Rigid Application theorist wants to co-opt this explanation, she's going to need a notion of rigidity in addition to rigid application that captures this intuitive difference—but after we accept an alternate notion of rigidity, it's not clear why we need rigid application anymore, especially when it seems nothing is a rigid applier.

The preceding argumentation has all been to the effect that none of the paradigm cases of rigid general terms turn out to be rigid according to Rigid Application, and thus that the view is INADEQUATE. It's worth reiterating, however, that Rigid Application isn't EXPLANATORY, in that it doesn't explain why such statements as 'water is H_2O' and 'tigers are animals' are necessary, if true. Consider a model with two worlds, w_1 and w_2, and two objects, x_1 and x_2. Suppose that x_1 only exists at w_1 and x_2 only exists at w_2. At w_1, x_1 satisfies F and G, and at w_2, x_2 satisfies F but does not satisfy G. Then both F and G are rigid appliers, for nothing satisfies one of these predicates at one world, but doesn't satisfy it at another. Further, $(x)(Fx \leftrightarrow Gx)$ is true at w_1 (the "actual" world), but it is not necessarily true, since it is false at w_2. Thus, Rigid Application does not allow us to move from a true universally quantified biconditional between two rigid appliers, to its necessitation—which is presumably what we need to do if we're to explain why 'water is H_2O' is necessary, if true[11].

What we've seen so far then is this. Rigid Application is indeed a natural extension of Kripke's notion of singular term rigidity to the general term case. However, none of the paradigm cases of rigid general terms (secondary quality predicates, natural phenomenon terms, chemical kind terms, and terms for species and higher biological taxa) are rigid appliers (potential exception: 'light' as used by scientists). Furthermore, *even if they were*, the fact that they were would not explain the most striking results of Kripke and Putnam's work, namely that theoretical identity statements involving such terms are necessary, if true. If there is a viable alternative account of general term rigidity, it should be adopted. And there is, and it should: rigid expression.

II. Rigid Expression

The view I endorse is that a general term is rigid iff it is a rigid expresser, and I repeat the definition of the latter term for the reader's convenience:

> [Rigid Expression] A general term G is a rigid expresser iff if it expresses the property P relative to the actual world, then it expresses P relative to all worlds.

It's worth reiterating that the world-relativity here is relativity to a world of evaluation, not the world parameter of the context of utterance. This means, in particular, that the claim that some G—for instance, 'cat'—might have expressed a different property, say, the property of being a penguin, is not incompatible with the claim that 'cat' is a rigid expresser. The claim that 'cat' might have expressed *penguin* is a claim that there is a world w in which w's inhabitants, speaking in <u>contexts of utterance</u> whose world parameter is invariably w, use 'cat' to express *penguin*. This does not mean that our word 'cat' <u>evaluated at</u> w, expresses *penguin*. In fact, we know that it does not express *penguin* relative to w, because it's false that were it the case that thing were as they are in w, cats would be birds.

[11] Soames (2002) makes the same point on pp. 257-259. Devitt (2005) concedes the point on p. 152.

As I explained in the introduction, Rigid Expression and Rigid Designation are entirely coincident for simple expressions, and until it becomes necessary to distinguish them, I will run the two theses together as Rigid Expression/ Designation. Arguments for and proponents of Rigid Designation will here be corralled as arguments for or proponents of Rigid Expression/ Designation—again, until it becomes necessary to distinguish them.

There are three main lines of objection to Rigid Expression/ Designation in the literature. First, it is maintained that all and only non-descriptive terms are rigid, whereas many descriptive terms are rigid expressers/ designators: thus, rigidity is not rigid expression/ designation. Second, it is maintained that all and only natural kind terms are rigid, whereas many non-natural kind terms are rigid expressers/ designators: thus, rigidity is not rigid expression/ designation. Finally, some have claimed that "rigid expresser [/designator]" is a trivial notion—not merely that it can't provide a descriptive/ non-descriptive term distinction or a natural kind/ non-natural kind term distinction, but that it can't do any work at all in our semantic theory.

Schwartz (2002) suggests the first line of attack: "Clearly there is an important difference between natural kind terms like 'gold' and nominal kind terms like 'bachelor'– and isn't this difference based on the rigidity of the one and nonrigidity of the other?" (p. 266). This seems to be a problem for Rigid Expression/ Designation, for it would seem to count both 'gold' and 'bachelor' as rigid—for instance, 'bachelor' expresses/ designates the same property relative to every world. We can see this because 'John is a bachelor' is true, at an arbitrary world w, iff John has *the property of being a bachelor* in w. I take Soames to be making a similar point when he says that extending rigidity to all terms is "problematic"[12] because "Kripke wanted to distinguish natural kind predicates like *is gold* and *is a tiger* from ordinary descriptive predicates such as [*is a philosopher*, *is a bachelor*, etc.]" (2002, p. 260).

The Soames/ Schwartz suggestion, that rigid general terms should be all and only the natural kind terms, seems equally off-base. After all, whether a general term is a natural kind term or not depends on what property it expresses/ designates. If it expresses/ designates a natural kind property, it is a natural kind term; otherwise, it isn't. But whether a singular term is a rigid designator does not depend on what object it designates. Any object can be designated rigidly, and any object can be designated non-rigidly[13]. The natural kind term/ non-natural kind term distinction is a distinction between terms with one type of semantic value and terms with a different type of semantic value. But the rigid term/ non-rigid term distinction is a distinction between terms that bear one type of relation to their semantic value (a persistent one) and those that bear a different type of relation to their semantic value (a non-persistent one). It would be rather surprising if the two distinctions coincided. And this very point shows, contra Schwartz, that the rigid/ non-rigid distinction is not needed to capture the difference between natural

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[12] In fairness to Soames, he says that *interpreting Kripke* as holding Rigid Expression is problematic for this reason, and this is consistent with Soames not seeing any problem at all with 'gold' and 'bachelor' both being rigid.

[13] "[R]igidity is a semantic claim about a designator, not a metaphysical claim about the essence of what is designated" (Sullivan 2007, p. 6b).

kind terms and other general terms. Natural kind terms are those that express/ designate properties which are individuated by their microstructure. Other general terms don't.

There is another reason why it would be surprising if all and only natural kind terms were rigid general terms. The rigidity of 'tiger' and 'animal,' we are assuming, is supposed to explain why 'all tigers are animals' is necessary if true. One might have thought then that the necessity of 'all hammers are tools' is also to be explained by the rigidity of 'hammer' and 'tool.' Or, at least, a theory that could produce such an explanation would be better than a theory that couldn't. So there's no sense in prejudging the case against theories that would try such explanations, as Soames and Schwartz seem to want to do.

Devitt (2005) joins me in thinking that Soames and Schwartz are making "a mistake." He says:

> [I]t is a mistake to think that the primary task of the rigidity distinction is to distinguish natural kind terms from nominal kind terms. The primary task is to distinguish kind terms that are not covered by a description theory from ones that are. [p. 154]

This task is equally problematic for Rigid Expression/ Designation, since it might well be thought that 'bachelor' is descriptive, and thus should be non-rigid (if the primary task of rigidity is distinguishing what's descriptive from what isn't), but it comes out rigid on Rigid Expression/ Designation.

On the one hand, I have no compunction in agreeing with Devitt. Since I'm inclined to the view that all general terms are non-descriptive, and since I'm arguing now that they're all rigid, Rigid Expression/ Designation does the work expected of it. A general term is rigid, according to me, iff it is non-descriptive. But on the other hand, it is clearly Devitt who is mistaken. [NAME REDACTED] (p.c.) has pointed out to me that in a technical sense, definite descriptions are indeed "not covered by the description theory." In particular, they don't satisfy Kripke's six descriptivist theses (1980, pp. 54-55), because what they designate is not determined by properties that speakers associate with them, but rather is determined by the meanings of their parts and the compositional rules of the language. So if Devitt is right, the purpose of rigidity for singular terms is to class names and definite descriptions together as rigid, and set them apart from descriptive names (like 'Julius,' maybe?). But that just isn't right: 'the inventor of bifocals' is non-rigid, if anything is.

A more charitable reading of Devitt's suggestion is that he means definite descriptions to count automatically as "covered by the description theory" (they are after all called definite *descriptions*), and therefore count automatically as non-rigid. However, rigidity doesn't distinguish between names and definite descriptions, as pointed out by, say, Kripke (1980). Actualized definite descriptions (like 'the actual teacher of Alexander') and certain descriptions designating necessarily existing objects (like 'the successor of 0') are rigid designators, just like names.

The upshot is this. There are rigid definite descriptions and non-rigid definite descriptions. If you count definite descriptions as not being covered by the description theory, since they don't satisfy Kripke's descriptivist theses, then Devitt's suggestion nets you the wrong result. If you count definite descriptions as being covered by the description theory, because they're after all *descriptions*, Devitt's suggestion nets you the wrong result. I suppose Devitt could say 'the teacher of Alexander' is descriptive, whereas 'the actual teacher of Alexander' is non-descriptive, but I don't know on what grounds he'd propose to do so. Thus I conclude that if general term rigidity is indeed to be an extension of Kripke's notion of singular term rigidity, then contra Devitt it should not have as its purpose distinguishing descriptive general terms (if there are any) from non-descriptive ones.

The most serious charge against Rigid Expression/ Designation is that according to it, every general term is trivially rigid, because every term trivially expresses/ designates the same property relative to every possible world. This is certainly true for some understandings of 'property.' For example, Carnap took properties to be intensions (1988, pp. 18-19). The intension of a predicate P is a function that maps a possible world w to the extension of P relative to w (construed as a world of evaluation). By definition, then, no predicate can have different intensions relative to different possible worlds. For suppose P has intension I_1 relative to w_1 and intension I_2 relative to w_2, where $I_1 \neq I_2$. If I_1 and I_2 are distinct, they must differ in the extension they assign to some argument w, i.e. $I_1(w) \neq I_2(w)$. But predicates have but one extension relative to each world, so either $I_1(w)$ is not the extension of P at w, or $I_2(w)$ isn't. If $I_1(w)$ is not the extension of P in w, then by definition I_1 is not the intension of P; similarly if $I_2(w)$ is not the extension of P in w, then by definition I_2 is not the intension of P. Thus predicates have at most one intension. It's of little use to talk of predicates having intensions *relative to worlds*, but if we allow such talk, we must admit that trivially, i.e. purely as a matter of what it is to be an intension, each predicate has the exact same intension relative to each world. If we call the semantic relation a predicate bears to its intension the intending relation, and call the semantic persistence of the intending relation rigid intending, then it is a trivial truth that all predicates are rigid intenders.

But there is no need to accept the identification of properties with intensions, and I do not. Even a relatively non-committal account of properties—properties are ways that things can be—can avoid the triviality charge, or so it seems. There is nothing in the definition of "way a thing can be" that requires that general terms express/ designate the same way for things to be relative to each possible world, in the way that the mere definition of an intension requires terms to have the same intensions relative to each world.

Several philosophers, however, hold that even on a non-intensional reading of 'property,' Rigid Expression/ Designation is trivial. I wish to dispute the charge. First, however, let us examine it. Soames (2002) says:

> Nor will it do to say that a predicate is rigid iff there is a unique property which it stands for that determines its extension at each possible world. …there is no point in defining a notion of rigidity for predicates according to which all predicates turn out, trivially, to be rigid. [pp. 250-251]

And Stephen Schwartz (2002) says:

> [Rigid Expression/ Designation] is unsatisfactory because, among other things, it extends the privilege of rigidity to just about all general terms…

> Rigidity has lost its exclusivity, like a club of which all are automatically members, and thereby its interest… The basic problem is that this proposed solution trivializes rigidity. [p. 266]

The thought here seems to be that if every general term is rigid, then rigidity (for general terms) cannot play any role in explaining semantic phenomena, and thus there is "no point" in working with such a concept of rigidity.

The first thing I want to do is concede one aspect of the charge, before denying the other. According to me, all general terms are rigid. Each general term expresses a property, and it expresses the same property relative to every possible world. 'Cow' rigidly expresses the property of being a cow, 'philosopher' rigidly expresses the property of being a philosopher, and so on. Rigidity is not an exclusive club. What I want to deny, however, is that this somehow trivializes the notion of rigidity. All general terms are rigid, yes, but this does not follow from the definition of rigid expression alone. Each general term expresses the same property relative to each possible world, but this might not have been so. Rigidity is not an exclusive club, but it could have been

Others who endorse rigid expression are inclined toward a different position, and this is where it is time to distinguish Rigid Expression, my view, from Rigid Designation. Linsky (1984), LaPorte (2000), and Salmon (2005b) are at great pains to show that even Rigid Designation can simply avoid the triviality charge altogether, since according to Rigid Designation not all predicates are rigid. LaPorte (2000) says that "if [Rigid Expression/ Designation] is to be satisfactory… it *must* make other expressions designating kinds come out non-rigid (pp. 294-295, emphasis added)."

The paradigm case of a non-rigid predicate is something like 'the color of the sky,' as in the sentence "my true love's eyes are the color of the sky." Linsky (1984) and Salmon (2005b, p. 124) hold that the expression is a second-order definite description, roughly equivalent to "the unique property F such that F is a color property and the sky is F." The designatum of this description evaluated at w_1, where the sky is green, is the property of being green; at w_2, where the sky is orange, is the property of being orange. Hence, it is not a rigid designator: it designates different properties relative to different worlds.

I personally would rather not take the Linsky/ Salmon approach here, for two main reasons. The first is that I'm inclined toward Rigid Expression and not Rigid Designation. To reiterate the distinction: there are two types of general terms, simple ones and complex ones. The simple ones are like 'groundhog' and 'water' and the complex one are like 'the color of the sky.' 'Designation' is defined in such a way that 'water' designates its semantic value (what it expresses) and 'the color of the sky' designates the unique thing, if there is one, that satisfies 'color of the sky.' So, as we've seen, 'the color of the sky' is not a rigid designator, and thus Rigid Designation is not committed to the claim that all general terms are rigid. However, according to Rigid Expression, a general term is rigid if it expresses the same thing relative to any world, where 'expresses X' more or less means 'has X as its semantic value.' Thus if we adopt a Neo-Russellian treatment of descriptions (e.g. 'the color of the sky' expresses the property P a property Q has when Q is instantiated by the unique color of the sky), complex general terms like 'the color of the sky' are apt to come out all rigid, just like the simple general terms.

For some, this might well be reason to deny Rigid Expression and instead adopt Rigid Designation. And to my mind there's not a whole lot that hinges on this choice, once we've de-fanged the triviality objection (see below). But for what it's worth, I'll say what bothers me about Rigid Designation. Designation, as I see it, is not a "real" semantic relation—it's gruesome, and arbitrary, and superfluous. It's gruesome in two respects: first, it's defined over a gruesome category of expressions: names, common nouns, and determiner phrases headed by 'the.' Other determiner phrases that can occupy the same sentence frames as 'the color of the sky'—like 'every color in the rainbow'—don't designate anything. It's also gruesome because what it is to designate differs from expression to expression: names and common nouns designate their semantic values (what they refer to or express, respectively), whereas determiner phrases headed by 'the' designate the unique satisfier, if there is one, of 'the's NP complement. What's more, designation is entirely superfluous in semantic theory—it's not merely that it can be defined out of our semantic primitives (refers, expresses, satisfies), but that there's no need in, say, a compositional semantics to have a special category for the semantic relation that (a) names and common nouns bear to their semantic values and (b) determiner phrases headed by 'the' bear to the unique satisfier of their NP complements. That category does no work.

Expression has both more naturalness and more generality. The way I've been using the word, 'expression' is the relation between a general term and its semantic value. Since every expression has a semantic value, every expression stands in the expression relation (even if we call it something else in differing cases—e.g. we say that names *refer* to their semantic values. Indeed, the referentialist says that every expression refers to its semantic value, and makes no distinction between referring and expressing.) So Rigid Expression allows us to ask whether any expression—name, general term, quantifier, complementizer, etc.—is rigid. In Section IV we'll see important parallels in the behavior of non-nominal expression that motivate a notion of rigidity that could apply to them, such as rigid expression (and not, clearly, rigid designation). Furthermore that question—is this a rigid expresser?—seems like the important one in the vicinity. It means: is this an expression whose semantic value doesn't depend on the world of evaluation? Compare this to: is this an expression where the unique satisfier of its NP complement doesn't depend on the world of evaluation? That question is mostly irrelevant, unless the head of the expression happens to care about the unique satisfier of its NP complement (and only one word in English does—'the'!)

But, as I said, not much beyond these vague naturalness and generality considerations rides on whether we adopt Rigid Designation or Rigid Expression. Not much—except that Rigid Designation has a simple reply to the triviality objection, rehearsed above. This however, strikes me as even a less important consideration, as the triviality objection just seems fundamentally misguided.

Let's try to get clearer on what the triviality objection amounts to. One way of interpreting the Soames quote above is that Soames is claiming that rigid expression is a trivial property of general terms because, as a matter of fact, all general terms are rigid expressers. That is, the trivial properties of things in domain D are all those properties had by every member of D. This seems like a bad interpretation, because it is no mark against a property that it be trivial in this sense. According to many, every complex expression is compositional (has its meanings determined by its parts and their mode of combination). And yet, there is a point in defining compositionality, even if all complex expressions are compositional.

A second way of interpreting 'trivial' here is taking the trivial properties of things in a domain D to be all those properties that every member of D can be known to possess a priori. Thus, the objection would be that rigid expression is a trivial property of general terms, because it's a priori that every general term is a rigid expresser.

This objection fails, though, because according to some theorists, there are indeed non-rigid general terms. There is a way of reading "Mad Pain and Martian Pain" (Lewis, 1980) in which what Lewis is claiming is that 'pain' picks out one property relative to some indices, and picks out a different property relative to other indices. This reading is tricky, for although Lewis explicitly states that according to him, 'pain' is non-rigid, he also seems to be assuming Rigid Application, for he says: "the concept and name of pain contingently apply to some neural state at this world, but do not apply to it at another" (p. 218b) and takes this to decide the non-rigidity of 'pain.' Nevertheless, he does say that 'pain' takes on different "senses" at different indices, as when he says "The madman is in pain in one sense, or relative to one population. The Martian is in pain in another sense, or relative to another population" (p. 221a)[14] On this reading, Lewis denied that all general terms were rigid expressers, and therefore it is not a priori that Rigid Expression is true unless it's a priori that Lewis was wrong.

Even if this interpretation of Lewis is implausible, and even if no other theorist does or would hold such a view, still I think the objection that the properties that can be known a priori to be possessed by all members of domain D are trivial in a bad sense is misguided. This is simply on account of the fact that a priori knowledge is often hard-won, and sometimes far more difficult to obtain than run of the mill knowledge. Any logical system in which one can derive the Peano axioms is incomplete, but this fact is hardly trivial. It strikes me that the same is true of the claim that all general terms are rigid.

Perhaps these two interpretations of 'trivial' are incorrect or uncharitable. Nevertheless, there's strong reason to suppose that no sense of triviality that makes Rigid Expression a trivial thesis is a triviality worth avoiding. Recall that according to Kripke, all names are rigid, and that according to Kaplan, all simple demonstratives and indexicals are rigid. This entails that all singular terms are rigid, on the further assumption that neither definite descriptions (Neale, 1990) nor complex demonstratives (King, 2001a) are singular terms. Call this suite of views N = ST (for "the names are all and only the singular terms"). N = ST seems to be in the same boat as Rigid Expression. Both views have a notion of rigidity (rigid reference, rigid expression) that applies equally and indiscriminately to every member of their respective domains (singular terms, general terms). So unless it can be maintained that N = ST trivializes the standard account of rigidity for singular terms, it's hard to see how it can be maintained that Rigid Expression trivializes rigidity for general terms.

What I think is the heart of the triviality objection is the worry that extending rigidity to all general terms will neuter its explanatory value. We've already seen that

[14] A note on populations: in context, it is quite clear Lewis is using them here in the same way as, and often as proxy for, possible world indices of evaluation. He introduces these cases with the assertion: "If a nonrigid concept or name applies to different states in different possible cases, it should be no surprise if it also applies to different states in different actual cases" (p. 219a).

rigid expression cannot help us in distinguishing descriptive general terms from non-descriptive general terms, or in distinguishing natural kind terms from non-natural kind terms. But the important question is whether Rigid Expression is EXPLANATORY, that is, whether it can explain why such claims as *water is H_2O* and *tigers are animals* are necessary. If it's EXPLANATORY, then it's explanatory, and so not trivial. In the next section, I argue that Rigid Expression is indeed EXPLANATORY.

III. Essentialist Conclusions

An account of general term rigidity is EXPLANATORY iff it can explain the truth of 'necessarily, water is H_2O' and 'necessarily, tigers are animals' in roughly the same way that singular term rigidity explains the truth of 'necessarily, Hesperus is Phosphorus.' It is appropriate then to investigate just what role rigidity is supposed to be playing in explaining the truth of 'necessarily, Hesperus is Phosphorus.' What we want to know, then, is whether the premises (3.0.1)[15] and (3.0.2) *entail* the conclusion (3.0.C) and if they don't, what needs to be added to them so that they do.

3.0.1. 'Hesperus' and 'Phosphorus' are rigid designators. [Assumption]
3.0.2. 'Hesperus = Phosphorus' is true at the actual world @. [Assumption]

3.0.C. '□ Hesperus = Phosphorus' is true at @. [Conclusion]

The two relevant semantic notions here are those of *rigid designation* and *truth at a world*. That is, we want to know what it is about rigid designation and truth at a world, that when 'Hesperus' and 'Phosphorus' are rigid designators and 'Hesperus = Phosphorus' is true at the actual world, '□ Hesperus = Phosphorus' is true at the actual world. On a completely standard formalization of these semantic notions—for a fragment of (quasi-formalized) English containing identity statements and the necessitations of such statements—we have:

<u>Definition of *rigid designator*:</u>
DefRD: Name n is a rigid designator iff there is an x such that for all w, Ref(n, w) = x.

<u>Definition of *true at w*:</u>
DefT1: For any world w, and names n_1 and n_2, '$n_1 = n_2$' is true at w iff $Ref(n_1, w) = Ref(n_2, w)$.
DefT2: For any world w_1, and sentence S, '□S' is true at w_1 iff for all w_2, S is true at w_2.

Where *Ref(n, w)* is simply the referent of *n* relative to *w* (construed as a world of evaluation). Immediately from (3.0.1) and the definition of *rigid designator*, we obtain (3.0.3) and (3.0.4):

3.0.3. There is an x such that for all w, Ref('Hesperus', w) = x. [by 3.0.1, DefRD]

[15] The strange numbering is intended to reveal parallels with subsequent arguments.

3.0.4. There is an x such that for all w, Ref(‘Phosphorus’, w) = x. [by 3.0.1, DefRD]

And immediately from (3.0.2) and the definition of *true at w*, we obtain (3.0.5):

3.0.5. Ref(‘Hesperus’, @) = Ref(‘Phosphorus’, @). [by 3.0.2, DefT1]

Together, (3.0.3)-(3.0.5) entail (3.0.6):

3.0.6. For all w, Ref(‘Hesperus’, w) = Ref(‘Phosphorus’, w). [by 3.0.3-3.0.5]

And (3.0.6) entails our conclusion (3.0.C), by two more applications of the definition of *true at w*:

3.0.7. For all w, ‘Hesperus = Phosphorus’ is true at w. [by 3.0.6, DefT1]
3.0.C. ‘□ Hesperus = Phosphorus’ is true at @. [by 3.0.7, DefT2]

This isn’t meant to be revolutionary or deep or insightful. It simply brings out a point. The only substantive inference (that is, the only inference that is not merely an application of our standard definitions) is the inference from (3.0.3), (3.0.4), and (3.0.5)—what our assumptions “mean” according to our definitions—to (3.0.6), the claim that ‘Hesperus’ and ‘Phosphorus’ have the same referent relative to *every* possible world—which is what our conclusion “means,” according to our definitions.

And here, it’s easy to see what role the rigidity of ‘Hesperus’ and ‘Phosphorus’ is playing in the inference.

Suppose you know that Ben orders the same toppings on his pizza every time he orders—but you don’t know which toppings. It could be vegan deluxe every time, or it could be pineapple and jalapeno every time, or it could be spinach and feta every time, or whatever. What you do know is that it is the same set of toppings he orders each and every time he orders. Ben, we might say, is a rigid orderer: with respect to any pizza-buying occasion, he orders the same fixed topping profile. Similarly, suppose Carlotta too is a rigid orderer: you don’t know what she orders, but you do know that every pizza she orders is the same as the one before it.

Now, suppose you learn that on one specific occasion, yesterday, Ben and Carlotta ordered the same toppings as one another on their respective pizzas. Then it follows that they always do so. For suppose it was pineapple and jalapeno that each ordered yesterday. Then you know that Ben always orders pineapple and jalapeno, because he’s a rigid orderer. And you know that Carlotta also always orders pineapple and jalapeno, because she too is a rigid orderer. So they both always order the same thing: pineapple and jalapeno.

If either Ben or Carlotta weren’t a rigid orderer, you could not conclude from the fact that yesterday’s orders were the same for both parties, that other orders before or after were or will be the same for both parties. If Carlotta isn’t a rigid orderer, then just because both she and Ben ordered pineapple and jalapeno yesterday (thus ordering the same as one another), it doesn’t follow that their orders will be the same as one another’s tomorrow. Carlotta might order spinach and feta tomorrow, if she’s not rigid in her pizza preferences, and this might differ from Ben’s predictable pineapple and jalapeno.

The case is parallel for rigid designation. When two expressions, for example, 'Hesperus' and 'Phosphorus', are rigid designators—that is, they respectively designate the same individual relative to each possible world—and the two expressions are also co-designators at at least one world (such as the actual world), then they are co-designators with respect to every world. This would not be true were they not rigid designators: if 'Hesperus' picked out Mars with respect to just one world w* (and thus was not a rigid designator), then its semantic value relative to w* could differ from 'Phosphorus's semantic value relative to w*, even if they co-designated relative to @.

III.1 Rigid Expression and Property Identity

I want to argue that rigid expression, the property a general term has when it expresses the same property relative to every world, plays exactly the same role as rigid designation in explaining certain necessary statements—in particular, statements concerning co-extension or extensional inclusion of properties. The argument I want to validate, parallel to that from (3.0.1) and (3.0.2) to (3.0.C) from the previous section, is as follows:

3.1.1. 'Water' and 'H_2O' are rigid expressers. [Assumption]
3.1.2. 'Water ≡ H_2O' is true at the actual world @. [Assumption]

3.1.C. '□ (x)(x is water ↔ x is a H_2O)' is true at @. [Conclusion]

There are two new things going on here. First, we have replaced *rigid designation* in (3.0.1) with *rigid expression* in (3.0.2). At the risk of some confusion, I'll introduce a new quasi-formal definition of the notion to be used in the arguments that follow:

> <u>Definition of *rigid expresser*:</u>
> DefRE: Common noun[16] N is a rigid expresser iff there is a property P such that for all w, Exp(N, w) ≡ P.

Where *Exp(N, w)* is simply what common noun *N* expresses relative to *w* (construed as a world of evaluation). Hopefully this formulation doesn't do too much injustice to the notion of rigid expression as defined in Section I.

The second innovation concerns the introduction of two homographic symbols '≡' and '≡', one in the object language in (3.1.2) and the other in the metalanguage in DefRE. The object language and metalanguage symbols are related in precisely the way you might expect:

> <u>Definition of *true at w* (continued):</u>
> DefT3: For any world w, and common nouns N_1 and N_2, '$N_1 \equiv N_2$' is true at w iff $Exp(N_1, w) \equiv Exp(N_2, w)$.

[16] With some degree of barbarism done to the language here, I will use 'common noun' as shorthand for 'common noun or mass term' in what follows.

I use the metalanguage symbol '≡' to denote the numerical identity of properties, so that (3.1.2) is to read "the property of being water is numerically identical to the property of being H_2O.'

I am *not* claiming that the English sentence 'water is H_2O' expresses the proposition that water ≡ H_2O. Some who have endorsed Rigid Expression/ Designation do hold this (Martí & Martínez-Fernández, 2010, pp. 56-57), though I take it to be implausible, insufficient, and unnecessary. It's implausible because it involves positing a new sense of English 'be,' as "fire trucks are red' clearly doesn't express the proposition that fire truck ≡ red. Furthermore, this ad hoc sense of 'be' is insufficient for the task at hand, since it won't explain why "tigers are animals" is necessarily true (as it doesn't mean tiger ≡ animal). Finally, the proposal is unnecessary, as the mere fact that water ≡ H_2O guarantees the necessity of "water is H_2O" *even if* the latter sentence only means (x)(water(x) → H_2O (x)) and nothing stronger.

What I *am* claiming, however, is that in the classic cases of theoretical identities—the identity of water and H_2O, or heat and molecular motion—genuine (i.e. numerical) identity is involved. Even if none of the standard formulations ("water is H_2O") express a claim involving the numerical identity of properties, the reason such formulations express necessary truths (that is, the reason (3.1.C) holds) is that the relevant properties (water and H_2O) really are numerically identical. What I want to show is that starting from that premise (in the object language, (3.1.2)) and the premise that the terms flanking the (object language) '≡' are rigid expressers (in (3.1.1)), it follows that the (object language) claim that those properties are necessarily co-extensive is true ((3.1.C)).

As in argument 3.0, (3.1.3) and (3.1.4) are immediate consequences of (3.1.1) and the relevant definition of rigidity (*rigid expression*):

3.1.3. There is a P such that for all w, Exp('water', w) ≡ P. [by 3.1.1, DefRE]
3.1.4. There is a P such that for all w, Exp('H_2O', w) ≡ P. [by 3.1.1, DefRE]

Similarly, (3.1.5) is an immediate consequence of (3.1.2) and our definition of *truth at a world*, and steps (6) and (7) follow in the same vein as before and for similar reasons:

3.1.5. Exp('water', @) ≡ Exp('H_2O', @). [by 3.1.2, DefT3]
3.1.6. For all w, Exp('water', w) ≡ Exp('H_2O', w) . [by 3.1.3-3.1.5]
3.1.7. For all w, 'water ≡ H_2O' is true at w. [by 3.1.6, DefT1]

However, unlike argument 3.0, we cannot simply infer our conclusion (C) from step (7). This is because what we want to show is what the English sentence 'water is H_2O' expresses, whereas I've already conceded that it does not express the numerical identity of water and H_2O, which is what we have in (3.1.7), above. However, as uncertain as metaphysics may be in the general case, hardly any metaphysical truth can be more certain than this, that numerically identical properties are coextensive:

<u>Principle of the Coextensiveness of Numerically Identical Properties (PCNIP):</u>

> For all possible worlds w, and all common names N_1 and N_2: if ‘$N_1 \equiv N_2$’ is true at w, then ‘(x)(x is a $N_1 \leftrightarrow$ x is a N_2)’ is true at w.

This is all we need to derive our conclusion:

3.1.8. For all w, ‘(x)(x is water ↔ x is H_2O)’ is true at w. [by 3.1.7, PCNIP]
3.1.C. ‘□ (x)(x is water ↔ x is H_2O)’ is true at @. [by 3.1.8, DefT2]

The reader might object that □(x)(x is water ↔ x is H_2O) was supposed to follow from the weaker assumption (x)(x is water ↔ x is H_2O)—perhaps together with the fact that ‘water’ and ‘H_2O’ are kind terms of the same type—not the stronger claim that water ≡ H_2O. The motivation I’m imagining someone has who would press this objection is something like this. “Look, Kripke said that theoretical identity sentences involving rigid designators are necessary, if true. He gives the example ‘water is H_2O.’ For a multitude of reasons, the logical form of ‘water is H_2O’ is (x)(x is water ↔ x is H_2O). So if that’s true, and if ‘water’ and ‘H_2O’ are indeed rigid designators, then it had better follow *from these facts alone* that □(z)(x)(x is water ↔ x is H_2O). If you introduce auxiliary or stronger hypotheses to show that water is necessarily H_2O, then you’re not explaining what Kripke was talking about.”

There are two things I should like to say in reply to my hypothetical interlocutor. The first is, that she can’t have what she wants. We’ve been through the only pluausible possible accounts of rigidity. Rigid extension and rigid application don’t even *try* to explain the necessity of ‘water is H_2O.’ If there’s any hope of explaining this, the arguments I’ve given are it. Second, it would be terrible if she could have what she wants. Suppose for instance that all and only ravens are birds. Kripke plausibly argues that both ‘raven’ and ‘bird’ are rigid. So if (x)(Fx ↔ Gx) and the rigidity of ‘F’ and ‘G’ are sufficient for demonstrating that □(x)(Fx ↔ Gx), then it should follow, on such a supposition, that necessarily all *and only* ravens are birds. Frankly, that’s absurd. Some additional hypothesis is needed. I have characterized the hypothesis as: the property of being water and the property of being H_2O are identical, and identical properties have necessarily identical extensions. And I don’t think there’s much ground to criticize this hypothesis.

III.2 Rigid Expression and Grounding

The work of the Rigid Expression theorist is not done here. For we must also capture the fact that it is the rigidity of ‘tiger’ and ‘animal’ that accounts for why ‘tigers are animals’ is necessary, and this can’t be done solely with the apparatus thus far developed, since patently the property of being a tiger is *not* the property of being an animal. Martí & Martínez-Fernández, who hold a view largely similar to my own, handle the case as follows: they claim to adopt the EXPLANATORY desideratum from Soames, while nevertheless quietly dropping the half of the desideratum requiring an explanation for the necessity of statements like ‘tigers are animals’ (see Soames (2002) p. 263 and cf. Martí & Martínez-Fernández p. 47). But I’d rather not avoid the difficult case by stipulating that I don’t have to consider it

In fact, however, an argument along similar lines to (3.1) can be given to show that 'tigers are animals' also expresses a necessary truth. Let '≤' denote the relation property A bears to property B when objects that are A are B in virtue of being A. For instance, a particular shade of red is red in virtue of being the particular shade it is; a tiger is an animal in virtue of its being a tiger; a hammer is a tool in virtue of its being a hammer. On the other hand, a shade of red is not red in virtue of being on the wall; a tiger is not an animal in virtue of being striped; and a hammer is not a tool in virtue of being possessed by an office clerk. So magenta ≤ red; tiger ≤ animal; and hammer ≤ tool; but it is false, for instance, that striped ≤ animal. The argument we want to capture then is:

3.2.1. 'Tiger' and 'animal' are rigid expressers.	[Assumption]
3.2.2. 'Tiger ≤ animal' is true at the actual world @.	[Assumption]
3.2.C. '□ (x is a tiger → x is an animal)' is true at @.	[Conclusion]

The relation ≤, as used here, is intended to express the grounding relation (discussed in detail in Fine 2001, Section 5 pp. 14-16, Schaffer, 2009 Section 3.2 pp. 375-377, and Rosen 2010, Sections 4-5 pp. 114-117). The relation is often expressed in terms of what *depends up*on what, or what *holds in virtue of* what (Rosen 2010, p. 109). It is beyond the scope of the present essay to elaborate or defend a theory of grounding[17]. However, I shall make only two assumptions concerning the nature of the relation, and as far as I am aware, these assumptions are standard in the literature.

Once again, steps (3) and (4) follow immediately from assumption (1) and the relevant definition of rigidity:

3.2.3. There is a P such that for all w, Exp('tiger', w) ≡ P.	[by 3.2.1, DefRE]
3.2.4. There is a P such that for all w, Exp('animal', w) ≡ P.	[by 3.2.1, DefRE]

To obtain the analogue of step (5), however, we need to extend our definition of a truth at a world to encompass statements involving the object-language symbol for grounding ('≤'). Once again, we homographically "lift" object-language grounding claims into the metalanguage:

<u>Definition of *true at w* (continued):</u>

[17] For those readers who might be suspicious of this notion, in addition to the citations above, I repeat Rosen's appeal for "ideological toleration" on the subject:

> Philosophers are right to be fussy about the words they use, especially in metaphysics where bad vocabulary has been a source of grief down through the ages. But they can sometimes be too fussy, dismissing as 'unintelligible' or 'obscure' certain forms of language that are perfectly meaningful by ordinary standards and which may be of some real use.
> So it is, I suggest, with certain idioms of metaphysical determination and dependence. We say that one class of facts *depends upon* or is *grounded in* another. We say that a thing possesses one property *in virtue of* possessing another, or that one proposition *makes* another true. [2010 p. 109]

DefT4: For any world w, and common nouns N_1 and N_2, '$N_1 \leq N_2$' is true at w iff Exp(N_1, w) $\leq_w$ Exp(N_2, w).

(Unlike the cases of '=' and '≡'—that is, numerical identity between objects and properties, respectively—I have indexed the metalanguage grounding relation with a possible world. This is because I do not want to presume, in the absence of a discussion, that grounding is not world-relative. See below for discussion.)

3.2.5. Exp('tiger', @) $\leq_@$ Exp('animal', @). [by 3.2.2, DefT4]

Unlike the previous cases, premises (3)-(5) don't obviously entail the analogue of (6) here:

3.2.6. For all w, Exp('tiger', w) ≤ Exp('animal', w).

The reason is that something must be said about the $\leq_w$ relation (whereas nothing had to be said about = or ≡, because, as we shall see, those relations are assumed to be essentialist).

Let's return to the pizza analogy. Suppose Ben and Carlotta are again rigid orderers—but don't suppose that they ordered the same thing as one another yesterday or on any other day. Now suppose we learn that their orders stand in some relation yesterday—not the relation of numerical identity, but some other relation. Does it follow that *every day* their pizza orders stand in that same relation?

No. If the relation is 'costs less than or equal to' then even though Ben's order cost less than or equal to Carlotta's yesterday, and even though they each order the same toppings every time (but not necessarily the same as one another), it doesn't follow that Ben's order always costs less than or equal to Carlotta's. Sometimes pizza parlors have specials; perhaps pineapple and jalapeno is on sale on Tuesdays and spinach and feta is on sale Thursdays.

However, if the relation is 'involves fewer than or the same amount of toppings as' then it does follow that if the orders of two rigid orderers stand in the relation on one day, those orders stand in it every day (just in case you missed it, we're assuming that the individuals in question order pizza every day. Pretend that they're graduate students.) For if Ben ordered fewer toppings than Carlotta yesterday, and everyday Ben orders the same thing and everyday Carlotta orders the same thing, then Ben always orders fewer toppings than Carlotta.

Only an *essentialist* relation will do. A property is essentialist only if[18] when an object has it in one world, it has it in any other world where it (the object) exists. A relation, likewise, is essentialist only if when some group of things (objects, properties, or what have you) stand in it, they stand in it in any world where they exist. When 'a R b' is true at some world, and 'a' rigidly designates/ expresses thing t_1, 'b' rigidly designates/ expresses thing t_2, and R expresses an essesntialist relation, 'a R b' is true at every world. So identity statements like 'water ≡ H_2O' are necessarily true because 'groundhog' and 'woodchuck' are rigid expressers, and numerical identity is essentialist.

[18] I don't assume the 'if' direction; essentialism may be more than just a matter of what instantiates what in what world.

The question then is whether the grounding relation is essentialist. If it is, then (3.2.3)-(3.2.5) do entail (3.2.6), and if it isn't, they don't. I'm just going to assume that grounding is essentialist: if having property P grounds having property Q in some world, then in every world where P and Q exist, having P grounds having Q. And I take facts like the fact that tigers are necessarily animals as evidence for this claim.

Principle of Grounding Essentialism (PGE):
For all properties P, Q: if there is some w such that $P \leq_w Q$, then for all w, $P \leq_w Q$.

(3.2.3) asserts that there is a unique property that is the value of the function λw. Exp('tiger', w) for any argument w. Let's name that property *F*. (3.2.4) asserts that there is a unique property that is the value of the function λw. Exp('animal', w) for any argument. Let's name that property *G*. Now we can argue:

3.2.6a. $F \leq_@ G$	[by 3.2.5, Def F, G]
3.2.6b. For all w, $F \leq_w G$	[by 3.2.6a PGE]
3.2.6c. For all w, Exp('tiger', w) $\leq_w$ Exp('animal', w).	[by 3.2.6b, Def F, G]
3.2.7. For all w, 'tiger ≤ animal' is true at w.	[by 3.2.6, DefT4]

The two crucial moves here are, first, the necessitation of the grounding relation between F and G at (3.2.6b), licensed by PGE, and second, the substitution of the functional expressions Exp('tiger', w) and Exp('animal', w) for F and G, respectively, licensed by the fact that these are constant functions which (by definition) always return F and G, respectively.

We still require one further principle, the analogue of PCNIP:

Principle of the Extensional Inclusion of Grounds in what they Ground (PEIGG):
For all possible worlds w, and all common names N_1 and N_2: if '$N_1 \leq N_2$' is true at w, then '(x)(x is a $N_1 \rightarrow$ x is a N_2)' is true at w.

From this we derive:

3.2.8. For all w, '(x)(x is a tiger → x is an animal)' is true at w.	[by 3.2.7, PEIGG]
3.2.C. '□ (x)(x is a tiger → x is an animal)' is true at @.	[by 3.2.8, DefT2]

In summary, the argument from the object language claim that being a tiger grounds being an animal, and the claim that the object language expressions 'tiger' and 'animal' are rigid expressers, proceeds largely in the same vein as similar arguments we've considered (argument 3.0 and argument 3.1), except in requiring two assumptions concerning the grounding relation: first, that it is essentialist and second, that the extension of a ground is included within the extension of any property it grounds.

There would be an even greater similarity between the arguments thus far considered if we also indexed metalanguage '=' and '≡' to worlds. So indexed, for instance, we could not argue directly from (3.0.5*) to (3.0.6*), even under the assumption that 'Hesperus' and 'Phosphorus' were rigid designators:

3.0.5*. Ref('Hesperus', @) $=_{@}$ Ref('Phosphorus', @).
3.0.6*. For all w, Ref('Hesperus', w) $=_{w}$ Ref('Phosphorus', w).

For, if which individuals were numerically identical varied from world to world, even actually true identity statements involving two rigid designators might fail to be necessarily true. For instance, even if 'Hesperus' and 'Phosphorus' both rigidly designate Venus, it doesn't follow that '□ (Hesperus = Phosphorus)' is true, *unless there are no worlds in which Venus is self-diverse*. One assumption we tacitly make about numerical identity is that it is essentialist: any two things that are numerically identical are numerically identical in any world where both exist. This is by all means an excellent assumption, but when it is recognized that this assumption is an assumption, and that it is on a par with our assumption that grounding is essentialist, we can better see that nothing special is occurring in the case of argument 3.2.

III.3 Rigid Expression and Non-natural Kind Terms

One interesting result of the foregoing is that the fact that 'water', 'H_2O', 'tiger', and 'animal' are all natural kind terms *was never appealed to* in the course of any of our arguments. Whereas in the previous section we saw that some researchers took this to be a sign of the triviality of Rigid Expression as a thesis about rigidity, I instead see it as a positive feature—the generality of the thesis. For now we are able to provide largely the same explanations for the necessity of such identities as 'water closets are bathrooms' and 'hammers are tools' as we can provide for 'water is H_2O' and 'tigers are animals.' Consider the following argument (where F and G are suitably redefined as the unique values of the functions λw. Exp('hammer', w) and λw. Exp('tool', w), respectively):

3.3.1. 'Hammer' and 'tool' are rigid expressers.	[Assumption]
3.3.2. 'Hammer ≤ tool' is true at the actual world @.	[Assumption]
3.3.3. There is a P such that for all w, Exp('hammer', w) ≡ P.	[by 3.3.1, DefRE]
3.3.4. There is a P such that for all w, Exp('tool', w) ≡ P.	[by 3.3.1, DefRE]
3.3.5. Exp('hammer', @) $\leq_{@}$ Exp('tool', @).	[by 3.3.2, DefT4]
3.3.6a. F $\leq_{@}$ G	[by 3.3.5, Def F, G]
3.3.6b. For all w, F $\leq_{w}$ G	[by 3.3.6a PGE]
3.3.6c. For all w, Exp('hammer', w) $\leq_{w}$ Exp('tool', w).	[by 3.3.6b, Def F, G]
3.3.7. For all w, 'hammer ≤ tool' is true at w.	[by 3.3.6, DefT4]
3.3.8. For all w, '(x)(x is a hammer → x is a tool)' is true at w.	[by 3.3.7, PEIGG]
3.3.C. '□ (x)(x is a hammer → x is a tool)' is true at @.	[by 3.3.8, DefT2]

No "new" assumptions are required here at all: merely the claim that being a hammer grounds being a tool (a hammer is a tool in virtue of its being a hammer), and the claim that 'hammer' and 'tool' are rigid expressers (a claim that is endorsed by both the Rigid Expression theorist and her opponents). This is not triviality on display, but generality:

what once involved two separate, unrelated explanations now is seen to fall under one and the same general explanatory rubric. This is to be appreciated.

IV. Why Everything is Rigid

If I'm right, then general term rigidity is rigid expression, and since all general terms are rigid expressers, all general terms are rigid. One might rightly ask why this should be so. Indeed, even setting aside complex predicates, it still isn't obvious why all simple general terms should be rigid expressers. Why *aren't* there lexically simple general terms that say, express the property of being an F relative to the actual world, and the property of being a G (for G ≠ F) relative to any other world? This question deserves to be answered.

A first step toward answering this question is simply realizing that not everything is relative to everything. For example, one and the same individual may fail to be tall, in one world and at one time, relative to the standard of height for NBA centers, but succeed in being tall relative to the standard of height for Danny DeVito impersonators, in that world and time. And yet, it is never the case that one person, in one world and at one time, is pregnant, relative to the standard height for NBA centers, but that very person is also not pregnant, in that world and time, relative to the standard of height for Danny DeVito impersonators. It might well make perfect sense to talk of some person being pregnant, in a world and at a time, relative to some standard of height. But the extra parameter would be a dispensable add-on: we could just as easily talk of being pregnant in a world and at a time *simpliciter,* and omit any mention of standards of height. The insight here is that being pregnant (in a world, at a time) is simply *metaphysically independent of* standards of height.

Perhaps then, expression is a relation that is metaphysically independent of possible worlds. If this were so, then the fact that some general term G expressed the property P relative to every world would just amount to the fact that G expressed the property P—talk of expressing *relative to worlds* could be trivially replaced by talk of expressing simpliciter, just as talk of being pregnant *relative to standards of height* is trivially replaced by talk of being pregnant simpliciter. It would follow directly from one's being an expresser that one was a rigid expresser.

The analogue of this view for certain rigid singular terms is endorsed in Kaplan (2004, p. 756) and Evans: (1985, p. 192). And indeed, something like this picture is suggested by Kripke himself. In the final footnote of the introduction to the 1980 printing of *Naming and Necessity*, he draws a distinction between de jure and de facto rigidity that some commentators (McGinn 1982) take to be a distinction between designators that simply deliver a semantic value (de jure rigid) and those that deliver a constant function from worlds to a certain semantic value (de facto rigid).

If a general term merely contributes a property to propositions expressed by sentences in which it occurs, rather than something that *determines* a property (like a description, or a function from worlds to properties), then it will be a rigid expresser. We might wonder, though, *why* general terms merely contribute properties, rather than things that determine properties, to propositions.

At bottom, I think the answer is as simple as this. Our reasoning about modal and counterfactual circumstances is governed by various principles, among them Leibniz's Law and all its substitution-instances involving singular terms. If we adopt, say, an informational metasemantics, then ‘Aristotle’ refers to Aristotle outside of modal contexts because ‘Aristotle’-involving sentences carry information about Aristotle’s properties, not someone else’s. Further, ‘Aristotle’ refers to Aristotle inside of modal contexts, because our adherence to Leibniz’s Law guarantees that modal ‘Aristotle’-involving sentences carry information about Aristotle’s modal properties, not someone else’s. If, on the other hand, we were inclined, say, to reject inferences like a = b; therefore, $\Box$ a = b—then modal statements involving ‘a’ would not carry information about what *a* was like in other worlds, and ‘a’ would be non-rigid. Now we can always ask further questions, like: Why reason in accord with Leibniz’s Law? But at some point the answer has to be something along the lines of: Because that’s the most useful way to do things.

To summarize: singular and general terms are rigid since directly referential/ directly expressive. They don’t contribute semantic values relative to worlds of evaluation, they contribute semantic values simpliciter.

V. Everything Else

If Kripke and I are right regarding our respective doctrines, names and general terms are all rigid. It is left to us to ask whether other simple expressions, such as quantifiers, conjunctions, adjectives, adverbs, complementizers, etc. are rigid, and whether complex expressions, like DP’s and CP’s, NegP’s and DegP’s are rigid as well.

With respect to the truth-functional connectives, McGinn (1982) says, “(Permitting ourselves some grammatical licence) we can apply the Kripkean intuitive test: can we find a true reading for, e.g., ‘Negation might not have been negation’? Clearly not.” (pp. 103-104). I am somewhat wary of the “intuitive test” here: first, because the word ‘negation’ is not the word ‘not’; second, because there’s some reason to think even Kripke didn’t endorse Kripke’s intuitive test (see King (2001b): pp. 320-321); and third, because if two expressions are non-rigid in the same way (i.e. each refers to what the other refers to in each world, but they change referent from world to world) then the intuitive test delivers the wrong result. Nevertheless, if we assume that ‘not’ and ‘negation’ have the same semantic value as one another, and that Kripke’s intuitive test works (even if Kripke never endorsed it), then the test provides evidence that ‘not’ is rigid, and similar tests (under similar assumptions) could be used to show that the quantifiers are rigid. For example, if ‘all’ and ‘universality’ have the same semantic value, then the fact that ‘universality might not have been universality’ has no true reading should be evidence that ‘all’ is rigid too.

A second line of evidence involves asking whether we consider anything other than the actual semantic value of a simple expression, when evaluating a sentence in which it occurs at other worlds. For instance, when we evaluate ‘P and Q’ at some non-actual world w, it seems that the sentence is true iff P is true at w *and* Q is true at w. ‘And’ makes the same contribution relative to arbitrary w that it does relative to the actual world. This line of evidence is easier to pursue than the nominalize-and-Kripke-test strategy considered in the last paragraph. And it seems to straightforwardly extend to all grammatical categories, such as verbs, adjectives, and adverbs. For instance, for ‘John runs’ to be true relative to the actual world, John has to run in the actual world. And so for any world: ‘John runs’ is true relative to arbitrary w iff John *runs* in w. ‘Runs’ does not denote one activity here, and a different one elsewhere; it expresses the same semantic value; it is a rigid expresser.

A third line of evidence concerns our judgments of the truth and falsity of certain sentences containing modal operators. Suppose for a second that ‘not’ does not rigidly express a function from propositions to their negations. Then, relative to some worlds, ‘not-P’ fails to express the negation of P. So it should turn out that possibly (P and not-P) is *true*. But it isn’t. So ‘not’ is rigid[19]. Similarly, if ‘all’ sometimes fails to express universal quantification, ◊ (some F’s are G, but all F’s are not-G) should turn out true (on the further assumption that ‘some,’ ‘but,’ ‘and,’ and ‘not’ are rigid), but again, it doesn’t. Using an actuality operator can reveal quite a bit here. For example it seems false that John might have run, while not doing what is *actually* sufficient for running; and false that John might have run quickly, relative to some standard of quickness, while not doing what is *actually* sufficient for running quickly, relative to that standard. This suggests that ‘run’ and ‘quickly’ both persistently express their semantic contents.

In light of such evidence, McGinn says, “we may hazard the generalisation that if an expression is semantically primitive then it has its semantic value *de jure* rigidly (p. 105).” I concur.

What What we say about the rigidity of complex expressions largely depends on how we want to treat their semantics. Consider for example a definite description, ‘the F.’ If its semantic value, relative to a world w, is the object O that uniquely satisfies F in w (if there is such an O), then clearly, many definite descriptions are non-rigid: ‘the inventor of bifocals’ has Benjamin Franklin as its semantic value in the actual world, and Descartes as its value relative to some world where Descartes uniquely invented bifocals. If, on the other hand, ‘the F’ has as its semantic value an intension—for example, a function from a world w to the unique individual O who has F at w, if there is one—then our prior considerations tell us that definite descriptions must *trivially* be rigid: as a direct consequence of the definition of ‘intension,’ relative to each world, each definite description has the same intension. Finally, if ‘the F’ expresses a property of properties, namely, the property a property G has when there is a unique F that is G, then it will be a non-trivial question whether ‘the F’ is rigid, depending on whether ‘the F’ expresses this same property of properties relative to each possible world.

I’ll walk through this last view just so it’s clear what the view is supposed to be. According to this view, definite descriptions are rigid in the “general” sense of rigidity I’ve suggested: relative to each possible world, they have one and the same semantic value. However, according to the view, the semantic value of a definite description is not what it designates, but rather a property of properties. For example, the definite description ‘the inventor of bifocals’ might express the property had by a property—for example, the property of running—when that property (the property of running) was instantiated by the unique individual who invented bifocals. So, on the view in question,

[19] I realize that this argument is not a decisive one, and that it also begs the question. It’s not decisive for the following reason. Suppose relative to all worlds except w, ‘not-P’ expresses the negation of P, but relative to w, it expresses Q, which is logically independent of P. If at w, P is true and Q is false, then ‘P and not-P’ will turn out false relative to w (because Q is false), and false relative to every other world (because it expresses a contradiction). The argument also begs the question because it assumes that the connective ‘and’ is rigid, and it is the rigidity of such connectives that is at issue. Nevertheless, the argument is strongly suggestive.

since ‘the inventor of bifocals’ is rigid, relative to each possible world it expresses this same property of properties.

Does it then follow that whenever ‘the F is the G’ is actually true, on this view, that it’s necessarily true? No. This is because ‘_____ is _____’ in the numerical identity sense of English ‘is’ expresses a relation between individuals, and not properties of properties. Thus, when it’s flanked by expressions whose semantic values are properties of properties, rather than individuals, it is not interpreted as an identity claim between those properties of properties. ‘The inventor of bifocals is the first postmaster general’ does *not* mean: the property had by a property P when P is instantiated by an individual who uniquely invented bifocals is one and the same property as the property had by a property Q when Q is instantiated by an individual who uniquely served as the first postmaster general. It’s obvious that it doesn’t mean that because the latter claim is patently false whereas it’s (somewhat less patently) true that the inventor of bifocals was the first postmaster general. What exactly identity statements flanked by definite descriptions do mean when those descriptions are taken to have second-order properties as meanings involves a long story about quantifier raising and variable binding and stuff better left to linguists. What’s important here is that were there to be an English expression ‘is$_{\equiv}$’ that expressed numerical identity between properties, the view in question would predict that ‘the F is$_{\equiv}$ the G’ would be necessarily true, if actually true. Of course, statements like ‘the inventor of bifocals is≡ the first postmaster general’ would be actually false, since the properties in question are diverse, but other true identities like ‘the teacher of Alexander the great is$_{\equiv}$ the teacher of Alexander III of Macedon’ would not only be true on the view, but necessary.

The case of sentences parallels the case of definite descriptions. If they express truth-values, many are not rigid; if they express intensions (functions from worlds to truth-values), all are trivially rigid; and if they express propositions (where these are not taken to be intensions), the question can go either way. I should point out that on at least one theory of propositions, if simple expressions are rigid, then complex ones are too. This is the ‘structured proposition’ approach. If the sentence [$_S$ *John* [$_{VP}$ *runs*]] has as its semantic value a structured proposition <John <runs>> (where ‘John’ and ‘runs’ are the semantic values of ‘*John*’ and ‘*runs*,’ respectively, relative to the context of evaluation), then if ‘*John*’ and ‘*runs*’ contribute the same semantic value relative to each possible world, [$_S$ *John* [$_{VP}$ *runs*]] will contribute the same semantic value relative to each possible world as well. So if the structured propositionalists are right, and McGinn’s hazarded generalization is also right, then rigidity ‘percolates up’ from the simple to the complex.

For at least some complex expressions, it will be hard to deny their rigidity. For instance, consider ‘female fox’. Following our earlier arguments, ‘vixen’ is rigid. Hence, if ‘female fox’ is non-rigid, the sentence ‘it might have been the case that vixens weren’t female foxes’ must be true; but it isn’t. The reason it’s difficult to tell whether definite descriptions and sentences are rigid is that there’s room for debate over their semantic value: objects or second-level functions; truth-values or propositions. But it’s hard to deny that ‘female fox,’ say, expresses the property of being a female fox—that is, the property of being a vixen. And it’s telling that when there is no room for debate, complex expressions are clearly rigid.

To conclude, there is a fair amount of evidence in support of the claim that all simple expressions are rigid, that is, that they have the same semantic value relative to each possible world. The evidence is mixed with regard to complex expressions, to a large extent because there is no consensus regarding what the semantic values of complex expressions are supposed to be. And at this point, we must leave the question.

VI. Conclusion

For an expression to be rigid is for it to have the same semantic value relative to each possible world. Names are rigid because their semantic value is the object they refer to, and they refer to the same object, relative to each possible world. In this chapter, I have defended the view that general terms are rigid, because their semantic value is the property they express, and they express the same property, relative to each possible world.

In all, we considered four candidate notions of rigidity, corresponding to four candidate semantic values for general terms: extensions, intensions, satisfiers[20], and properties. We rejected the thesis that rigidity was rigid extension, because none of the paradigm cases of rigid general terms came out rigid, according to the thesis. We rejected the thesis that rigidity was rigid intending, because it is trivially true that all general terms are rigid intenders. And we rejected the thesis that rigidity was rigid application for two reasons: first, because like rigid extension, none of the paradigm cases of rigid general terms come out rigid, according to the thesis; second, even if the paradigm cases were rigid, according to the thesis, nevertheless it is powerless to explain why ‘water is H_2O’ is necessary, if true.

Thus I endorsed the thesis that rigidity for general terms was rigid expression: a general term G is a rigid expresser iff G expresses the same property relative to every possible world; or, alternatively: iff *if* for any P, G expresses P relative to the actual world, *then* G expresses P relative to any other possible world. It was argued that on this account all general terms are rigid, but that this was a substantive—not a trivial—fact. Furthermore, I argued that my view could explain why ‘water is H_2O’ and ‘tigers are animals’ are necessary, in exactly the same way that Kripke’s notion of rigid designation allowed him to explain why ‘Hesperus is Phosphorus’ is necessary.

There are several upshots to these conclusions. First, Leibniz’s Law for properties is that $(X)(Y)(X \equiv Y \rightarrow (\Phi \leftrightarrow \Psi))$, where X and Y range over properties, and Φ and Ψ differ at most in that open occurrences of X in Φ are replaced with Y in Ψ. In simpler terms, numerically identical properties have numerically identical intensions. Intuitively, every substitution-instance of the law involving a general term is true: if the property of being a groundhog is numerically identical to the property of being a woodchuck, then necessarily, all and only groundhogs are woodchucks; and if the property of being a water closet is numerically identical to the property of being a bathroom, then necessarily, all and only water closets are bathrooms. As outlined in Section III, the doctrine that rigidity for general terms is rigid expression, combined with the doctrine that all general terms are rigid expressers, delivers the result that every instance of Leibniz’s Law for properties is true, thus confirming intuition.

Second, we are now in a position to unify and simplify the semantics of general terms. If it is not just natural kind terms, but all general terms that are rigid, then all general terms may be given a unified semantic treatment. This is the Uniformity Principle

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[20] That is, things that satisfy the general term, things that it *applies* to.

in action: what is true for natural kind terms is true more generally for all general terms. Further, if rigidity for general terms is rigid expression, i.e. if rigid general terms express the same property, relative to each possible world, then we may simplify our semantic clauses by stripping them of superfluous world-parameters. We need no longer say "'dog' expresses, relative to some world w, f(w)" for some specified function f from worlds to contents, but rather may more simply say "'dog' expresses (simpliciter) the property of being a dog."

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