

6 How Things Have to Be¹

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Putnam on Natural-Kind Terms

According to Saul Kripke's intended notion from his landmark *Naming and Necessity* (Kripke 1980), a term τ designates an object x *rigidly* (and is a *rigid designator* of x) if τ designates x with respect to every possible world in which x exists and does not (in the same use) designate anything else with respect to any possible world. In his classic and marvelously creative paper 'Meaning and Reference',² Hilary Putnam proffers a theory according to which natural-kind terms, like 'water' and 'tiger', are rigid designators. He writes:

When I say "*this* (liquid) is water," ... the force of my explanation [of the meaning of 'water'] is that "water" is whatever bears a certain equivalence relation (the relation [*x is the same liquid as y*]) we called "*same_L*" above) to the piece of liquid referred to as "*this*" *in the actual world*.

We might symbolize [this] in the following way. ...:

[(*OD*)] (For every world W) (For every x in W) (x is water $\equiv x$ bears *same_L* to the entity referred to as "*this*" *in the actual world* W_1)

... If we extend [Kripke's] notion of rigidity to substance names, then we may express Kripke's theory and mine by saying that the term 'water' is *rigid*.

The rigidity of the term 'water' follows from the fact that when I give the "ostensive definition": "*this* is water," I intend [(*OD*)] ...

(p. 707).

Later in Putnam's discussion, it emerges that (*OD*) is a misformulation, or at least highly misleading. Instead, his intent is that x is water in a possible world w if and only if x is the same liquid in w that the exemplar is in the actual world. Whether the exemplar is also water in w , as (*OD*) evidently requires, is altogether irrelevant. What matters is that x *as it is in* w be the same liquid as the exemplar is *as it is in the actual world*. A four-place cross-world relationship is invoked: x is the same liquid in w_1 that y is in w_2 . Putnam understands such a four-place cross-world relationship

as a binary relation between a pair of peculiar entities: x -in- w_1 and y -in- w_2 . These are *entities-as-they-are-in-particular-worlds*. Although x itself exists in infinitely many possible worlds, such an entity as x -in- w exists in w and in no other world. In *Reference and Essence* (1981), I call such putative entities ‘possible-world slices’, on an analogy to *time slices*, or temporal stages (phases). Thus, (OD) should be reformulated in conformity with Putnam’s intentions as follows:

(OD') $(w)(x)[x \text{ exists}_w \supset (x \text{ is water}_w \equiv x\text{-in-}w \text{ is the } same_L \text{ as this-in-}W_{@})]$,

where $W_{@}$ is the actual world and where $same_L$ is the equivalence *same-liquid* relation between possible-world slices of individuals.

Putnam continues with characteristic vigor:

What Kripke was the first to observe is that this theory of the meaning (or ‘use,’ or whatever) of the word ‘water’ (and other natural-kind terms as well) has startling consequences for the theory of necessary truth. ...

... we can understand the relation $same_L$ (same liquid as) as a cross-world relation by understanding it so that a liquid in world W_1 which has the same important physical properties (in W_1) that a liquid in W_2 possesses (in W_2) bears $same_L$ to the latter liquid.

Then the theory we have been presenting may be summarized by saying that an entity x , in an arbitrary possible world, is *water* if and only if it bears the relation $same_L$ (construed as a cross-world relation) to the stuff we call “water” in the *actual* world.

... Once we have discovered that water (in the actual world) is H_2O , *nothing counts as a possible world in which water isn’t H_2O* .

On the other hand, we can perfectly well imagine having experiences that would convince us (and that would make it rational to believe that) water *isn’t* H_2O . In that sense, it is conceivable that water isn’t H_2O . It is conceivable but it isn’t possible! Conceivability is no proof of possibility. ... a statement can be (metaphysically) necessary and epistemically contingent. Human intuition has no privileged access to metaphysical necessity.

(pp. 708–709)

In the preface to the second edition of Salmon (1981) (the first edition was a revision of my doctoral dissertation), I said, ‘The central argument of Part II—that Kripke and Putnam made unsubstantiated claims, indeed false claims, to the effect that the theory of direct reference has nontrivial modal-essentialist import—initially met with controversy, but few writers today would dispute it’ (p. xvii).³ The year after these words were published saw (Mackie 2006), which does just that, or something rather

close to it. More accurately, Mackie argues that the central argument of part II of Salmon (1981) is correct in spirit but not in letter. The primary bone of contention between Mackie (2006) and Salmon (1981) is whether the case has been made that Putnam's direct-reference theory of natural-kind terms, taken in conjunction with empirical or otherwise uncontroversial premises, yields conclusions that are both modal-essentialist and non-trivial, such as that the sentence 'Water is H₂O' expresses a necessary truth about water.

One of the central tenets of Putnam's direct-reference theory is that the meaning of the substance term 'water' can be explained in an ostensive definition, 'This liquid is *water*', said with reference to a paradigmatic water sample. The ostensive definition itself, upon analysis, allegedly entails that 'water' rigidly designates a particular liquid substance. On my reconstruction of Putnam's theory, the ostensive definition is deceptive in that its underlying logical form is modal, complex, and indeed modally complex. Given Putnam's purposes, however, quantification over possible-world slices is neither desirable nor necessary. (Salmon (1981) includes an account of cross-world relations that eliminates all reference to world slices.)

Salmon (1981) distinguished first of all between a general term, like 'water' or 'tiger', and the corresponding predicate formed from the term in combination with the 'is' of predication serving as copula: 'is water' or 'is a tiger'. Drawing this distinction enables us to say that while 'water' designates a certain liquid substance, the extension of the corresponding predicate 'is water' is not this same substance but the set or class of water samples (or the set's characteristic function, etc.). Here, I shall represent the copula by the partially artificial notation '*is*{____}', where the space between the braces is to be filled with a general term. If *v* is a general term, we thus represent the corresponding predicate as '*is*{*v*}'. If *v* is a count noun, the predicate may be represented instead as '*is-a*{*v*}', though the supplementing indefinite article is regarded as nothing more than syntactic garnish (and not, for example, as indicating existential quantification). In either case, the predicate applies to all and only the instances of the kind (or other universal) designated by *v*.⁴ The predicate 'is water', formalized as '*is*{water}', might thus be read 'is an instance of water' or 'is a water sample'.

The intended underlying logical form of the ostensive definition 'This liquid is *water*' is now reformulated as follows, where the demonstrative 'this' again designates a paradigmatic water sample⁵:

$$(POD_{\text{water}}) \quad \Box(x)(x \text{ is}\{\text{water}\} \equiv x \text{ is}\{dthat[\text{the liquid substance } \ell: \text{ this is}\{\ell}\}\}).$$

This Putnamian ostensive definition has the intended consequence that a substance sample is water in a possible world *w* if and only if that

sample is an instance in w of the very same-liquid substance ℓ that the indicated exemplar is an instance of in the actual world. Thus, according to (POD_{water}) , there is a particular liquid substance ℓ —the very liquid of which the exemplar is a sample—such that necessarily, any sample of ℓ is water and only samples of ℓ are water. By definition, water necessarily coincides with a liquid substance.

That is not all. Putnam agrees with Kripke that ‘water’ rigidly designates the particular chemical compound H_2O . In Salmon (1981), I argued that there is no distinction among general terms, as there is for singular terms, between rigid and non-rigid designation, and that for general terms, designation and rigid designation are one and the same (pp. 44–54). I offered as a criterion for rigid designation of a general term v that a sentence of the following form be true, where β is a term that designates a kind (sort, type, category) or other universal (pp. 73–75):

$$(C) \quad \Box(x)(x \text{ is}\{v\} \equiv x \text{ is}\{dthat[\beta]\}).$$

This proposed criterion was encouraged by Putnam’s remark that the rigidity of ‘water’ follows from (POD_{water}) .⁶

Salmon (1981) defined notions of *metaphysical extension* and *metaphysical intension* for universals (pp. 46–47). The metaphysical extension of a universal U in a possible world w is simply the set or class of U ’s instances in w . The metaphysical intension of U is then the function that assigns to each possible world w , U ’s metaphysical extension in w . In these terms, the truth of (C) requires that the semantic intension of ‘ $\{v\}$ ’ and the metaphysical intension of the universal designated by β be the same. This is what it is, I argued, for v to designate rigidly the same kind that β designates.

The truth of (POD_{water}) requires that the semantic intension of ‘water’ be the same as the metaphysical intension of the liquid ℓ of which the exemplar is an instance. As Salmon (1981) notes (pp. 150–151), by the proposed criterion, (POD_{water}) has the consequence that ‘water’ thereby rigidly designates a particular liquid substance—the very liquid ℓ in question.

Non-Rigid General Terms

Putnam’s and my earlier claim that the rigidity of ‘water’ follows from (POD_{water}) is, I have come to see, mistaken. Salmon (1981) overlooked a relevant logical possibility, brought to my attention by Linsky (1984). This is the possibility that the semantic content (or “meaning”) of ‘water’ is the same as that of a non-rigid general term.

Can there be such a thing as a non-rigid general term? Even a descriptive common-noun phrase might be regarded as rigidly designating a

certain *kind*. For example, the phrase ‘unmarried man’ may be seen as designating a certain kind of man: the kind, *bachelor*. But if the phrase designates that kind, it does so rigidly.

It is logically possible that ‘water’ is a non-rigid general term. To see why this is so, it must first be observed that even if definite descriptions are typically singular terms—as John Stuart Mill, Gottlob Frege, and many others have taken them to be, contrary to Russell’s theory—some definite descriptions are in fact general terms rather than first-order singular terms. (General terms might be regarded as second-order singular terms.) This is illustrated by the predicate-nominative use of ‘the color of the sky’ in.

Henry’s favorite shirt is the color of the sky.

The verb in this sentence is not the ‘is’ of identity. It is the familiar ‘is’ of predication, the same verb that occurs in ‘Henry’s favorite shirt is blue’. In fact, although it is a noun phrase the description plays the very same semantic role as the single word ‘blue’ in its adjectival use. Both are predicative, both designate a color (indeed the same color), etc.

In fact, the definite description ‘the liquid substance ℓ : this $is\{\ell\}$ ’ occurring in (POD_{water}) is a general-term definite description rather than a singular-term definite description.⁷ One reason this is significant is that traditional theories have hypothesized that a term like ‘water’ abbreviates a non-rigid general description like ‘the colorless, odorless, thirst-quenching liquid in Earth’s rivers, lakes, streams, and oceans’. The theories of Frege and Russell were basically of this sort. Even Mill, whose theory of ordinary proper names has a remarkably contemporary flavor, held a theory of general terms very similar to Frege’s and Russell’s. Such descriptonal theories of general terms are the foil to the direct-reference theory, which diametrically opposes them.

Let us abbreviate the general (non-singular) definite description, ‘the liquid that covers most of the Earth’s surface’ as ‘earthliquid’.⁸ Then, the identity sentence ‘Water = earthliquid’ is true although not necessary. The new term ‘earthliquid’ is, like the general description it abbreviates, a descriptonal general term that applies to something x with respect to a possible world w if and only if x is a sample in w of the liquid that covers most of the Earth’s surface in w . In the actual world, a liquid sample is earthliquid if and only if it is water. Let W_m be a possible world in which most of the Earth’s surface is covered by methane. In W_m , a bit of liquid is a sample of earthliquid if and only if it is methane. There is a special corresponding kind: *Sample of the liquid that uniquely covers most of the Earth’s surface*—or as it may now be abbreviated, *Sample of earthliquid*. This kind is to be sharply distinguished from water. Although the two kinds, water and *Sample of earthliquid*, have a common metaphysical extension, they differ in metaphysical intension. In W_m , a sample of water is an instance of the former kind and not the

latter, whereas a sample of methane is an instance of the latter kind and not the former. Then, the following modal generalization may be asserted:

$$\Box(x)(x \text{ is}\{\text{earthliquid}\} \equiv x \text{ is-}a\{\text{dthat}[\text{Sample of earthliquid}]\}).$$

That is, in any possible world w , something is earthliquid in w iff it is an instance in w of the particular kind, *Sample of earthliquid*.

By the criterion proposed in Salmon (1981), ‘earthliquid’ thus rigidly designates the kind, *Sample of earthliquid*. But this is mistaken. The term designates water (and nothing else). Water is a different kind from *Sample of earthliquid*. In the actual world, any liquid sample that is of one kind is also of the other, but there might have been liquid samples that were of one kind and not the other. That is to say, the two kinds share a common metaphysical extension but they differ in metaphysical intension. Furthermore, while ‘*Sample of earthliquid*’ designates rigidly, ‘earthliquid’, like the description it abbreviates, designates non-rigidly. There is thus a distinction even among general terms between rigid and non-rigid designation. Routinely, general definite descriptions are non-rigid designators.

The truth of (C) cannot be taken as a criterion of (rigid) designation for general terms. Although the truth of (C) is indeed a necessary condition for a general term v to designate rigidly the universal designated by β , it fails as a sufficient condition when v is a non-rigid general definite description. However, where β is a non-rigid general description, the truth of (C), because of the presence of the rigidifying ‘*dthat*’ operator, precludes the possibility that v abbreviates β . If (POD_{water}) is true, then whatever ‘water’ designates, the semantic intension of ‘is water’ coincides with the metaphysical intension of a particular liquid substance, the substance of which the exemplar is an instance.

The defect in Salmon (1981)’s criterion for general-term rigidity is repairable. Following the case of singular terms,⁹ we may say that a general term v rigidly designates the universal designated by β if and only if the following is true:

$$(C') \quad \Box(\text{dthat}[\beta] = v),$$

The original (C) is a trivial logical consequence. But the two are not equivalent.

The intended underlying logical form of the ostensive definition ‘This liquid is *water*’ is properly given not by (POD_{water}) but by

$$(OD_{\text{water}}) \quad \Box(\text{dthat}[\text{the liquid substance } \ell: \text{this is}\{\ell\}] = \text{water}).$$

In English, ‘Necessarily, *that* [the liquid of which this is an instance] is *water*’.¹⁰

According to this new criterion, ‘water’ rigidly designates water, whereas the descriptive term ‘earthliquid’ (which also designates water) does not rigidly designate. The general term ‘sample of earthliquid’ also does not rigidly designate water, although it rigidly designates the kind *Sample of earthliquid*. This repair foregoes Putnam’s and my former claim that the rigidity of ‘water’ follows from (POD_{water}) itself. It follows trivially from (OD_{water}) , which also trivially entails Putnam’s variant, (POD_{water}) .

Perhaps the truth of (POD_{water}) together with the observation that the liquid substance of which the exemplar is an instance is a natural kind precludes the possibility that ‘water’ designates only non-rigidly. For what can it non-rigidly designate if the semantic intension of ‘is water’ coincides with the metaphysical intension of a natural kind? (Notice that the semantic intension of the non-rigid general term ‘is earthliquid’ coincides with the metaphysical intension of a *non-natural* kind.)

One way or another, (POD_{water}) must be strengthened to yield the result that ‘water’ is rigid. However, (POD_{water}) by itself is sufficient to yield the desired result that the semantic intension of the predicate ‘is water’ is exactly the metaphysical intension of a particular liquid substance, the very liquid of which the exemplar is an instance, so that *if ‘water’ rigidly designates, it rigidly designates something whose metaphysical intension is exactly that of the liquid substance of which the exemplar is an instance.*

Modal-Essentialism in the Putnam Theory

Given that ‘water’ is rigid, (POD_{water}) also yields the further result that one of water’s features is *modal-essential*, i.e., a feature it metaphysically could not fail to have: that x is a sample of it if and only if x is a sample of the very liquid that the actual exemplar is actually a sample of (whatever that liquid is discovered to be).

This appears to be an example of trivial modal-essentialism.¹¹ It is none too surprising that water has this feature by necessity, since ‘by definition’, i.e., by (OD_{water}) , water just *is* the very liquid of which the exemplar in question is a sample. But Putnam argued that his direct-reference theory of natural-kind terms has modal-essentialist consequences that are metaphysically substantive—in particular, that water could not fail to be the particular compound consisting of two parts hydrogen, one part oxygen.

Suppose for the moment that ‘H₂O’ is an abbreviation for a general definite description, e.g., ‘the chemical compound of two parts hydrogen, one part oxygen’ (or ‘the chemical compound molecules of which consist of two hydrogen atoms together with one oxygen atom’, or something similar). Then, Putnam’s focal sentence

- (1) Water is H₂O.

has the specific form of an identity sentence employing both a simple term and a definite description, $\lceil \alpha = (\iota\beta)\phi_\beta \rceil$ —except that both α and $\lceil (\iota\beta)\phi_\beta \rceil$ are general rather than singular, so that the verb is an ‘is’ of identity to which general terms attach (hence, a kind of higher-order dyadic predicate).¹² Among the logical consequences of (1) is the following:

$$(x)[x \text{ is}\{\text{water}\} \supset x \text{ is}\{\text{H}_2\text{O}\}].$$

As Kripke and Putnam note, the truth expressed is evidently *a posteriori*, and its negation conceivable. If it is nevertheless a metaphysically necessary truth, and if ‘water’ rigidly designates water, then water has a further modal-essential feature: that all of its samples are also samples of H₂O. This claim is evidently non-trivial modal-essentialism. It flies in the face of the metaphysical thesis that the chemical composition of water is a modal-accidental feature.

How exactly does the necessity of (1) follow, as Putnam claims, from (*POD*_{water}) taken together with (1) itself, or even from that together with the assertion that ‘water’ is rigid?

The answer is that it does not. This is established by reinterpreting ‘H₂O’ by means of a non-rigid general term, for example, ‘earthliquid’. It is *a posteriori* that water is earthliquid. Given that ‘water’ is rigid, the following analog of (*POD*_{water}) is also true:

$$\Box(x)(x \text{ is}\{\text{water}\} \equiv x \text{ is}\{\textit{dthat}[\text{earthliquid}]\}).$$

Yet if ‘water’ is indeed rigid, then it is not necessary that every sample of water is earthliquid. In some possible worlds, earthliquid is water; in others, it is methane. The reinterpretation of ‘H₂O’ yields a counter-model to Putnam’s claim.

Putnam provides in the passage quoted above a sketchy indication of how the necessity of (1) is supposed to follow from (*POD*_{water}). He points out, to begin with, that (*POD*_{water}) asserts a particular cross-world equivalence relation, *same*_L, between water samples in an arbitrary possible world *w* and the exemplar in the actual world. He then argues that we can understand the *same*_L relation as a cross-world relation by holding that a bit of liquid in a world *w*₁ is the *same*_L as a bit of liquid in *w*₂ if *x* in *w*₁ has the same important physical properties in *w*₁ that *y* has in *w*₂. On this understanding, it follows from (*POD*_{water}) that a bit of liquid in an arbitrary world *w* is water in *w* if and only if it has the same important physical properties in *w* that the exemplar has in the actual world. ‘Once we have discovered the [microstructure] of water’, Putnam declares, ‘nothing counts as a possible world in which water doesn’t have that nature’ (p. 709). (See note 4.)

The sentence just quoted should arouse suspicion. It is fundamentally a statement of a special case of modal-essentialism:

Water's microstructure (whatever that is discovered to be) is a modal-essential feature of water.

How did this bit of modal-essentialism find its way into our direct-reference theory of 'water'? Is it really derived as a consequence of the theory? Or is it assumed as an independent and metaphysically laden supplement to the theory?

According to an insightful analysis by Keith Donnellan, Putnam generates the necessity of water being H₂O by combining (POD_{water}) with two other premises: the empirical assertion that the exemplar is composed of two parts hydrogen, one part oxygen; and the reductive assertion that the cross-world $same_L$ relation consists in having the same chemical analysis (the same 'important physical property') in the relata's respective worlds.

Let us construe the hyphenated term 'H₂O-matter' as abbreviating the mass-noun phrase 'matter composed basically of two parts hydrogen, one part oxygen'—where being 'basically' composed of such-and-such is composition of such-and-such with relatively small amounts of impurities or other variation. Building upon Donnellan's analysis, Salmon (1981) reconstructed Putnam's largely implicit derivation as follows:

(POD_{water}) $\Box(x)(x \text{ is}\{\text{water}\} \equiv x \text{ is}\{dthat[\text{the liquid substance } \ell: \text{ this is}\{\ell\}\}\})$.

(2) $(\exists!\ell)[\ell \text{ is-}a\{\text{liquid substance}\} \wedge \text{this is}\{\ell\} \wedge \text{this is}\{\text{H}_2\text{O-matter}\} \wedge \text{is}\{\text{H}_2\text{O-matter}\} \text{ is-}a\{\text{chemical analysis}\}]$.

(3) $\Box(F)(\ell)(\ell \text{ is-}a\{\text{liquid substance}\} \wedge F \text{ is-}a\{\text{chemical analysis}\} \wedge (\exists x)[x \text{ is}\{\ell\} \wedge F(x)] \supset \Box(x)[x \text{ is}\{\ell\} \supset F(x)])$.

Therefore,

(4) $\Box(x)[x \text{ is}\{\text{water}\} \supset x \text{ is}\{\text{H}_2\text{O-matter}\}]$.¹³

The road from Putnam's claims about startling consequences of his theory of natural-kind terms, and Donnellan's analysis of the program, to the foregoing derivation is long and winding. The interested reader will find the details in Salmon (1981). The crucial point is this: Putnam's proposal that the cross-world $same_L$ relation 'may be understood as' the cross-world *same-important-physical-property* relation amounts, at a minimum, to (3).¹⁴

With the derivation of ‘Water is necessarily H₂O’ laid out in this way, its validity is obvious. Even in extremely weak modal logics (expanded to include ‘*dthat*’ and second-order validity),

$$(POD_{\text{water}}), (2), (3) \vdash (4).$$

But the principal weakness of the Putnam-Donnellan program is also thus laid bare: (3) is evidently a supplement to the theory of meaning. Even if (3) is true, and even if it is *a priori*, it is itself both modal-essentialist and evidently non-trivial. It asserts that, necessarily, if at least one sample of a given substance has a particular chemical analysis, then it is a necessary feature of that substance that all of its samples have that same basic chemical analysis. Small wonder it follows from this, taken together with (POD_{water}) and the minor supporting premise (2), that it is a modal-essential feature of water, even though it is *a posteriori*, that its samples are basically two parts hydrogen, one part oxygen.

We were investigating the consequences of the ostensive definition when the modal-essentialist premise (3) was surreptitiously brought into play. The case has not been made that (3) comes from direct-reference theory. Quite the contrary, it appears to be an independent, and metaphysically loaded, supplement to the theory of natural-kind terms—one that a committed anti-modal-essentialist will deny even if he/she buys Putnam’s direct-reference theory of ‘water’. In short, the case has not been made that (4) is a genuine consequence of the direct-reference theory of natural-kind terms.¹⁵

Reconfiguring the Putnam Program

Not all binary relations can be construed as cross-world relations. Consider, for example, the relation, *x* kisses *y*. (Cf. Salmon 1981, pp. 116–135.) Appreciating this, Putnam provides a purported reduction of the equivalence *same_L* relation: *x*’s being the *same_L* as *y* is reducible to *x* and *y* being liquid samples having the same important physical property, i.e., the same chemical analysis. This reduction allegedly enables us to understand *same_L* as a cross-world relation: liquid samples in different possible worlds are the *same_L* when they share the same chemical analysis across their respective worlds.

The reconstructed derivation invokes this purported reduction, recasting it as premise (3). The very fact that Putnam’s proposed reduction is thus modal-essentialist, and yet evidently independent of the theory of reference, is precisely what casts serious doubt on his claim that his theory of reference has the startling consequences he claims it has.

But perhaps Putnam's rationale might be better captured by avoiding talk of 'same_L' and 'same liquid' altogether and instead building the reduction directly into the ostensive definition of 'water', thus:

$$\begin{aligned} (OD_{\text{water}'}) & \quad \Box(\textit{dthat}[\textit{the basic chemical analysis } F: F(\textit{this})] = \textit{water}) \\ (POD_{\text{water}'}) & \quad \Box(x)(x \textit{ is}\{\textit{water}\} \equiv \textit{dthat}[\textit{the basic chemical analysis } F: \\ & \quad F(\textit{this})](x)). \end{aligned}$$

Mackie's principal objection (pp. 185–186) to the letter of Salmon (1981) is that this alternative rendering of the ostensive definition has one evidently telling advantage over $(OD_{\text{water}'})$. We modify (2) as follows:

$$(2') \quad (\exists!F)[F \textit{ is-a}\{\textit{chemical analysis}\} \wedge F(\textit{this})] \wedge \textit{this is}\{\textit{H}_2\textit{O-matter}\} \wedge \textit{is}\{\textit{H}_2\textit{O-matter}\} \textit{ is-a}\{\textit{chemical analysis}\}.$$

We now have the following:

$$(POD_{\text{water}'}) , (2') \vdash (4).$$

The former modal-essentialist premise (3) plays no role in the derivation of (4) from $(POD_{\text{water}'})$ and (2'). Replacement of $(POD_{\text{water}'})$ and (2) by $(POD_{\text{water}'})$ and (2') renders (3) an idle wheel. To this extent, Mackie argues, Putnam's claim is vindicated that the necessity of (1) is a consequence of his direct-reference theory taken together with (1) itself.¹⁶

In this, Mackie is evidently not alone. In an article obviously heavily influenced by Kripke's and Putnam's thought on the topic, as well as Donnellan's analysis of Putnam (as presented in Salmon 1981), Scott Soames writes:

Let us first examine the way in which the necessity of these sentences [like (1)] is related to their truth. As I see it, the crucial issue involves the nondescriptuality of simple manifest kind terms, and the way in which their reference is determined. ... For example, we may imagine 'water' introduced by the following stipulation ...

The general term 'water' is to designate the kind instances of which share with all, or nearly all, members of the class of paradigmatic 'water'-samples those properties that "make them what they are" (and that distinguish them from certain paradigmatic 'non-water' samples). These are properties that explain their most salient characteristics—e.g. the fact that they boil and freeze at certain temperatures, that they are clear, potable, necessary to life, and so on. Hence, the predicate 'is water' will apply (with respect to any world-state) to all and only those quantities of matter that have the properties that actually explain the salient features of all, or nearly all, of the paradigmatic 'water'-samples (and that are lacking in all, or nearly all, the paradigmatic 'non-water'- samples).

... (i) We begin with the ostensive introduction of ‘is water’ by a stipulation that it is to apply (with respect to any possible state of the world) to all and only instances of the kind determined by certain properties—namely those possession of which by all, or nearly all, members of the ‘water’-sample in the actual state of the world distinguishes them from members of the ‘non-water’-sample, and (causally) explains the salient characteristics of the ‘water’-sample. (ii) It is then discovered scientifically that possession of the property expressed by ‘is H₂O-matter’ distinguishes the members of the ‘water’-sample from the members of the ‘non-water’-sample, and (causally) explains the salient characteristics of the ‘water’-sample. (iii) From this it follows that the kind designated by the simple manifest kind predicate ‘is water’ is the kind determined by the property expressed by ‘is H₂O-matter’. (iv) This is sufficient to establish the necessity of sentences like [(1)].

... As I see it, the necessity of ... statements [like (1)] follows from their truth, plus the way in which the reference of the terms they contain is standardly fixed.¹⁷

The proposal appears to be that ‘water’ may be regarded as defined by, in effect, the following replacements for (OD_{water}) and (POD_{water}):

(OD_{water}'') \square (*dthat*[the explanatory profile $F: F(\text{this}) = \text{water}$]
 (POD_{water}'') $\square(x)$ (x is{water} \equiv *dthat*[the explanatory profile $F: F(\text{this})(x)$]).

Here, I use the phrase ‘explanatory profile’ as a term for the conjunction of those properties “possession of which by the exemplar in the actual world distinguishes it from the counter-exemplars, and (causally) explain the exemplar’s most salient characteristics” (wording extrapolated from Soames).¹⁸ We now modify (2’) as follows:

(2'') $(\exists!F)[F$ is-a{explanatory profile } $\wedge F(\text{this}) \wedge \text{this is}\{\text{H}_2\text{O-matter}\} \wedge \text{is}\{\text{H}_2\text{O-matter}\}$ is-a{explanatory profile }.

We thereby obtain a result exactly analogous to Mackie’s:

(POD_{water}''), (2'') \vdash (4).

Here again, the modal-essentialist principle (3) plays no role.

These proposals raise the obvious question: Is the envisioned replacement of (OD_{water}), whether by (POD_{water}') or by (POD_{water}''), legitimate?

This question must be answered in the negative. Given how the English word ‘water’ is actually understood, neither (POD_{water}') nor (POD_{water}'') can serve as an appropriate ostensive definition, even if both fix the right semantic intension. Furthermore, if either (OD_{water}') or (OD_{water}'') is

taken as a redefinition, providing the word ‘water’ with a new and different meaning specification, the modal-essentialism therewith contained in (4) then becomes trivial.

We have already seen that (POD_{water}) fails to deliver the consequence that ‘water’ is rigid. Both $(POD_{\text{water}'})$ and $(POD_{\text{water}''})$ fail in a further respect that is more fundamental to the theory. They fail to deliver a crucial consequence that (POD_{water}) delivers: that if ‘water’ rigidly designates a kind, it rigidly designates *a kind whose metaphysical intension is that of a particular liquid substance*. Both $(POD_{\text{water}'})$ and $(POD_{\text{water}''})$ also fail to deliver the desired consequence that the semantic intension of the predicate ‘is water’ is the metaphysical intension of a liquid substance. The problem is not that $(POD_{\text{water}'})$ and $(POD_{\text{water}''})$ are false. Even if they are true, even if they are necessary, the fact that the semantic intension of ‘is water’ is the metaphysical intension of a substance does not follow from $(POD_{\text{water}'})$ together with (2'), nor from $(POD_{\text{water}''})$ together with (2'').

Neither $(OD_{\text{water}'})$ nor $(OD_{\text{water}''})$ is a plausible rendering of the intended force of the ostensive definition, ‘This liquid is *water*’. Neither can be regarded as analytic. The question of whether $(POD_{\text{water}'})$ and $(POD_{\text{water}''})$ are even true is the very issue that separates the modal-essentialist about compounds from the anti-modal-essentialist. If a compound’s chemical analysis and its explanatory profile are modal-essential features, then $(POD_{\text{water}'})$ and $(POD_{\text{water}''})$ get the right semantic intension for ‘is water’; otherwise, they do not. The Mackie-Soames proposal purports to settle a substantive metaphysical controversy while smuggling modal-essentialism into an alleged mere specification of the meaning of ‘water’.

In a sense, $(OD_{\text{water}'})$ and $(OD_{\text{water}''})$ miss the very point of the ostensive definition. This is, in Putnam’s words, to *explain the meaning* of the English word ‘water’. A proper definition specifies meaning in a philosophically neutral manner, without begging any substantive questions. Insofar as this is its objective, $(OD_{\text{water}'})$ and $(OD_{\text{water}''})$ do not merely specify the English meaning of ‘water’ incorrectly. They evidently specify the wrong meaning. In effect, they miscast ‘water’ as a term for a particular basic chemical analysis or for a particular explanatory profile, or for an ‘important physical property’, rather than as a term for a particular *liquid substance*. Indeed, Soames (2004) characterizes the term ‘water’ defined in his proposed alternative to $(OD_{\text{water}'})$ as a term for a particular *explanatory kind*:

As I have imagined their ostensive introduction, both [‘is water’ and ‘is green’] stand for what might be called *explanatory kinds*. In the case of ‘is water’, the kind is one that is determined by the properties possessed by paradigmatic ‘water’-samples that both distinguish them from paradigmatic ‘non-water’ samples and (causally) explain, in the actual state of the world, such salient characteristics of the

members of the ‘water’-sample as their boiling point, freezing point, their properties as solvents, and so on.

The intuitive, pre-theoretic concept of water is not that of an explanatory kind, nor is it that of a chemical-analysis kind. It is that of a *liquid substance*, that of a particular natural kind of bits of fluid matter.

While (OD_{water}) cannot be plausibly regarded as a more explicit rendering of the ostensive definition ‘This liquid is *water*’, it might serve instead as a rendering of a distinctly different sort of sentence: ‘The chemical analysis of the liquid substance of which this is a sample is necessarily that of water’. The latter is not suited to define or introduce the word ordinary-language word ‘water’. It is better suited to define the particular phrase ‘the chemical analysis of water’. It is not especially well suited for that purpose either, but it might do. (The phrase ‘the chemical analysis of water’ presupposes an understanding of ‘water’. Its full meaning should then follow from a separate definition of ‘chemical analysis’. It is, rather, a formal consequence of (3) taken together with the authentic ostensive definition: ‘This liquid is *water*’. Analogous remarks apply in connection with ‘the explanatory profile of water’.)

A more explicit variant of (OD_{water}) illustrates both the former’s inappropriateness as a definition of ordinary-language ‘water’ as well as the true nature of the derived modal-essentialism. If one were so inclined, one could introduce a name for the chemical analysis (whatever it might turn out to be) of water. One might coin the word ‘waterchemistry’ in a Kripkean reference-fixing stipulation on the model of ‘meter’, ‘Neptune’, ‘Newman I’, or ‘ π ’:

Let ‘waterchemistry’ be a mass-noun general name for (and thus a rigid designator of) the basic chemical analysis of water, whatever that analysis might be, if water has a unique basic chemistry; otherwise let it designate nothing.

It should be emphasized that ‘waterchemistry’ is not defined to be a substance term as such; instead it is introduced as a general term for all those bits of matter that have a particular basic chemical analysis. The sentence ‘Waterchemistry is a substance’ is certainly not analytic, and similarly for ‘Every instance of waterchemistry is a sample of the same substance’.

The reference-fixing introduction might be accomplished instead through something that resembles a more traditional ostensive definition: ‘The chemical analysis of this is *waterchemistry*’, said while pointing to a freshwater lake. The underlying modal force of the intended definition might be given by the following:

($OD_{\text{waterchemistry}}$) \square (*dthat*[the basic chemical analysis F : $F(\text{this})$] = waterchemistry).

This has exactly the form of ($OD_{\text{water}'}$). Taking its Putnamian immediate consequence,

$$(POD_{\text{waterchemistry}}) \quad \Box(x)(x \text{ is}\{\text{waterchemistry}\} \equiv \textit{dthat}[\text{the basic chemical analysis } F: F(\text{this})](x)),$$

together with (2) delivers the following result:

$$(4') \quad \Box(x)[x \text{ is}\{\text{waterchemistry}\} \supset x \text{ is}\{\text{H}_2\text{O-matter}\}].$$

Given further that 'waterchemistry' is also rigid, (4') yields the additional result that the exemplar's basic chemical analysis has a particular modal-essential feature: something has that basic chemical analysis only if its chemical analysis is basically two parts hydrogen, one part oxygen.

This is trivial modal-essentialism *par excellence*. It is analogous to, and every bit as trivial as, the consequence of (POD_{water}) together with the rigidity of 'water', that the liquid of which the exemplar is a sample has as a modal-essential property that something is a sample of it if and only if it is a sample of the very liquid that the actual exemplar is actually a sample of (whatever that liquid is discovered to be). The philosopher who believes that the chemical analysis of a compound is a modal-accidental feature will insist that 'Any sample of water is waterchemistry' is true but contingent, that in some possible worlds there are samples of water that are not H₂O-matter, and hence not waterchemistry.

One may decide to use the word 'water' henceforth not for water *per se*, but for the basic chemical analysis of its samples (assuming that those samples share a common basic chemistry). To do so would be misleading, but there is no law against it in free countries. Such re-labeling is precisely what ($OD_{\text{water}'}$) and ($OD_{\text{water}''}$) do. Let the buyer beware. In replacing the artificial term 'waterchemistry' with the pre-existing word 'water', ($POD_{\text{water}'}$) conceals the trivial nature of (4') while simultaneously misrepresenting the modal-essentiality of water's chemical analysis as a trivial consequence of its English meaning. Explaining the meaning of (4) to be what (4') expresses is not a way of making the modal-essentiality of water's chemical analysis derivable from the meaning of 'water', any more than calling a medium-size pizza 'extra large' makes it so.

The triviality of the derived modal-essentialism is perhaps better illustrated by a less arcane example. Suppose the word 'X-color' is introduced by means of the following modal ostensive definition and its Putnam-style immediate consequence:

$$\begin{aligned} (OD_{\text{X-color}}) \quad & \Box(\textit{dthat}[\text{the color } k: \text{this is}\{k\}] = \text{X-color}) \\ (POD_{\text{X-color}}) \quad & \Box(x)(x \text{ is}\{\text{X-color}\} \equiv x \text{ is}\{\textit{dthat}[\text{the color } k: \text{this is}\{k\}]\}). \end{aligned}$$

The word ‘X-color’ is a general term for a certain color. ($OD_{X\text{-color}}$) has the same form as (OD_{water}). It also has the same form as ($OD_{\text{water}'}$), which, *qua* meaning-explanation, makes ‘water’ into a general term for a certain chemical analysis rather than a substance term. Given that ‘X-color’ is rigid, it follows from ($POD_{X\text{-color}}$) that one particular feature is a modal-essential property of X-color: something has it if and only if it is the same color that the exemplar actually is.

Suppose now it is discovered that the exemplar is blue. Assuming that ‘blue’ rigidly designates a color, it follows that necessarily, if a thing is X-color, it is blue. It also follows that X-color has a modal-essential property: anything that has it is blue. The derivation exactly parallels the derivation of (4) from ($POD_{\text{water}'}$) and (2). The derived result is exactly analogous to the fact that necessarily, any instance of waterchemistry is H₂O-matter.

This kind of modal-essentialism is completely trivial. By logic alone, it is a modal-essential feature of any universal that any instance of it is an instance of it. It should not be startling that trivial results like this can be extracted from the direct-reference theory. They can also be extracted from a description of chicken soup, and in the same way. Whether one chooses to call waterchemistry ‘waterchemistry’, ‘water’, or something else, it is assuredly a modal-essential feature of it that all its samples are H₂O-matter. The question remains whether (4) is true as ‘water’ functions in ordinary English. The anti-modal-essentialist answers in the negative. Direct-reference theory evidently has no horse in that race.

That ($OD_{\text{water}'}$), taken as an ostensive definition of ‘water’, renders the derived modal-essentialism trivial is perhaps most clearly illustrated through one final example. Suppose a new general name ‘2H-1O’ is introduced not ostensively but in a designatum-fixing stipulation:

Let ‘2H-1O’ be a mass-noun general name for (and thus a rigid designator of) the particular kind, *Matter composed basically of two parts hydrogen, one part oxygen*.¹⁹

Suppose the intent is given by the following familiar (C') and (C) sentences, respectively:

(D_{2H-1O}) \square (*dthat*[H₂O-matter] = 2H-1O)
 (PD_{2H-1O}) \square (x)(x is {2H-1O} \equiv x is-*a*{*dthat*[H₂O-matter]}).

Here, the ‘*dthat*’ operator is redundant. The phrase ‘matter composed basically of two parts hydrogen, one part oxygen’ (abbreviated as ‘H₂O-matter’) may be regarded as a rigid designator of a particular kind. The semantic intension of the predicate ‘is 2H-1O’ is the metaphysical intension of this kind. More to the point, the term ‘2H-1O’ is a Millian general name; its semantic content is the very kind designated.²⁰

2H-1O is, by definition, a particular chemical-analysis kind. The ostensive definition (OD_{water}) fixes the semantic content of the familiar term ‘water’ in such a way that it purportedly names the very same kind, H₂O-matter, and is thereby a Millian synonym of ‘2H-1O’. But whereas the sentence ‘All 2H-1O is H₂O-matter’ is derivable from the designatum-fixing definition of ‘2H-1O’, and is in that sense analytic, by contrast a mere ‘explanation’ of the English meaning of ‘water’, by itself or even together with the observation that a particular exemplar is H₂O-matter, should not allow inference to the apparently synthetic sentence, ‘All water is H₂O-matter’, let alone to (4).

It is a small feat to derive from ($PD_{2\text{H-1O}}$) the consequence that necessarily, all 2H-1O is H₂O-matter. Given that ‘2H-1O’ is rigid, it follows that it is modal-essential to 2H-1O—i.e., to the kind, H₂O-matter—that all of its instances are H₂O-matter. The triviality of this sort of modal-essentialism is as obvious as anything in this area can be.²¹ ($POD_{\text{waterchemistry}}$) is simply the ostensive counterpart of the designatum-fixing ($PD_{2\text{H-1O}}$). The former requires one extra step in the derivation of the same necessary proposition, but insofar as Mackie transforms ‘water’ into ‘waterchemistry’—an ostensively defined Millian name synonymous with ‘2H-1O’—the modal-essentialism embodied in that proposition is exactly the same.

Trivially, it is modal-essential to any substance that all of its samples are samples of it, and it is modal-essential to any chemical analysis that anything that has that analysis has it. It has not yet been established, as advertised, that as a consequence of the direct-reference theory of natural-kind terms, a substance’s chemical analysis is a modal-essential feature of that substance. Specifically, it has not been established that as a consequence of direct-reference theory, it is modal-essential to water that each of its samples are basically two parts hydrogen, one part oxygen.

The Failure of the Reconfigured Putnam Program

The $same_L$ relation is neither primitive nor monolithic. Like most equivalence relations that come readily to mind (e.g., *x is wearing the same color shirt as y*), there are intervening entities (colors) and an intervening relation R in virtue of which entities bear the equivalence relation to one another: x bears R to the same intervening entity as y . Equivalence relations of this sort are legitimately construed as cross-world relations if the intervening entities can be cross-world identified.

Putnam’s reduction of the $same_L$ relation is directly contrary to the spirit, if not also to the very letter, of Kripke’s *haecceitism*. The latter is Kripke’s doctrine that it is perfectly legitimate for one to stipulate, even by name if one chooses, which entities are present and have various properties in the class of possible worlds that one is singling out for consideration (e.g., the class of worlds in which Hubert Humphrey wins

the 1968 U.S. presidential election).²² Among the things that one can legitimately stipulate are present in the possible worlds under consideration are material substances. According to haecceitism with respect to substances, one may legitimately fix which possible worlds are presently under consideration by stipulating that the very same-liquid substance is present in all of them. This by itself completely justifies our understanding of *same_L* as a cross-world relation. One might then assert that in a pair of worlds under consideration, w_1 and w_2 , a particular bit of matter x is a sample of that substance in w_1 , while another bit of matter y is a sample of it in w_2 . One is free to stipulate, in particular, that one is considering exactly those worlds in which some liquid samples are of the very same-liquid substance ℓ of which the exemplar is actually a sample. No further ‘reduction’ of the *same_L* relation is warranted by the direct-reference theory, and no further reduction is necessary to render the cross-world *same_L* relation legitimate. (For details, see Salmon 1981, section 13, pp. 116–135.)

In short, according to Kripke’s haecceitism with regard to substances, the *same_L* relation is legitimately regarded as cross-world quite independently of any proposed reduction of that relation. Putnam’s proposed reduction of the cross-world *same_L* relation to the *same-important-physical-property* relation is non-trivially modal-essentialist, and it is no part of direct-reference theory proper. Without that modal-essentialist reduction, the necessity of water being H₂O is not guaranteed by the modal ostensive definition of ‘water’ taken together with the rigidity of ‘water’ and the empirical fact that the exemplar is H₂O.

To repeat: the case has not been made that (3) is anything other than exactly what it appears to be: a non-trivial metaphysical sentence that is quite independent of direct-reference theory and that plays a pivotal role in the derivation of (4) from the modal ostensive definition of ‘water’ provided in Putnam’s theory. The case has not been made that direct-reference theory comes with substantive metaphysics as a free bonus.²³

Notes

- 1 The present paper was written primarily in 2008. Portions were presented at Philosophy in an Age of Science: A Conference in Honor of Hilary Putnam’s 85th Birthday, Harvard and Brandeis Universities, May 31–June 3, 2011. I am especially grateful to several participants for discussion and comment. I am also grateful to Teresa Robertson Ishii for extremely fruitful discussion, for exposing significant errors in an earlier draft, and for much else.
- 2 Putnam (1973).
- 3 *Modal-essentialism* is the doctrine that some properties of some things are properties that those things metaphysically could not have lacked. This contrasts with *quiddity-essentialism*, the doctrine that each thing has a quiddity essence (a whatness or *what-it-is*). The unadorned term ‘essentialism’ has become ambiguous in contemporary philosophical English. Regrettably, this has led to a great deal of needless confusion. As with nearly all of the

modal-metaphysical literature in the Quinean and Kripkean eras (roughly the latter half of the 20th century), the present essay is concerned with modal-essentialism, and not at all with quiddity-essentialism.

- 4 Cf. Salmon (2003, 2005).
- 5 The present formulation involves an improvement over that provided in Salmon (1981), p. 145. See note 13.
- 6 Putnam: “The rigidity of the term ‘water’ follows from the fact that when I give the ‘ostensive definition’: ‘*this* (liquid) is water,’ I intend [(POD_{water})] and not [$\Box(x)[x \text{ exists} \supset (x \text{ is water} \equiv x \text{ bears } same_L \text{ to } this)]$]” (Putnam 1973), p. 707.
- 7 Salmon (1981) mistakenly took it to be a singular term. This led to unnecessarily complicated formulations.
- 8 To distinguish the relevant description from a singular definite description, it might be formalized thus, where ‘ k ’ is a general-term variable, as opposed to a singular-term variable, and ranges over kinds (or other universals) whose instances are particular individuals:

(t_k) [k is-a{liquid-substance} \wedge samples of k cover most of the Earth’s surface].

- 9 Salmon (1981), pp. 40–41.
- 10 Salmon (1981) raised the question, but remained neutral, whether kinds having the same metaphysical intension are *ipso facto* the same kind (p. 53n9). Teresa Robertson Ishii has made observations that strongly incline me to believe that there are numerically distinct kinds that exactly coincide in metaphysical intension. See note 20. Salmon (1981) adopted an artificial use of ‘designate’, which I do not now favor, according to which a general term, η , designates each of the kinds, categories, etc., whose metaphysical intensions coincide with the semantic intension of the corresponding predicate ‘is v ’.

The following formulation is stronger than (C) yet weaker than (C’), where ‘ k ’ is a general-term variable that ranges over universals whose instances are particular individuals:

(C’’) $(\exists k)\Box(v = k) \wedge \Box(x)(x \text{ is}\{v\} \equiv x \text{ is}\{dthat[\beta]\})$.

The left-hand conjunct requires that v be rigid. The right-hand conjunct is just (C), which fixes the semantic intension of ‘is v ’. Unlike (C’), however, (C’’) does not fix the designatum of v .

- 11 Cf. Salmon (1981), pp. 82–87.
- 12 This deviates from the view of Scott Soames in one significant respect, and from my own view in another. Soames (2002), at p. 291, parses (1) as a universal-conditional, ‘ $(x)[x \text{ is water} \supset H_2O(x)]$ ’, whereas I regard it instead as an identity employing general terms, ‘Water = H_2O ’. Soames regards ‘ H_2O ’ as a predicate synonymous (at least roughly) with something like ‘is a liquid sample consisting of two parts hydrogen, one part oxygen’. I regard it ‘ H_2O ’ (on an analogy with ‘Neptune’, ‘Newman I’, and ‘ π ’) as a general name whose reference is fixed by a general description, perhaps ‘the chemical compound whose molecules are made up of two hydrogen atoms and one oxygen atom’. I note in this connection that it is at least distinctly odd, and very likely incorrect, to make substitutions for the term’s components—for example, the substitution of ‘the most plentiful element’ for the ‘H’ in ‘ H_2O ’, or ‘3 – 1’ for the ‘2’. Cf. Salmon (1987).
- 13 See note 3. The present formulation likewise involves an improvement over that provided in Salmon (1981), pp. 178–184.

- 14 Putnam's claim that the cross-world *same_L* relation 'may be understood as' the cross-world *same-important-physical-property* relation must have at a minimum the force of

$$(3') \quad (w_1)(w_2)(x)(y) (x \text{ exists}_{w_1} \wedge y \text{ exists}_{w_2} \supset \\ [(x \text{ is}_{w_1}\{\ell\}) \wedge (\ell \text{ is-a}\{\text{liquid substance}\}_{w_2} \wedge y \text{ is}\{\ell\}_{w_2})] \supset \\ (F)(F \text{ is-a}\{\text{chemical analysis}\} \supset [F_{w_1}(x) \equiv F_{w_2}(y)]])).$$

Given trivial assumptions, (3) is equivalent. Compare this again to the last sentence of the passage quoted earlier. Cf. also Salmon (1981), at pp. 179–180, 183–189.

- 15 One of the criticisms in Mackie (2006) is that if (3) is *a priori*, then (4) is after all an '*a priori* consequence' of (*POD*_{water}) and (2). This is mistaken. If a conditional $\lceil \phi \supset \psi \rceil$ expresses something that is knowable *a priori*, this in itself does not make ψ a *consequence* of ϕ . (The conditional can be *a priori* without being a logical truth.) Though the conditional is *a priori*, it might also be highly controversial, with some philosophers even insisting that its negation is *a priori*. If (3) is *a priori*, then the conditional $\lceil \text{If } (POD_{\text{water}}) \text{ and } (2), \text{ then } (4) \rceil$ is also *a priori*. The relevant issue, however, is whether direct-reference theory can *consistently* accept this conditional's antecedent while rejecting the consequent—even if the conditional itself is correct and even if it is *a priori*.
- 16 Mackie justifies the replacement of (*POD*_{water}) by (*POD*_{water}') not on the ground that doing so better captures Putnam's intentions and explanations, but on the ground that the replacement is merely consistent with Putnam's theory of 'water'. This is insufficient to vindicate Putnam's claim. Otherwise, the replacement of (*POD*_{water}) by the conjunction $\lceil (POD_{\text{water}}) \wedge (3) \rceil$ would count as vindication, so that the original reconstructed argument explicitly invoking (3) would already vindicate Putnam's claim. It does not.
- 17 Soames (2004), at 160–165, 176. I have replaced Soames's convention of using italics for quotation with the convention of single quotation marks.
Soames (2004), pp. 165–166, offers two arguments for the principle that 'manifest' natural kinds that are metaphysically co-intensional are identical, but neither is conclusive. In any event, even if co-intensional manifest natural kinds are identical, it does not follow that, more generally, co-intensional kinds (whether natural, gerrymandered, or otherwise) are the same. See notes 10 and 21.
- 18 I have taken considerable liberties in extrapolating these formulations from Soames's actual wording. Nothing in my discussion depends on this.
Soames (2004) asserts (pp. 174–175) that whenever a '*dthat*'-term, $\lceil dthat[\beta] \rceil$, is used in a designatum-fixing ostensive definition, where the semantic content of β is a descriptive concept *the such-and-such*, competence with the expression thereby introduced requires knowing that it designates the such-and-such (provided that there is exactly one such-and-such). For this reason, Soames might balk at my representing his proposal by means of (*OD*_{water}'), depending on whether he disbelieves that semantic competence with 'water' requires knowing that it designates an explanatory profile. My criticism of Soames's proposal does not turn on this issue.
- 19 My view of the chemical terms for water, 'H₂O' and 'dihydrogen monoxide', is that they function not as abbreviations but in the manner of '2H-1O'—except perhaps that '2H-1O' names the kind *H₂O-matter*, whereas 'dihydrogen monoxide' names the substance that is the principal component of acid rain (*viz.*, water). See note 20.
- 20 This same kind is arguably also the semantic content of the mass-noun phrase 'matter composed basically of two parts hydrogen, one part oxygen'. It seems to me that in general, a gerrymandered general term of the form $\lceil v \text{ that is } \mu \rceil$

(e.g., ‘girl who is brown-eyed’, or simply ‘brown-eyed girl’) may be regarded as a directly referential general name whose designatum is fixed by a general definite description, perhaps along the lines of ‘the kind corresponding to the propositional function \hat{x} (x is a $v \wedge x$ is μ)’.²¹ (Caution is due in connection with words like ‘alleged’, ‘decoy’, ‘pretend’, ‘wannabe’, etc., as in ‘alleged embezzler’.) Unlike the typical cases of fixing-the-designatum-by-a-description (‘Newman-1’, ‘meter’, etc.), in the case of a typical compound general term, the property expressed in this designatum-fixing description is known *a priori* to hold of the designatum.

A sharp distinction must be maintained between the general definite description ‘the liquid that covers most of the Earth’s surface’ (abbreviated as ‘earthliquid’) and the included common-noun phrase ‘liquid that covers most of the Earth’s surface’. Soames (2004), p. 167, takes it that the latter, like the former, non-rigidly designates water. Like any count-noun phrase, the latter rigidly designates a kind—in this case, a special kind of which water is the only instance in the actual world and methane is the only instance in W_m .

I have introduced a variable-binding operator—the theta-abstraction operator—which works as follows: Where ϕ_α is an open formula (open sentence), both the designatum and the semantic content of the expression ‘ $\Gamma(\theta\alpha)[\phi_\alpha]$ ’ are the kind appropriately determined by the Russellian propositional function semantically associated with bound occurrences of ϕ_α (this propositional function being what I call the *bondage content with respect to* α of ϕ_α). Cf. (Salmon 2006). Then, a theta-abstract ‘ $\Gamma(\theta\alpha)[\phi_\alpha]$ ’ might be read: ‘thing α such that: ϕ_α ’. For example, the designatum/content of ‘thing x such that: x is brown-eyed and x is a girl’ is the kind, *Brown-eyed girl*, appropriately determined by the propositional function \hat{x} (x is brown-eyed $\wedge x$ is a girl). Cf. (Salmon 1981), p. 51.

For reasons related to this, Alonzo Church’s lambda-abstraction operator, as it occurs in ‘ $\Gamma(\lambda\alpha)[\phi_\alpha]$ ’ where ϕ_α is an open formula, is susceptible of a contextual definition: ‘ $\Gamma is-a\{(\theta\alpha)[\phi_\alpha]\}$ ’.

- 21 The kind, H₂O-matter, and the compound, water, coincide in metaphysical intension. Are they ipso facto the same kind? (See note 10.) Robertson Ishii observes that if so, it evidently follows that it is trivially modal-essential to water that all of its instances are H₂O-matter—since this is trivially modal-essential to the kind, H₂O-matter. While this may well be modal-essential to water, the prospect that this is trivial seems most implausible. Indeed, if water = H₂O-matter, then, astonishingly, modal-essentialism concerning chemical compounds emerges as a truth of modal logic. For the proposition expressed by the sentence ‘Water = 2H-1O’ would then be nothing more than the classical-logical truth that water is water. In short, this formulation would be analytic, and (given that both terms are rigid) therefore necessary. So also would ‘Water = H₂O-matter’.

If it were correct that it is trivially modal-essential to water that all and only its samples are H₂O-matter, would this vindicate the claim that direct-reference theory taken together with uncontroversial empirical facts yields modal-essentialism concerning chemical compounds? Even if so, the derived modal-essentialist sentence is not (4) but (PD2H-1O). One still needs ‘Water = 2H-1O’ to obtain (4) from (PD2H-1O). Furthermore, the obtained modal-essentialism would in that case be trivial. More plausibly, water and H₂O-matter are distinct kinds—despite their coincidence in metaphysical intension, and despite the identity of water and H₂O. (But compare the case of water and dihydrogen monoxide with the case of the property of being blue

in color and that of reflecting light having a spectrum dominated by energy within a particular band of wavelengths (roughly 440–490 nm). Are these not the very same property?)

22 See Salmon (1996).

23 At the 2011 Conference in Honor of Hilary Putnam's 85th Birthday, Putnam agreed that non-trivial modal-essentialism is not derivable from his theory of reference for natural-kind terms.

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