

Is It Water?

A note on a puzzle first propounded by Hilary Putnam

Copyright Flash qFiasco 2009
<http://www.flashq.org>

Suppose a substance were discovered (or produced) having the properties of water: colorless, odorless, tasteless, with a boiling point of 100 degrees Celsius and a freezing point of zero, and so on; but *not* composed of two hydrogen atoms and one oxygen atom. Not, in other words, H₂O. Would it *be* water? A vast amount of intellectual horsepower has been expended on this riddle, encompassing all possible worlds.

What would be true in all possible worlds has been defined as a necessary truth; what would be true in no possible world as a contradiction, in at least one possible world but not in all as contingent. This is a diversion. “Possible worlds” is just a goofy way of saying what is imaginable (in this one, it goes without saying). If, in no possible world, would something not made of H₂O be water, is simply to say that we cannot imagine it. It will be sufficient to put this riddle to bed in any actual world.

As with many philosophical puzzles, this one can be run backwards, with equally odd results [the color puzzle is similar: blue, green, bleen, grue.] Suppose someone had a portion of H₂O and nothing but H₂O which did *not* behave as we expect water to. Suppose it would not boil no matter how much energy were put into it and would not freeze no matter cold it got; it remained fluid under all conditions. Would this be water (would we correctly call it “water”)?

The question Putnam’s riddle tacitly poses is this: what is it for a thing to be what it is? Is it to have specific *properties*, or to have specific *components*? Ordinarily, it is to have *both*. The ‘or’ is not exclusive. Moreover, the components determine the properties; there is a causal link between components and properties. Nonetheless, they are logically distinct; that is, they are distinguishable, but not usually separable. Whether components uniquely and exhaustively determine properties is another question, which will be addressed later. For now, the issue is this: Putnam’s puzzle presumes to break the causal link: we are to suppose the same properties but *different* components. And now we are confused, for it seems that we have two no-longer related pieces of a broken logical distinction and that we must abandon one of them. It seems that we must say either that a thing is what it is *made of* regardless what properties it exhibits, or (exclusively ‘or’) that it is its *properties* regardless what it is made of. And we do not want to abandon either; this is obvious by running the puzzle backwards (same components, different properties).

Putnam’s question can be generalized: could two things have all the same properties and different components? Reversed: could two identical constellations of components/causes produce different properties/effects? Are there ontological *puns*? That is, do unique constellations of components guarantee unique constellations of properties, and v.v.?

Suppose there were two kinds of water available, quite commonly, one which boiled and froze (like the water we know), and one which stayed liquid no matter what, but that they otherwise looked, tasted, smelled, and behaved identically. If there were no difference of a chemical nature in the water itself, then we would assume some other causal factor to be at work—some outside ‘influence’, some other (invisible) substance which was drawing off the heat from the unboilable liquid and injecting heat into it to stop it freezing. We would search indefatigably for this other factor; we would give it a name before we had even found it (sorry, “ether” and “phlogiston” are taken). Suppose there were no other factor. Well then, we should have to rethink quite a lot of what we know and think we know about chemistry! It would be like discovering that

certain gemstones did not break along the planes determined by their atomic lattices, but along quite 'ethereal' planes corresponding to nothing at the atomic level. These would be concrete examples of disjointing components from properties. This would require a substantial rethink of our concepts "substance", "components", and "properties". But do such anomalies ever really occur? If at all, certainly not commonly, and that is why we have no words for this sort of case, in which the link between components and properties is deliberately broken (as in Putnam's question, 'is it water?'). That is also why we are puzzled, because this sort of thing just does not happen and it is hard to imagine it. It is not only hard to imagine *it*, it is hard to imagine what all *else* would have to be different for *this* to be different.

Were this sort of thing to happen often, we would probably develop a vocabulary appropriate to it. That is, we would have a word, "water", for the substance which boils and freezes and so on, as we now know it, and another word, maybe "woter", for the permanently liquid form of it. We might well develop three distinct words (or other grammatical distinctions) for substances, one of which subsumed the normal cases in which components uniquely causally determine properties, and two more for special cases emphasizing a) components rather than properties, and b) properties rather than components, where the two were disjointed.

To the further question whether physical components *exhaustively* determine properties, there is an answer. It is "no". Quite definitely "no".

The question comes to this: is a thing nothing but what it is made of? And the answer is, not necessarily; it depends on the thing. Take Coca Cola (or Coke), for example. It is a liquid with a particular chemical composition (the recipe is a trade secret, but surely includes such things as water, sugar, extract of cola nuts, and once included cocaine "for that little lift"). Is anything made of exactly those components in exactly those proportions, and no other components, Coca Cola? No. It is not that simple. Coca Cola is a registered trademark owned by the Coca Cola Company of USA. Not every substance containing those and only those ingredients is Coke; only that combination of ingredients *produced and distributed by the Coca Cola Company* is Coke. The same ingredients sold by some other company is not Coke, but a violation of trade laws (passing off). (Of course, a person who drank some cola, not knowing which company produced it, might mistake some other beverage for genuine Coca Cola; this is an empirical issue, but not a serious philosophical objection which requires rebuttal.) The components alone do not exhaustively define either the correct name or the substance in this case.

Suppose someone owned water. I mean, owned it in the same sense in which the Coca Cola Company owns Coke, as a registered trademark. This is not such a wild idea. A company did once own heroin. A company did once own aspirin. They were registered trademarks. They are now generic substances, and the names are no longer copyrighted. But suppose some company owned water, in the sense in which a pharmaceutical company once owned the recipe for, and the name, "aspirin". In that case, a substance with the same properties, but consisting of different components, would not be water. Not by definition, but by law. Until the patent expired. This is exactly what happens in the case of generic medicines. The active ingredient is patented and given a name, which is trademarked and protected by law for a certain period of time. After the expiry of the patent, other firms may use the same active ingredient, but they may not use the same name. They may, of course, change some of the other ingredients (substrates, inactive ingredients, flavorings, etc.). Occasionally, a product becomes so entrenched in the market and the public consciousness, that the name comes to be used generically for all products having the same active ingredient, or even for all products having the same effect (even with other active ingredients); examples abound: aspirin (for pain killer), Kleenex (for tissue), Xerox (for photocopy), and so on.

As it happens, no one has a patent on water. So, is water nothing but what it is made of? Let us consider a few other examples: glue, poison, fuel. Must glue necessarily be made of some particular combination of substances and no others? Must poison necessarily be made of some particular combination of substances and no others? Must fuel necessarily be made of some par-

ticular combination of substances and no others? No. For the terms “glue”, “poison”, and “fuel” are not specific to chemical composition. The properties which glue, poison, and fuel must have can be fulfilled by many different compositions. The important thing about glue is that it sticks, *whatever* it is made of; the important thing about poison is that it kills, *whatever* it is made of. Of course, some glues stick to some things and not others, and some poisons kill some living things and not others, and this in turn depends (causally) on their chemical compositions. So, for a specific purpose, the chemical composition is relevant; not to whether something *is* glue or poison or fuel, but rather to its *suitability* to the purpose at hand. We still call arsenic poison, even after we discover that some particular creature is immune to it. We still call something glue even if it does not stick to glass, provided it sticks to something else. For some engines, even water is fuel.

“Epoxy” is more specific. Epoxy specifies not only properties (adhesion), but also components (resin and hardener).

Is water more like glue, poison, and fuel, or more like epoxy? Is what is important about water what it *does*, or what it *is*? Its properties or its components?

Is what a thing *is* nothing but what it is *made of*? To this question, I answer unequivocally “no”. If you think that what a thing is is nothing but what it is made of, then try to distinguish a wedding cake from a birthday cake by the ingredients alone. Part of what a wedding cake *is* depends on the purpose to which it is put (the occasion on which it is consumed, the context in which it has meaning, the play in which it is a prop, etc.).

If you think that water is nothing but what it is made of, then try to distinguish water from holy water by a chemical analysis.

Is what we call “water” *defined as* what it is made of (namely, H_2O)? Or is it more like glue, poison, fuel, and wedding cake? There is an analogous case: salt. For most people, salt is table salt, the stuff they put on food. For most people, anything which tasted the same would be called by the same name. For them, it would *be* salt, even if it were not sodium chloride. As it happens, many people happen to know the chemical name for table salt, sodium chloride, just as many people happen to know the chemical name for water: H_2O . A chemist will be familiar with many salts, not only sodium salts; for him, “salt” has a different meaning, or an additional meaning, or another dimension of meaning. Wittgenstein might have called it an “aspect”. Water is like salt in this respect: there is a common usage of the word and any substance which did the same thing (tasted the same or similar enough) would be called by the same word; that is, it is property-specific. We *assume* a particular chemical composition, but deviations from that composition (within a tolerance) are not essential. In addition, there is another use of the word which emphasizes and presupposes a specific chemical composition. Some people, for health reasons, reduce their intake of sodium by taking another salt, potassium chloride, with their food instead of the more common sodium chloride. It is perfectly correct to say, “please pass the salt” even if it is not *sodium* chloride, and this usage does *not* presuppose any specific chemical composition or knowledge of chemical compositions. The taste of potassium chloride is sufficiently within tolerance of the taste of sodium chloride to merit being called “salt” at the dinner table. It is *not* within tolerance in fertilizer manufacture. Our usage of “water” is like that: sometimes it means a particular chemical composition (H_2O), sometimes it means whatever does the same thing or has the same effect (properties).

What puzzles people about the ‘is it water?’ riddle is twofold: first, the chemical name for water, H_2O , the name which emphasizes the composition rather than the properties, is commonly known; and second, one too easily equivocates the two overlapping but distinct aspects, components and properties, or fails to notice that they are distinct.

What if something had all the same properties as water, but a different chemical composition than H_2O . Would it *be* water? The answer to that depends on which aspect of water concerns you: its chemical components or its properties. If the former, no, it is not water; if the latter, yes, as sweet water as you’ll ever taste. So long as you remember that we never actually see a substance

which has all the same properties as water but not made of hydrogen and oxygen in the ratio 2:1, we do *not* have to abandon either definition of substance as component-specific or property-specific; for the two are normally not disjointed. We can have our cake and eat it, too.

It is much less puzzling to ask “is aspirin acetylsalicylic acid (and nothing but acetylsalicylic acid)?” Yes, of course it is acetylsalicylic acid; that is what it is made of. But it is not *nothing but* acetylsalicylic acid, even supposing it contains no other ingredients. It is perfectly correct to say that aspirin is a pain killer and a coagulation damper (thereby emphasizing its desired properties rather than its chemical composition). Now, is some other chemical which has the same pain-relieving and anti-coagulation properties aspirin? No. The reason is not to do with the substance itself, but with history (industrial and legal history), and in this aspirin is significantly different to water. No one ever owned water the way someone did once own aspirin, and that makes all the difference.

It would be astonishing if some other substance, not made of two hydrogens and one oxygen, had *all* the properties of water. Given what we know about chemistry, we certainly do not *expect* such a thing. But it is quite possible that someone should find, and earnestly try to find, a substance which has the pain-killing and anti-coagulative properties of aspirin, but composed of other components than acetylsalicylic acid.

Suppose some other substance did have *all* the properties of H₂O. What would distinguish it from water, apart from its not being H₂O? I think what is really puzzling about this is not whether such thing would *be* water, as the idea that some totally different inner constitution might produce all the same external phenomena. Is it possible (imaginable, at all likely) that two totally different sets of causal conditions should produce exactly the same effect? We find this hard to imagine; we are strongly inclined to say that there *must* be some minimal difference in the effects, if there is any difference at all in the cause or inner composition.

Or, to speak plainly, where we do in fact notice a different effect, we *assume* a different cause, however minimal, even if we can't find one. For example, in medical trials, if the same drug has different effects on different patients, we put it down to assumed differences in the patients' genetic constitutions or to environmental factors (and not, for example, to intermittent causality). That is, we are satisfied with this as an explanation, without actually testing the constitutions of the patients to determine which genes or other factors (including environmental ones) might have made some people receptive to the treatment and others not.

It would be astonishing, given what we know about chemistry, if some substance not made of two hydrogens and one oxygen were to possess even the few properties of water associated with quenching thirst. Given what we know about the processes in the human body, it would be astonishing if any other substance were absorbed by the human body in exactly the same way as water is. But I should decline to state that such a thing is impossible. Some pharmaceuticals are specifically designed to mimic other substances precisely in order to get them absorbed into the body (for example to pass the blood-brain barrier). Common foods, such as margarine, are specifically designed to mimic certain properties (such as taste) and *not* others (such as the propensity to cause high cholesterol levels in the blood).

How many purposes must a substance be suitable for in order for it to be water, or for us to call it water? If it quenches thirst and fire, but does not dissolve sugar, is that enough? If it also dissolves sugar but does not freeze, is that enough? This is not such a wild idea. For thousands of years, man has been adding ingredients to things to change their properties to suit his needs. We add carbon to iron to make steel. We add things to water to lower its freezing point or to raise its boiling point or reduce surface tension. This is water with an additive, two hydrogens and one oxygen and something else. But there is also such a thing as heavy water: H₃O. Therefore, water is not *necessarily* H₂O.

Suppose we found something with some of the properties of water, but not made of two hydrogens and one oxygen at all. How many properties would it have to mimic in order for us to

call it water? Well, to what purpose would you use it? If you needed it only to quench thirst, and it did that, we might indeed call it water. Or drinking water (as opposed to, for example, freezing water or boiling water). Provided that, as far as quenching thirst was concerned, it was indistinguishable from water, i.e., provided that it was fluid at drinking temperature, colorless, odorless, tasteless, mixed pleasantly with ouzo, and that it did indeed quench thirst. Just as one says “pass the salt” whether it is salts of sodium or of potassium. Potassium salt tastes different to sodium salt (more metallic). Still, one gets used to it. One gets used to the taste of skimmed milk and margarine, too, and says “pass the milk” or “pass the butter” for the genuine article or the substitute indiscriminately. So ersatz water might be distinguishable from H₂O water, it might have a slightly different taste to H₂O water; though how slight *slight* is we cannot say *a priori*. We should have to taste it first and maybe get used to it.

Cork is commonly used to seal wine bottles. Plastic stoppers are also used. No one says “pull out the plastic stopper”; everyone says “cork the wine bottle”, even if the cork is plastic. So there is an obvious case in which the properties are preeminent, not the composition.

We say “please pass me my reading glasses” or “give me the magnifying glass,” “I’d like a glass of whiskey,” even if it is made of plastic. Here we have a clear-cut example of a word or phrase—reading glasses, magnifying glass, drinking glass—which once denoted both a function or property and a specific chemical composition, and the function was bound to that material composition but no longer is. The function has been detached from the material; a new material, one which has enough of the useful properties of the original material, has been substituted for the original material. But we still use the original term. No one would say “give me the magnifying plastic.” A similar thing could happen to “water.” It is common usage, not metaphysics, which decides.

How many properties did plastic have to have in common with glass in order for us to continue to call a magnifying glass a magnifying glass even though it was made of plastic? Did plastic have to have the same melting point as glass? Evidently not. This was not essential to its intended function. Nor was it essential that it be composed of silica, lime, and sodium carbonate. It only had to bend light. A similar thing could happen to water; it is not a matter of metaphysics, but of our purposes.

“Shoehorn.” This common household implement is undoubtedly so called because it was once made out of a hollowed-out piece of animal horn. Nowadays they are made of plastic or metal.

In France, what is called “champagne” comes only from a certain part of the country (called Champagne). A sparkling wine which tastes the same but comes from another part of the country is called something else. It *is* something else. The Germans respect this, and a sparkling wine, even one which *has identical ingredients (from the same grape sort), is fermented identically, and tastes identical to champagne*, but which comes from some other region, is called *Sekt*. The British and Americans call anything “champagne” which tastes like it, wherever it comes from. The Germans call “beer” only that which contains exactly four ingredients: hops, malt, water, and yeast. The British and Americans call many beverages “beer” which contain many other ingredients (coloring, preservatives, foaming agents); the Germans wouldn’t touch it much less call it “beer”. So what it is to be beer or champagne? What it tastes like, or what it contains, or where it comes from? It depends.

What Putnam’s puzzle does is to confront us with an apparent choice: suppose you had to choose between ‘a thing is what it is made of’ and ‘a thing is its properties’, and you couldn’t have both. Which would it be? The fact that we find this puzzling shows how committed we are to the notion that this sort of disjunction never actually occurs, that what a thing is made of does in fact always determine its properties. But, as a few examples show, this is a dogma which does not apply to all cases exhaustively.

Postscript

Putnam's original thought-problem was designed to answer the question, whether meaning is something that goes on in the mind of the speaker while he is speaking, or is public (e.g., consists in rules of grammar). The 'all possible worlds' bit was supposed to show that meaning is not private but must be public. It is a bizarre argument, to say the least, against the possibility of a private language, to have to imagine a sort of counter-earth orbiting the sun exactly opposite our own earth.

There are much easier, and more sensible, ways to argue the point. I shall offer one here. Let us suppose that meaning is a private thing which goes on in the mind of the speaker. Let us suppose that what *you* mean by "driving license" is what everyone else means by "toilet paper," simply in virtue of your having defined it this way to yourself. This is your private definition of "driving license." Now let us suppose that you run a red light, that a policeman pulls you over and demands to see your driving license—demands to see what he and everyone else means by "driving license." You hand him a piece of toilet paper. Your vehement protest that, *this* is what *I* mean by 'driving license'" is going to land you in jail. If you persist in redefining lots of other words too, you will land in the booby hatch. You are, of course, at liberty to redefine "booby hatch" to mean "The White House" if you wish, but you still won't be the president of anything but your own private cell. Insanity is a psychological condition to be treated, not a philosophical position which we need to refute. Q.E.D.

fin