

**“Water is and is not H<sub>2</sub>O”**  
**An Introduction**

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Imagine a liquid that is identical to H<sub>2</sub>O in terms of its *superficial features*. It has the same color, texture, and taste of H<sub>2</sub>O and it quenches thirst in just the same way. However, this liquid is completely different in terms of its *deeper causal properties*. When chemists examine it, they find that it is not composed of H<sub>2</sub>O but of some very different chemical compound. Is this liquid water?

This “Twin Earth” thought experiment was first introduced in the philosophical literature. The standard answer is *no*, the entity is not water. In other words, the standard philosophical view is that when it comes to natural kind concepts like this one, it is not the superficial features but the deeper causal properties that are criterial for category membership. This thought experiment and intuition have been extraordinarily influential in philosophy and also in the cognitive scientific study of psychological essentialism.

In a series of experiments, we show that when reasoning about such cases, people do not endorse the standard philosophical intuition. Instead, people assent to two distinct claims: There is a sense in which the Twin Earth liquid is water; and also there is a sense in which that liquid is not truly water at all.

For example, in our first experiment participants read a Twin Earth scenario similar to that in the first paragraph here. After reading the story, they chose from three options:

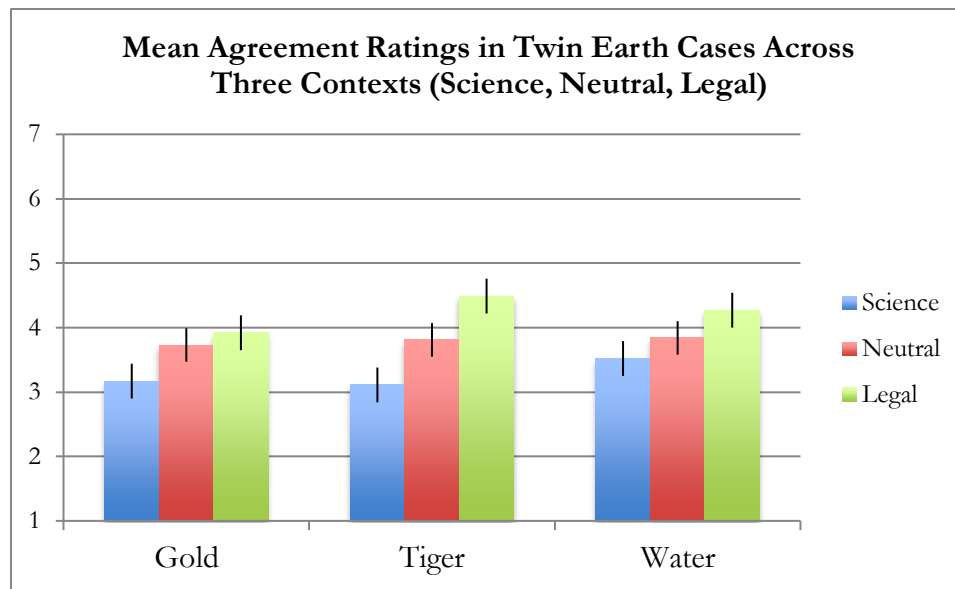
- (1) The liquid from Twin Earth is water
- (2) The liquid from Twin Earth is not water.
- (3) There’s a sense in which the liquid from Twin Earth is water, but ultimately, if you think about what it really means to be water, you’d have to say there’s a sense in which the liquid from Twin Earth is not truly water at all.

Most participants chose the “Two Sense” response, endorsing that the Twin Earth liquid both is water and is not water. We take this as evidence that people represent natural kinds using two sets of criteria, corresponding to two senses of category membership.

Moreover, our experiments suggest that which one of these senses is relevant varies based on context. For instance, in a more “scientific” context—in which the liquid’s underlying causal structure is more relevant—we’d predict participants to be more inclined to judge the Twin Earth liquid as *not* water. However, in a more “legal”

context—in which the liquid’s superficial features are more relevant—we’d predict participants to be more inclined to judge the liquid on Twin Earth as water. This is exactly what we found.

We ran an experiment testing categorization of three Twin Earth entities (putative gold, tiger, or water). Participants read about one of those entities in either a scientific, neutral, or legal context. Then they reported whether they agreed (7) or disagreed (1) with a categorization statement: The metal from the asteroid is gold; The animal from the mountains of Asia is a tiger; The liquid from Twin Earth is water. Across all three entities, agreement was strongest in the legal context and weakest in the scientific context.



In light of these findings, we suggest that theories of psychological essentialism should not be designed to capture the standard philosophical intuition. Instead, the data provide evidence for a more complex account according to which people associate natural kind concepts with two different sets of criteria. One set of criteria is based on superficial features, the other on deeper causal properties. The complex and ambivalent reaction people have to Twin Earth cases arises because *both* of these criteria actually play a role people’s category membership judgments.