

The Subjective Nature of Mathematics

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- In the historical debate between Einstein and Bohr, it is practically seen in every sentence that Einstein was debating ontology ("Do you really believe the moon is not there when you are not looking at it?")^[1] while Bohr was debating epistemology (we only know until particles are observed, at which point the "wave function collapses" into a definite state). This is like as if one is talking about basketball, while the other is talking about hockey. It's no surprise that they were talking passed each other, not aware of what was going on. Worse is that the whole physics community for the past 100 years did not see it. In 2022, the Nobel Prize in physics was headlined as: quantum mechanics is right, Einstein is wrong – indicating by all measures that we still don't have it right.
- My concern is not primarily about math but about physics. The language of physics is math, and forcefully it must embrace its glory and mishaps. And so the issue in math that we will be examining in this paper has inevitably pervaded over into physics. A cure in physics necessarily needs an incursion into math.
- Worth repeating: A proposition or state of affairs is *subjective* if its truth-value or existence **depends** on any individual's perception, belief, or experience. To be more explicit: If there is a need of a (rational) mind to hold that thought, we are dealing with a subjective matter. In the realm of *form versus content*, we are looking into the *form of its existence*, objective versus subjective. By this standard, the real nature of math is subjective, contrary to centuries of belief that it is objectively true. On the other hand, gravity exists regardless of the existence of mind.
- Art, morality and language fall immediately into the category of subjectivity. Then why was mathematics so wrongly perceived? We see it in the use of language by ordinary folks: why can't you be as logical as $1+1 = 2$? First, $1+1 = 2$ is a tautology. Second, it's a mathematical statement, hence it is subjective, meaning if no mind exists to hold that thought, $1+1=2$ doesn't exist. One can hear the ghosts of past mathematicians screaming in horror: Math is NO opinion – failing to realize that subjectivity encompasses much more than mere opinions. It also carries the connotation that it isn't real, as in: son, it's just an opinion, it's not really real?! Third, this brings up the point that one has conflated form and content: the content of a subjective matter can be real or fictional. And math is no exception; it can deliver equations that describe the real world. But also nonsensical stuff like – the Banach-Tarski Paradox: a solid 3D sphere can be cut into a finite number of non-overlapping pieces and then reassembled into two identical copies of the original sphere, without stretching or adding material.
- We are not talking about mathematical fictionalism which is thought of as a reaction to mathematical platonism. Platonism is the view that (a) there exist abstract mathematical objects (i.e., nonspatiotemporal mathematical objects), and (b) our mathematical sentences

and theories provide true descriptions of such objects. Fictionalism, on the other hand, is the view that (a) our mathematical sentences and theories do purport to be about abstract mathematical objects, as platonism suggests, but (b) abstract objects do not exist and so (c) our mathematical theories are not true. Thus, the idea is that sentences like '3 is prime' are false, or untrue, for the same reason that, say, 'The tooth fairy is generous' is false or untrue—because just as there is no such person as the tooth fairy, so too there is no such thing as the number 3. To decipher this conflation of ideas, we must consider the following: 1) True/false are values assigned to statements, which is a crucial ingredient in **logic**. For instance, the statement "it is raining." If we check the weather, and it is indeed raining, then that statement is true. Otherwise, it is false. 2) Consider the statement, "Superman is from planet Krypton." Recall form versus content: in this case, we are not investigating its form – whether or not Superman is real, but its content. So even though Superman is a fictional character, that statement is nevertheless true – as oppose to someone making the claim that he is from Venus, which we all agree, is false.

- While they are deeply intertwined, logic and epistemology focus on entirely different questions. We must remind ourselves that the philosophical distinction of real/fiction (ontology) always plays an important role, but our true/false values belong to another realm of ideas: a) to **logic**, but also, b) to epistemology as we are more concerned about questions of **knowing** rather than what is the essence of reality. Think of **logic** as the calculator that computes values based on strict rules, and **epistemology** as the scientist investigating whether the numbers fed into the calculator accurately reflect our knowledge of the real world.
- Logic, a mental construct, has its own limitation, which is illustrated in the famous conundrum, "This sentence is false." This needs to be pointed out as all endeavors of the mind have their own limited applicability. That limitation is carried on in math, and is in full display with Bertrand Russell's paradox about sets that contain themselves, by asking whether the "set of all sets that do not contain themselves" contains itself. This seemingly innocent question forced set theory at the time to be revised, as both possible answers lead to an inescapable logical trap.
- There are two forms of existence. For instance, gravity can exist without the existence of minds in the universe. On the other hand, $1+1=2$ is a thought and can only exist if there are minds in the universe that can hold that thought. And there are two words to describe these two forms of existence: "objective" for gravity; "subjective" for $1+1=2$.
- The history of mathematics gives us a hint in general about mathematicians in their views on the subject. By their selection of "rational", "irrational", "real" and "imaginary" for their word choices to describe different sets of numbers, one is led to believe that mathematicians have held for a very long time the point of view that numbers are objective creatures – especially the word choice "imaginary" as if those numbers exist on a different plane of reality than "real" numbers. This falsehood must come to an end: All numbers, transcendental and beyond, are subjective in nature.

- Quantum states. And what's behind the fuss?! The truth of the matter is that quantum states are a mathematical construct. Read: they are subjective in nature. The pertinent question is: do they describe the real world? That question resides in the content rather than the form. Our guiding enquiry is of epistemic nature, which leads us to the result: no one knows, or more strongly, no one can know before a measurement has taken place. That has already been explored^[2].
- When people declare that QM says that a particle exists in two different places at the same time^[3], do they realize how ridiculous that sounds? Moreover, do they realize that one can't find out before the measurement because to find out, you must observe, and observation will run you right into the Heisenberg Uncertainty Principle: an observation means injecting energy into the system, which means the system will be altered, which means you will observe the system after the unavoidable alteration? Tough luck. Does that mean that "human" observations determine the fate of the universe? Another ridiculous concept. Every particle is continuously absorbing energy from just about every other particle in the universe. In that sense, every particle is being "continuously observed." It is why it is continuously jiggling and wiggling, and can be described mathematically by a wave function. See here ^[4].

[1] Pais, Abraham. *"Subtle Is the Lord...": The Science and the Life of Albert Einstein*. Oxford: Clarendon Press, 1982. ISBN 0-19-853907-X.

[2] Joseph Palazzo, Quantum Mechanics - Ontology Meets Epistemology, <https://www.vixra.org/abs/2511.0085>, 2025-11-20.

[3] Ladd, Thaddeus D., Fedor Jelezko, Raymond Laflamme, Yasunobu Nakamura, Christopher Monroe, and Jeremy L. O'Brien. "Quantum Computing." *Nature* 464, no. 7285 (2010): 45–53; https://arxiv.org/abs/1009.2267?utm_source=chatgpt.com, 12 Sep 2010.

[4] Joseph Palazzo, Why Quantum Mechanics Must Be a Probability Theory, <https://www.vixra.org/abs/2310.0008>, 2023-10-02.