

Ontology vs. epistemology assignment

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Ontology deals with questions concerning what entities exist or can be said to exist. What do we know? What are we certain of? What can we prove? What is the nature of existence? Epistemology is the study of knowledge. How do we know what we know? How can we establish truth and certainty? Are their limits to what we can know based on how we come to know it? These epistemological questions when combined with ontological questions have philosophers pondering what exists and how we know it exists. In *A Certain Ambiguity*, by Gaurav Suri and Hartosh Singh Bal, there was a constant question of proof.

How do you go about proving something? Well the book suggests that it is only possible to prove something if you have a set of accepted axioms. An example that was often used to illustrate this was Euclidean geometry. When you have the five axioms defined and the postulates formed from the axioms you have basic geometry that you learned in high school (Euclidean). However you learn later on in the book, that if you ignore the 5th axiom than you have a whole new kind of geometry, called non-Euclidean geometry. What everyone thought they knew about geometry and axioms was completely changed by altering the original axiom.

That is deep. The fact that one alteration could have that much of an effect on what mathematicians “knew” is mind blowing. Most people trust math and believe that it is flawless but if you think about it, isn't math just created by humans. Since we, as humans, are incapable of knowing everything it would be illogical to say that we know everything about math or that what we know is one hundred percent true now and forever. Yet people continue

to trust it; similar to what was discussed in my first essay about people and their belief in religion.

People that believe in God “ know” He exists with every ounce of their being simply based on the idea (axiom) that all this complexity we are surrounded by had to be created by someone or something. They choose to make their axiom that God exists, which makes one type of reality (Euclidean). Then there are people who chose to make the same axiom not true and they form a new reality, which results in God not existing (non-Euclidean). Two different realities can form from two different applications of one axiom. We are able to solve mathematical problems such as proving there is no largest prime number. We can be certain in the fact that there will always be a larger prime number because we have created proofs that convince us it is true. Behind every “ proof” is a set of axioms that are accepted as true whether you realize what they are or not. As proven by the discovery of non-Euclidian geometry we don’t really “ know” every mathematical possibility; our minds are not capable of grasping every idea and concept about a world we can’t even prove exists. On page 25 Adin discusses his view on the importance of certainty. Mathematics requires proof, and proof confirms truth. I’ve always been interested in how one can be sure of something, and mathematics seems to provide the way to certain truth. ” I do not agree that mathematics can provide certain truth, especially if proof can be subject to interpretation??? which I will be discussing in more detail. It can pacify us and our curiosity temporarily but I would be hesitant to name anything to be “ certain” in this world. Our knowledge is so limited. We are learning new “ truths” and have disproven previously accepted “ truths. Even though,

nothing is certain we still accept things that make sense because we have defined it as “ common” knowledge. The expression two plus two equals four is certain only because the value of each of these numbers are defined. Everyone over two years old “ knows” what the value the number two represents and when you count two numbers above that you reached the value of the number four and the problem is solved. In my first essay, I explained how if all of a sudden a person was moved from a third world country to the United States, their view on their previous reality would change because their knowledge would be expanded.

The first half of this quote explains that idea in a different way, “ Each society thought that their way was the natural way, the absolute way, and the certain way, but Protagoras and Sophists realized that one way was not anymore certain or real than any other way. They went on to generalize that every human idea is relative to the circumstances surrounding the originator of the idea, and that true knowledge is unattainable. “(pg. 42) The second half of the quote intrigued me. People are too dependent on one another to formulate or recognize new “ truths. The movie Flatland showed how people’s thoughts and ideas are limited to what they can see and what they experience. The circles were powerful and influential and clearly “ knew” they could control the thoughts of their people. The circumstance surrounding the idea of the existence of the 3rd dimension was the shapes were to be punished if they disobeyed the circles and tried to prove there was a 3rd dimension. When someone finally stood out and fought to prove the existence of the new dimension, was when the people followed along because the new truth made more sense.

If people keep looking at certainty with an “oh look, something shiny” attitude they are going to continue to be pawns in someone’s game and are never really going to increasing their knowledge. “Oh look, something shiny” is used to express the way people react when they are told a new “truth.” Most people are not educated enough to understand Einstein’s Relativity Theory but they accept it as true because intelligent people tell them it is true. The relationship between the two philosophical questions is obvious in this example.

The people of Flatland “know” there is not a 3rd dimension because it is what they were told to believe. They then “know” there is a 3rd dimension which was dependent on the proof they were shown of its existence. I’m sure if an unreliable person told them about the new dimension they would not have accepted the proof as true and would have continued to live in ignorance. It could be argued that what we know is not highly dependent on how we come to know it because there is more than one way to solve a mathematical problem. There are multiple ways to prove the Pythagorean Theorem, for example.

One could argue that the process doesn’t matter as long as you get the same end result. I would have to disagree with that person. How could you say that the process to get to an answer doesn’t matter? Through many processes we have discovered errors, contradictions, or new ideas that branch from alternate proofs. If an alternative proof was never created because one already existed we would be limiting our knowledge more than it already is. When people say to “question everything” the goal is not to

annoy everyone; it is to get people thinking about things and to spark creativity.

People learn and understand things in different ways. If we were taught there is only one “ possible” proof, what would happen to human curiosity? After all without curiosity, mathematics and science would not exist. If we never tried to figure out the alternative proofs than we never would have been able to expand our knowledge. We, as humans, crave knowledge and believe that is what makes us superior to the other living beings on our planet. On page 234 there is a passage from Johann Carl Friedrich Gauss discussing the problem he faced in his career with the fifth postulate.

He writes, “ The problem forces us to go outside mathematics in a manner that no other problem has ever done. It forces us to re-examine some of our most cherished assumptions, and ultimately it makes us think about what we know and how we know it. ” I find this interesting and it really makes me think that there may actually be a philosophical connection to mathematics after all. Euclidean geometry was a solid fact but that “ fact” was altered by the assumptions made. Even the most scientific discoveries have assumptions??? no matter how accepted or obvious those assumptions may be.

If you think about it the only reason these assumptions seem obvious to even the most simple mind is because that is what we were told to believe our entire lives. What we know does completely depend on how we come to know it. That does not mean that we are always right or certain but it does provide a foundation that we feel safe enough to stand on. And when there is

an earthquake and the foundation begins to shake (when non-Euclidean geometry was first discovered) we panic. When we believe the earthquake is over the ground beneath our foundation rose up and we now accept the new elevation as our safe foundation.

There is no way to know how far the ground will raise the foundation or if the foundation will crumble and that may be the only thing we can be certain about. Creativity is what drives mathematicians and scientists. They often view their work as beautiful. It is difficult to ignore the way in which mathematics is taught to children and adolescents. There is no creativity and there is no curiosity or exploration. Children “ know” math is boring and difficult. Mathematicians “ know” math is creative and beautiful. Which is correct? Well, it is difficult to say.

Mathematicians were all children at one point, most, going through the same schooling that current children are. Minor changes have occurred but geometry in the 10th grade has always been terrible and uncreative. So what made the mathematicians create a new point of view on mathematics? Maybe they view their work as beautiful because they are finally able to think on their own after years of being confined to one way of thinking. Maybe if school made math creative and beautiful to children they wouldn't have the same appreciation for it as they enter adulthood.

Maybe every person had individual experiences that happened in their lives that led them to becoming a mathematician. There is no way to know what effects we are going to have on the future. The fact is, life is a mystery to us and there is no way for us to know everything that could possibly be a factor

in creating or destroying something. The sensitive dependence on initial conditions (butterfly effect) explains the phenomenon when a small change at one place in a complex system can have large effects elsewhere.

It addresses issues of philosophical significance, such as determinism and free will. This would be impossible to prove stated by Heisenberg's Uncertainty Principle. The butterfly effect could be provable however, if Laplace's demon, as discussed in *Improbable*, existed. Laplace's demon is the ability to be able to see every possible outcome of an event and the chain of events that would follow. Heisenberg's Uncertainty Principle explains that it is not possible to observe a particle without affecting its behavior in some way.

Heisenberg proved (from the axioms of quantum mechanics) that we can't measure both the position and momentum of a particle. If we behave anything like particles we would be limited by both determinism and free will. We are influenced and affected by our environment yet we are also able to make choices and act upon them when we choose. It could be argued that any choice we make is already predetermined and there is really no way to prove or disprove that. It seems reasonable to believe that we will never know what is going on in the big picture.

We are unable to obtain that level of knowledge. This is analogous to the continuum hypothesis, which states that there are no sets bigger than the integers and smaller than the real numbers. This seems pretty straightforward, kind of like saying that there are no integers between 0 and 1. It should be easy to prove or disprove, right? Wrong. It turns out that the

continuum hypothesis can be neither proved nor disproved from the current axioms of mathematics. The two parts of this assertion were proved by Kurt Godel and Paul Cohen.

They proved that unless a new axiom comes along – some basic, obvious fact that has somehow eluded mathematicians to date – we will never know if the continuum hypothesis is true or false. It imposes a hard upper bound on what we, as humans, can know. Einstein's Theory of Relativity is unsettling when you think about it philosophically. The theory basically states that two observers who move relative to each other will often measure different time and space intervals for the same event. Einstein proved that time and length are dependent on your viewpoint. Now our idea of time isn't even certain.

Einstein dared to say that we must now re-interpret how we view the world around us. Before this theory, philosophers argued that there was an absolute truth and an absolute way of approaching various aspects of life. However, now that relativity is “ true”, facts are no longer absolute, but instead dependent upon your viewpoint, your own “ philosophical” inertial reference frame. Right and wrong now vary from person-to-person. Of course we make laws to insure people “ know” what is right and wrong. People break laws and justify their actions making it “ right” in their minds.

There are people in this world, that don't believe the Holocaust actually happened. There is “ proof” that this happened and they still refuse to believe it is true. What defines proof? If everything that has been said or done can be doubted no matter how much evidence you have backing you

up, nothing can be certain. Therefore proof can not “ truly” exist. Proof must only exist in our minds. In *A Certain Ambiguity*, someone explains that unless axioms are used, “ People make up their minds first, and tailor their arguments to support the position they want to take. “(pg. 54) As I will discuss further in to the paper, even axioms are uncertain. Proof must solely depend on how well we can convince ourselves if something is true or not; which would support the idea that what we know is dependent on how we come to know it. Mathematical ideas can be proven, disproven, or in some instances neither proven nor disproven. Our ideas and our knowledge are constantly changing. What we “ know” has been changing and will continue to change throughout our lives and even further than that. As long as humans are curious there will be changes to what we know.

How we come to know the new knowledge will affect the way we value and apply the information. People need to be convinced something is “ true. ” No one likes change especially if that change alters their reality somehow. Mathematics forces us to question the world we live in. This constant questioning and doubt leads us on a path to greater knowledge. Although we may not be able to obtain every bit of knowledge that will ever be available we will be able to continuously expand and reach new limits that previous generations couldn’t even dream of.