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Honors 213

Personal Philosophy of Existence: An Axiomatic Approach

Restate my Presumptions:
1. Mathematics is the language of nature.
2. Everything around us can be represented and understood through numbers.
3. If you graph these numbers, patterns emerge. Therefore: There are patterns everywhere in nature.
-Max Cohen in π

A foundation is necessary for any construction. Before a building is erected, a solid physical foundation is made to keep the building where it was intended to be. A modern scientific paper builds upon a foundation of papers and discoveries stretching back over all of human history. All western music is built from foundation chords that are part of the major triad. Likewise, an understanding of existence must have a foundation. The aim of this essay is to lay that foundation. Through the use of an axiomatic system, the philosophy of existence that I believe in will be made clear. By nature, this philosophical system is inherently personal – it is composed of my own beliefs – but understanding of this system has value beyond that of simply being able to understand me. An understanding of the basic principles that a person operates on is valuable for anyone. Insight into how I develop ideas can help show the causes of my actions, and may help someone else increase their understanding of their own actions as well. Just as importantly, the ideas enumerated here can be applied as a whole or piecemeal to anyone with the same or similar axioms, allowing them to improve their understanding of themselves and their decisions. Thus, the use of terms like "I," "my," and "other people" in the actual philosophy do not apply specifically to me – it can represent anyone for whom these axioms hold.

Before the actual ideas can be explained, a framework for the language used must be set up. While most of this essay is intended to be as independent as possible from external sources, the attempt to communicate the philosophy to readers requires language and ideas that are understood by others. I will begin on the assumption that the reader understands the use of English in a formal math paper – if the reader does not, then they cannot be reading the paper, so it is reasonable to start there. The other necessary element to communicate these ideas properly is a format and structure for the actual ideas (as opposed to that of my communications medium). The best way to do so for my purposes is to build my philosophy as an axiomatic system. The main rationalization for this method is to make it as portable as possible to others. The axioms are self-evident to me, and those that agree should be able to follow the statements easily, and as a result, agree with the conclusions. Those who do not believe the axioms to be true, meanwhile, will at least understand the reasoning and logic used to come to these conclusions, and if they agree in part, they may be able to adjust the axioms to come up with a similar conclusion without having to re-build the entire system from scratch. As a result of my use of an axiomatic system, I will limit the language in the axioms and conclusions to well-formed declarative sentences, with only two possible values: true and false. While it is true that this is a somewhat idealized system, limiting myself to this helps to clarify the meaning, and allows use of the rules of deductive logic. To use those rules, I must have well-formed statements – i.e. ones that are true or false.

My Axiomatic Philosophy of Existence.

Any axiomatic system requires a certain number of undefined terms that are to be used as starting points:

- Me (or I, or myself, or any other first-person pronouns)

- An Object (This can refer to as many objects as are necessary other than myself)
- Senses
- Time
- Cause

Fundamental Axioms

FA.1: I exist.

This is the most basic axiom – it is intrinsically necessary before any other conclusions can be made. If I do not exist, then I am not able to sense anything or act in any way, which would result in an immediate contradiction. Thus, this axiom is necessary for any further conclusions.

FA.2: If my senses tell me a statement is more likely to be true than false, then it is true.

Lemma: If my senses tell me an object exists, then it exists.

FA.3: If my senses tell me a statement is more likely to be false than true, then it is false.

This pair of axioms is the core of the philosophical system, because they are necessary to come to any other conclusion. Without them, it would be impossible to convert anything into an axiomatic system, and logical reasoning could not occur. By applying these axioms, the full range of logical and non-logical statements can be made and boiled down to logically true or false. A key thing to recognize is that because of this, reality is determined by my senses. While it may seem unreasonable to say that my senses are always right, if I do not start with that assumption, nothing can be deduced. If I allow for the possibility that my senses are wrong, I can never be sure of anything, because it could always be claimed that my senses are wrong. Thus, these Axioms force me to assume that at any moment, my senses determine what is real or true and what is not. In that way, the "universe" is limited to everything I can detect or understand with my senses and the logic that is deduced from those senses. At this point, though, they apply entirely to static systems – the Fundamental Axioms only apply to any given moment. Because I perceive the passage of time, and realize that what my senses detect change, something more must be introduced.

Dynamic Axioms

Definition: Change occurs when a statement is true at one point in time, and false at another.

DA.1: All change is caused by something.

This axiom is at once the most difficult to believe and the most self-evident. Change does not spontaneously occur – while the actual cause of something may be beyond the scope of current knowledge (or perhaps even beyond human comprehension), I believe that there is a cause for everything.

DA.2: Change continually occurs beyond the bounds of my senses.

This axiom seems extremely obvious, but it is nevertheless important - because statements can only be shown to be true or false if I sense them, there's no way to be certain that anything occurs when I'm not sensing it – this axiom ensures that change is continuously occurring independent of me and my senses.

Conclusion 1: The converses of Axioms FA.2 and FA.3 are false.

Proof: If change occurs beyond the bounds of my senses, then there is a statement beyond the bounds of my sense that has a value of true or false. If that is the case, then for the converses of FA.2 and FA.3 to hold, my senses would have to tell me that they were more likely to be true than false (or false than true). This creates a contradiction, because DA.2 states that the change occurs beyond the bounds of my senses.

This conclusion is a result of combining the axioms I have already stated with deductive logic. A good axiomatic system is as simple as possible, with as few axioms as possible each with as small a scope as possible. This is useful because it allows another person to accept only a very small number of things at face value. Because this conclusion is deduced from the axioms, accepting the axioms forces the conclusions to be true. The value of this conclusion, though, is mostly in clarification – while my senses tell me if something is true or false, statements can be true or false without me sensing them as such.

DA.3: Any change I cause must have some effect within the bounds of my senses.

While it is certainly true that change I cause can have effects beyond my senses, for that to occur, there must be some change that I can detect – I can't remotely cause change somewhere else without pressing a button or yelling really loudly or something similar to that which is detectable by my senses. This seems self-evident.

Conclusion 2: I do not cause all change.

Proof: If change occurs beyond the bounds of my senses (DA.2), and any change I cause must have some detectable effect (DA.3), then if I stop taking any action or causing any change within my senses, in that time change occurs beyond the bounds of my senses (DA.2), so the change could not have been caused by me.

This conclusion justifies the use of this axiomatic system (or of rationality and logic, for that matter) – without it, change cannot be predicted independent of me. While the axioms from which this is deduced seem mostly self-evident on their own, the fact that they result in this conclusion helps show that they are likely to be true. If this were not true, it could be assumed that I am actually the center of the universe, and things only actually occur when I sense them. In that case, change would be only a figment of my imagination, created by my mind to keep the world interesting. While it may never be possible to know for sure, my personal belief is that this is not the case – if nothing else, the universe is full of too many wondrous things for me to think of. Thus, I must invoke the Dynamic Axioms to explain what I do not think I could have come up with on my own.

Predictive Axiom

Definition: A Prediction is a statement that a specific change will occur given a specific set of circumstances. i.e. If I hit the table, it will make a thudding sound.

PA: If a prediction is true every time it is tested, and there is a consistent explanation for the cause of the change, then it can be accepted that the prediction will be logically true.

This axiom is the underpinning of the scientific method – you can build a statement from an earlier set of statements if and only if is tested *and* given a reason why. If both of these circumstances are not provided, then the statement is still true in a given instance, but cannot be expected to be true when the predicted circumstances occur again. If both are provided, it is not certain that the statement will end up true, but from a logical and philosophical standpoint, it will be accepted as true. At some point in the future, the statement may end up being false, and in that case the prediction is declared false (or altered to become true again). Until that occurs, however, the prediction is considered logically true. This is necessary to prevent random coincidence from making things appear true that are not.

Conclusion 3: A prediction that is detected as more true than false that also has a consistent explanation is logically true.

Proof: FA.2 can be applied to any statement that is sensed as more true than false, and that statement gains a logical value of true. If FA.2 is then applied to another statement, and the related prediction is given an explanation for why it occurs, then the Predictive Axiom makes the prediction logically true.

This conclusion shows how the Predictive Axiom is actually used. While specific examples will be addressed shortly, this conclusion can still be understood in general. Because my senses never give a certain answer, to make a prediction I only need to have the preponderance of evidence that FA.2 and FA.3 offer. This allows me to come to a conclusion that something will occur, without being absolutely certain that the circumstances are correct. While it is not addressed specifically due to the limitations of true/false logic, this can also be understood to say that predictions are not certain – if the circumstances prompting them are not certain, then the conclusions cannot be, either.

Definition: Knowledge is composed of the set of all statements gained from the senses through application of FA.2 and FA.3

Conclusion 4: With enough knowledge, all true statements can be predicted.

Proof: If a statement is true, then it satisfies the first requirement of the predictive axiom. To satisfy the second requirement, there must be an explanation for the cause. Because all changes have a cause (DA.1), an explanation must exist. If enough information has been gained from the senses to discover that explanation, then the second requirement of the Predictive Axiom has been met, and the prediction can be declared true (Hypothesis, PA).

The importance of this conclusion is immediately apparent – it creates the framework for a deterministic or non-deterministic universe. If all knowledge can be gained, then the universe becomes deterministic, and anything can be learned. If, on the other hand, the human mind is unable to learn everything (which is very likely, considering how small the human mind is compared to the size of the universe), then not everything can be predicted. Unfortunately, there's no way to be sure which of these is the case – because I do not know everything right now, I do not know what the human mind may someday learn. It is possible that in the future, some change will occur to make me omniscient. But as of right now, changes occur that I do not know the causes of, so I am not omniscient.

Application of my Axiomatic Philosophy

The Fundamental axioms require specific sensory input and the Dynamic and Predictive axioms require specific changes to occur, so few useful conclusions can be drawn without specific examples. However, this application to specific situations is where the value of this philosophy arises. By creating logical predictions, it can act as a guide to decision making or it can simply provide information.

To make the system and its value clearer, a simple example is useful. In describing how the Predictive Axiom operates, I have already begun exploring a basic model of this

Axiomatic system. To complete the model, I will interpret the undefined terms as follows:

- Me: Me, the author of the paper.
- An Object: The desktop of the table in front of me.
- Senses: Hearing, Touch, and Vision w/ respect to hitting hand on table
- Time: Time as naturally understood using seconds.
- Cause: Me (striking the table)

When I strike my hand on the table, I hear a thudding sound. I also feel a slight vibration. The prediction I decide on, therefore, is that when I strike the table, it makes a low thudding sound as a result of the vibrating table disturbing the surrounding air. Thus I assume that when I strike a table of similar composition, I will again hear a slight thudding sound. Later, I hear a similar thudding sound coming from another room. While the event is beyond the scope of my vision, I can apply FA.2 and DA.1 to conclude that a fist has struck a table in the other room, because of the evidence my hearing offers. While this seems to be naturally obvious, these are the logical steps my mind goes through to come to that conclusion.

The action to take based upon hearing the thud would be dependant on much more than just the sensory information from that specific event. It also depends on what I had learned in the past about what happened in the room I heard the sound from. Knowledge of who might have caused it and similar pieces of information would be necessary to construct a clear picture of what might happen if I took a specific action. But the method for deciding on an action would still depend on predictions and statements that the axiomatic system provided, and thus depend entirely on conclusions I have come to in the past.

Another useful model helps explain how the theory of gravity arose:

- Me: Isaac Newton
- An Object: An apple.
- Senses: Vision – watching an apple fall.
- Time: Time as naturally understood using seconds.
- Cause: Gravity

According to a biography, Newton was watching an apple fall from a tree (not on his head) when he came up with his theory of gravity. He noted that the apple seemed to be falling as though it was being pulled on by the earth from below. He applied FA.2 and decided that that actually was occurring. From that, he predicted that all things pulled on each other through the mechanism of "gravity." He built on the past work of others and came up with his own sort of math to describe this force, and in fact, set forth the basic laws of physics. His experiments refined these predictions and supported them, and his theories seemed to hold true, with a reasonable explanation of how and why they acted the way they did. Eventually, it turned out that he was not entirely correct – Einstein refined his predictions further through relativity. But for his time, the predictions he came up with seemed entirely correct, and they were likely deduced through Newton's unconscious use of this axiomatic system.

The final example is slightly different, as it details the sources of another axiomatic system:

- Me: Me, the author of the paper.
- An Object: Paper, pencil, straight edge, and compass.
- Senses: Vision
- Time: Time as naturally understood using seconds.
- Cause: Me, and whatever created the universe

The Axioms of Euclidean geometry as proposed by David Hilbert (through Greenburg's textbook) can be deduced from applying my axiomatic system to a paper, pencil, straight edge, and compass. If you start with a blank sheet and draw a line on it, it is reasonable that the line has at least two points on it: when you draw a line, you must touch the pencil to the paper, and when you stop drawing the line, you pull the pencil away – these each correspond to two different points on the line. While you draw arrows on a line to indicate that it continues infinitely in either direction, you still must be able to point to two points to be able to draw a line segment. The senses also indicate that if you make two dots, a line can be drawn between them. It also follows from vision that another point could exist not on one of the lines that has been drawn. That provides the Incidence axioms. It also appears that more points could be drawn satisfying the betweeness axioms. With a compass and straight edge, rays could also be created with equivalent angles, and using a ruler, segments can be drawn of equivalent. Drawing two triangles with equivalent length of two sides and the angle between them can be measured with the compass and straight edge to be identical triangles. From that follows all the congruence axioms. The continuity axioms are much more difficult to conclude using senses, but unless you get an electron microscope and can see down to the atomic level, the line appears to have points between any two points. The parallel property is the least apparent using these senses and objects, but it can appear to be true by drawing two lines with a perpendicular transversal. Even if you use an extremely long sheet of paper, these lines don't seem to meet, so it seems at least plausible that it is the case, allowing application of FA.2, which forces it to be logically true using the philosophical axiomatic system. As a result, it can be applied as a geometric axiom.

All the propositions and theorems of Euclidean geometry can then be deduced from this application of my axiomatic system, using these same tools and application of FA.2, as well as the Predictive Axiom. In effect, geometry as a branch of mathematics is an application of the Predictive Axiom, using a hypothetical axiomatic system and logic rules instead of the actual physical model. It can even be used to deduce hyperbolic geometry if the Klein Model is used instead of the standard Euclidean paper, pencil, straight edge, and compass model.

The primary limitation of this philosophy is in the application of FA.2 and FA.3. Both are dependent on me for an understanding of what is "more likely" true. Everyone does not have the same experiences, ideas, or genetics, so their application of what is most likely will be different. As a result, my philosophy is not the answer to everything – it does not make everyone always agree. But it at least sets some common ground, and offers a foundation and starting point for logic, reasoning, and even communication. Without that foundation (or something like it), it is impossible to build up to anything at all. This explanation of my philosophy of existence can thereby be a way to find common ground – if everyone can work their ideas back to where they initially applied FA.2 or 3 to their experience, some understanding will be found.

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