

9. Mathematicians have the concept of rigorous proof, which leads to knowing something with complete certainty. Consider the extent to which complete certainty might be achievable in mathematics and at least one other area of knowledge.
Yew Chung International School - Hong Kong

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Theory of Knowledge essay

Topic 9:

Mathematicians have the concept of rigorous proof, which leads to knowing something with complete certainty. Consider the extent to which complete certainty might be achievable in mathematics and at least one other area of knowledge.

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Mathematics is a body of knowledge that studies concepts of quantity, space, changes and structure through its own language—numerical. Admittedly, mathematics qualifies as a highly logical and meticulous academic in which almost all statements can always either be proved or disproved by mathematical reasoning. The numerical systems are the fundamental making of the mathematical universe, but are also an abstract concept that does not have implications if it's extrapolated from this very field. As Einstein once said “as far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality.” In mathematics, “complete certainty” is to the extent at which statements can be declared as true or denounced as false by examining them with the self-sustaining rules of numbers. It is a quality that allows for mathematics to achieve objectivity and impartiality. It also allows for mathematicians to use their perceptions and reasoning that would eventually lead them to forming consensus. On the other hand, as a social science, economics studies phenomenon that affiliates with matters that involve certain irregularity and thus are less capable at achieving complete certainty. However, is this necessarily an undesirable characteristic for this discipline to have? Literature, as a linguistic subject appreciates the versatility that multiple points of view bring about. At such areas of knowledge, “complete certainty” actually becomes a suppressing factor to the individuality that is so encouraged.

Many say that the concept of mathematical proof is based on nothing but numbers' self-sustaining rules. In other words, when mathematicians claim that something can be proved, they are implicitly claiming that their formal system is consistent and true. This inevitably forms a circular contradiction as they are using what they believe to be true in the first place to prove something else. However, this argument is invalid when applied to cases in which mathematicians are trying to prove theorems of computation phenomenon using the rules of numerical. As long as the hypothesized statement itself stays within the boundaries of mathematics as an area of knowledge, no contradiction exists. A good illustration would be the concept of mathematical induction¹ that involves proving mathematical generalizations with specific steps of procedure. The theorem is valid because subjects of the proof are themselves products of the system of numerical. As we learn about different linguistic systems, we would find that no two languages have the exact same set of rules, that each one is unique. As long as it is made clear to the audience that the content is subjected to a particular set of rules, it is legitimate to prove or disprove statements based on the assumption that the fundamental system is right.

Despite the fact that renders almost all statements proved by mathematical logic to be true, there are still, however, ones that stray on the boundaries. Gödel's second incompleteness theorem²,

¹ is a method of mathematical proof typically used to establish that a given statement is true of all natural numbers.

² To find a complete and consistent set of axioms for all of mathematics is impossible, thus giving a negative answer to Hilbert's second problem.

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perhaps the most widely celebrated result in logic, which (informally) implies that any formal system that contains basic arithmetic, if sound (meaning that all theorems that can be proven are true), is necessarily incomplete (meaning that there are true theorems which cannot be proved in that system). Gödel has been able to construct and show that, whatever the given collection of number-theoretical axioms, a formal statement in the logic that is a true number-theoretical fact, but which does not follow from those axioms. Therefore no formal system, including numerical, is capable of achieving complete certainty for all statements within the discipline.

Although the system of numerical is similar to that of economics and linguistics in many ways, the latter has relies upon the system to communicate rather than to provide set of laws. Ultimately, complete certainty is not achieved nor desired in these academic disciplines.

In Economics, many things are quantified and translated into different indexes that allow us to study the distribution of goods and services. This seemingly methodical system might lead people to believe that Economics a science of exactness—this is largely untrue; it is much more a study of correlations. Certain behavioral traits that we display are the elements that are responsible for the general outlook of our economy—such as, how much we decide to spend, to invest or to save. A good example would be the differences between the concepts of economic development and economic growth. The latter is a quantitative index that expresses a country's the increase in value of the goods and services produced by an economy. It can be shown on a graph and can be calculated while economic development is a qualitative index very much important to the measurement of improvement of any country's status. To calculate this index, we need figures such as the Human Development Index³, which includes quantified data (e.g. infant mortality rate, doctor per square kilometers) that help economists to translate non-mathematical information into mathematical data. Although this process may very likely include inaccuracies and the results may be debatable, it certainly allow room for different interpretations of the situation (of the country at hand) to be made. Economists try and work out the aggregate relationships that exist between those behavior and other factors, such as government policies and environmental factors, in order to have a brief idea of the economy. And the rest of it is up for the economists' deliberations. Along this process, it is important to see the "big picture" instead of the threads that are behind it, abandoning the

For literature, there is an absence of the lending use for mathematical data and the discipline as a whole is no where near achieving complete certainty, nor is it desired. For anyone, whether it is an English literature professor at a renowned university or a high school student, reading a book is simply receiving verbal stimulation as one form of perception. There is no smell; no seeing; no hearing—strictly imagination. That is, the subjective interpretation of the reader plays an even bigger role in this discipline. We do not have to reach far back into history to be able to see that versatility

³ Is the normalized measure of life expectancy, literacy, education, standard of living, and GDP per capita for countries worldwide.

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is what is achievable and welcomed in the field of literature. Virginia Woolf, the famous English novelist dedicated her career to works following a pioneering format—stream-of-consciousness⁴. Her works, such as *Mrs. Dalloway*, are made up of lines and words that are very much open to the readers' attention and that is exactly the characteristic that have made this form of literature appreciated by so many. Not only with contemporary writers, but is evident in literature history too. It has been long debated whether the phantom dagger that appeared before Macbeth⁵ was a symbol of self-certainty, a supernatural sign, or simply a hallucination? with authors are never fully willing to disclose what thoughts or events had led them to write certain things. And most of the time, they themselves do not know and even if they did, they would not have been able to control the imaginations of their readers. As soon as it is read, a text become personalized, and thus there is no way to disprove or prove a thought or idea about what the author could have meant by the words that he/she had written down. And thus, complete certainty is virtually unachievable, and at the same time not desired in literature. And as we let our sight expand to a scope of all literature formats, we can see that as time moves on literature has changed and evolved, away from narrow perspectives, to wide range appreciation. From Shakespeare to Samuel Beckett, from William Blake to Carol Ann Duffy, literature has developed overtime and denies its need for complete certainty to prosper. The lack of complete certainty and the data that supports it provides possibility for the coexistence of different views that are taken on a same piece of work; it is the ultimate aim for this academic discipline.

However, some may argue that, even literature cannot escape the quest for consensus, the need for complete certainty. Or else how should we decide who is worthy of a literary prize? The Salman Rushdie novel (*Midnight's Children*), when selected to be the winner of the Man Booker Prize⁶ cause much controversies and heated debates. Having touched on sensitive political issues and adopted a rather pioneering style of writing, the book has been criticized for not deserving the honor. Similar arguments are evident with the nomination of many other literary prize winners; there are readers who adore them and those who don't. This is because authors, unlike mathematicians, are not there to achieve complete certainly but rather present their own interpretation of facts basing on experience and emotions. How would a winner or two be selected from the crowd? Over the years, there have been many debates that regards which work should be on the book prize list and which shouldn't, and yes to quantitatively assess the popularity of a book, to plot out a graph for the structure of a poem may be ways to avoid controversies in any areas. But it is something that takes away the true purpose of the discipline and adds nothing but rigidity to it. Reader's interpretation would not be undervalued by the objective perception and logic, which contradicts with the

⁴ ostensibly unedited, spontaneous live or recorded performances, as in film, music, and dramatic and comic monologues, intended to recreate the raw experience of the person portrayed or the performer

⁵ One of Shakespeare's plays

⁶ also known in short as the Booker Prize, is a literary prize awarded each year for the best original full-length novel

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appreciation of literature in the first place.

As stated before, to achieve complete certainty is to be able to either confirm or falsify the claim of a speculated statement. Looking at the basics, we can already see a clear difference ---mathematical connotations are strictly defined while many words have fine distinctions in each context that they are used. And as we go a level beyond and see the structure of mathematical statements, we see that they are based on mathematical logic that is concerned with setting mathematics on a rigid axiomatic framework, and studying the results of such a framework. However, with other areas of knowledge such as Economics we see that there are different degrees of certainty that exist within the discipline but where complete certainty is neither achievable nor desired.

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