# TOK Essay Role of Analogy

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## Knowledge Question

The role of analogy is to aid understanding rather than to provide justification. To what extent do you agree with this statement?

## Introduction

Analogy is a term that is used to refer to the inductive learning. The meaning as in the dictionary is the description of one thing in relation to another with the aim of explaining or clarifying something. In this discussion, however, I will by using the term to mean elaborating a meaning of a particular point in one area of knowledge by using a different area of knowledge area or knowing since the similarity between two different items can be used as a guide light to substantiate various situations light of the other. As such, the difference or the commonalties that may exist between two particular situations can be ideal in exploring one another and enlighten them as well. ‘Understand’ is a word commonly used to perceiving the intended meaning of a concept, a word, a situation, language, image, or any other phenomenon. The word, as it will be used in this discussion, can also refer to comprehending. To justify, a phrase I intend to use, can be used to mean providing a proof to show what is right or wrong. As it will be used in this discussion, ‘aid understanding’ refers to the provision of information that could help to substantiate a subject. ‘Aid understanding’ is providing information to explore or substantiate a subject. I will also define the phrase ‘provide justification’ as using substantial facts or evidence to justify whether a subject in the discussion is right or wrong. In some areas of knowledge such as mathematics, according to Sprague (2017), formulae for solving complex sums were introduced to prove prior theories.

The knowledge question seeks to assess the degree to which the function of a comparison of facts in different areas is used to support comprehension rather than supplying reason. In the mathematics area of knowledge, the formulae for complex numbers were developed from efforts to understand and prove prior theories (Sprague, 2017). The two functions of interpretation as well as argument were thus served by purpose and usage of structure areas. On the other hand, to have an interpretation of several areas of knowledge, a new hypothesis is developed. In the process of knowing and understanding scientific concepts, language, concepts development, and reason are indispensable (O'Brien, 2006).

## Mathematics

The field of mathematics deals with numbers' manipulation on the basis of universally accepted axioms (Jesudason & Heydon, 2013). Math starts by basic logics, arguments, and ideas that have been agreed upon and aren't expected to change. The topic is thus universally grasped both deductively and inductively by logic. Mathematics logics can be used in real life to create the awareness of the consequences and how an action is desirable. However, there is a discussion of whether mathematics was invented or discovered.

According to Lemos (2007), early premises motivated the foundation of many theories of mathematics. For instance, following Euler's invention of the derivations based on the polar principle of complex numbers, De Moivre developed his theory. It may be argued that in mathematics, a fine line occurs between comprehension and justification. To grasp a formula requires the experience of using a single principle to address different issues. Proving, on the other hand, requires the capacity to steadily order the patterns of mathematical thinking. I assume that each should be widely viewed as the other's undertaking. Both situations include describing the measures based on equivalent premises.

**#Claim 1.**

Comprehension as well as explanation of axiomatic and arithmetic principles are given by numerous mathematical theories. De Moivre's works, for example, link complex numbers and trigonometry together. It is also a precursor to the idea of Euler that justifies the interdependency between trigonometric and exponential complex functions. The two models can be used to explain the exponential law or action of integers as well as justify it. In hyperbolic trigonometry and matrices, analogues of the formulas are also applied. In addition to having a factual interpretation of complex numbers, the paradigm of De Moivre can be proved by inductive inference for natural numbers using Euler's concept. The contrast of the two formulae thus gives an interpretation of mathematical knowledge as well as a rationale.

In addition to providing a factual understanding of complex numbers, De Moivre's method can be conclusively demonstrated by inductive reasoning for natural numbers using Euler's idea. Therefore, an interpretation as well as a justification of mathematical knowledge is given by the contrast of the two formulas.

The above argument can be refuted by claiming that the interpretation that the above hypothesis attempts to explain is given by earlier knowledge. While two models explain one subject, only one provides a detailed framework for other truths to be deduced or caused. For example, Euler exploits the trigonometric relationships of complicated numbers. The viewpoint of De Moivre presents an entirely distinct field of logic that can be discovered by modifying the philosophy of Euler. Consequently, trying to explain the behavior of integers can be frustrating.

**#Claim 2**

Mathematical knowledge facilitate solutions that could be used to understand concepts and justify them as well. Even a single formula suffices a conclusive result that doesn't not to be complemented by another concept. Even though somewhat similar, De Moivre's and Euler formulae give a distinct comprehension of integers. The universality of mathematics as affirmed as one formula is used to deduce the other. The same analogy can be used in other areas of knowledge. For example, a comparison would be integral in reasoning key similarities and difference between two methodologies. Analogy guarantees that expected outcome is yielded from a formulae in line with prior mathematics theories (Lagemaat, 2014).

To counter the argument above, mathematical solutions are problem specific despite the knowledge itself being universal. Arguing that comparison of two methods justifies the outcome could be insufficient because formulae are specific. Each of them must be facilitated by inductive and deductive reasoning. The difference can also be seen Euler and De Moivre's steps and processes. It ensures that different structures, laws and premises are considered by the models. In the end, the consensus on one step does not explain the similarities of the two mathematicians in mathematical reasoning.

## Natural Sciences

The field of science is concerned with discovering, by scientific methods, the natural world around man (Jesudason & Heydon, 2013). In Physics, by discerning the known natural laws, the energy types in matter are studied. A study of the Law of Gravitational Force of Newton and the model of Coulomb founds that both principles are based on identical physical fundamentals. The two concepts explaining the interaction between two bodies, for example, obey the inverse square relationship. The effect of gravity is defined by Newton, while Coulomb investigates the influence of electric fields. In comparison, electrical charges have both positive and negative charges that activate the forces of attraction and repulsion, while gravity is only correlated with attraction. There are clear correlation similarities in reasoning deductively and inductively with regard to the scope of theories and applications.

**#Claim 3**

In natural science, the advancement of a single hypothesis will support the interpretation of several different fields of study. For example, to describe the attraction between particles in an electric field, the inverse square relationship between two bodies under a gravitational force may also be used. It is used to improve an understanding of the behavior of the elements under the control of sources of energy. Both hypotheses follow the system of simple physical laws that make partial behavioral assumptions (Burgin, 2016). One definition may also help to explain multiple fields of expertise.

By disagreeing that correspondences can be misleading because each discipline is different due to its salient construction, the above claim can be countered. The fields of gravitational force and electric energy are unrelated, for example. While similar patterns like an inverse square connection and attraction may be exhibited, the variables at work are not the same. An analogy of the law of Newton and Coulomb can be confusing and cause a confusion because each force's other core elements are completely distinct. Therefore, only to a limited extent can it be appropriate to permit the comprehending and justification of each field.

**#Claim 4**

In natural science, the understanding of dissimilar concepts is key to generate perception based on past concepts. The Inverse Square law was conceived by Robert Hooke to examine the interaction between two objects of varying distances. The use of the model in making other physical laws such as Newton's gravitational force and Coulomb's theories of electric energy is allowed by language and theoretical improvement. A comparison of the methodology and context of Hooke yields his conclusions applicable to the fields of Newton and Coulomb. Although the fields are distinct, field analogies allow a precise understanding as well as reasoning of the prerogatives of each scientist.

Even through it is necessary to comprehend the fundamental laws of natural science of various concepts in order to come up with new theories, it can be argued that extended advancements will be able to justify them. If justifications are provided, the use of Hooke's Inverse Square law to comprehend Newton and Coulomb's laws will greatly benefit and even gain further exploration. Attempting to justify the state of the relationships of one theory's variables as it relates to the other facilitates the interpretation. In addition, in order to breach knowledge gaps, it creates the need for a deeper investigation. It is therefore, important to prove the adequacy of analogies.

**Conclusion**

The purpose of the discussion was to decide the degree to which the function of analogy is not to justify but to support comprehension. Mathematical theories, especially De Moivre's, Euler's formulae and trigonometry, therefore provide comprehension of axiomatic and arithmetic principles and evidence as well. Deductive and inductive logic requires the areas that each term interprets to be compared, supporting its assumptions. In natural science, the advancement of a single hypothesis in natural science will help the interpretation of multiple fields of research. For example, to describe the interaction of particles in an electric field, the inverse square relationship between two bodies under a gravitational force may also be used. The law of relativity by Hooke, specifically inverse square law, is the central principle upon which claims of Newton and Coulomb are made.