Does the production of knowledge require accepting conclusions that go beyond the evidence provided for them in the two AOK's: math and natural sciences?

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Though in certain cases, it may seem as though knowledge is produced by accepting conclusions beyond the evidence provided for them, the title statement is deeply flawed.
Firstly, the function of a conclusion is to conclude a question in a full and lasting way, thus stating that a proper conclusion may go beyond the evidence provided for it is simply makes it a grotesquely impractical conclusion, since evidence is used to assert the validity and truth of a statement, not providing sufficient evidence for a statement means that it is unclear if the statement is, in fact, true and valid. Secondly, as previously stated, the accepting of uncertain conclusions without sufficient evidence is unreasonable, however stating that the production of knowledge requires this is simply irrational. The word “requires” suggests that there are situations in which a conclusion can be assumed to be true without there being any reason for it to be true, this is logically incoherent, suggesting that the statement is not true and that all conclusions need evidence to be provided for them in order for the conclusion to hold ground.

In mathematics, conclusions are defined by the evidence provided for them, for example, 2+2=4 is defined by the total number of units in 2 groups of 2 units is 4 units, thus accepting conclusions that go beyond the evidence provided for them is wrong by definition in mathematics. For example, the sum of a sequence of numbers is called a series, when this sequence changes as a result of multiplication, it is called a geometric series, for example, the sequence 1,½,¼,⅛… has a geometric series 1+½+¼+⅛+... where every number is half the previous number, logically, this can go on till infinity because you can always have a number that is half of the number before it. It may come as a surprise to some that it's actually possible to find a sum of an infinite number of factors, this is on the condition that the series is convergent, meaning that every number approaches a particular number, in the case of the previously mentioned series, every additional factor approaches the sum of the number to 1. This is one of the scenarios in which people may believe one must accept conclusions that go beyond the evidence provided for them, some may feel this because it’s impossible to count to an infinite number, since a larger number may always be added or subtracted to the series, this is not true, in order to find the sum of an infinite number one must only see that there is a mathematical proof of that series being convergent, that is, every factor must get progressively smaller so that the total doesn't surpass a particular point. Though it may not seem like it, this provides concrete answers that are true by definition, due to the type of reasoning being a deductive one. By using a deductive approach, accurate and specific answers to a problem can

be obtained, which are good for solving maths problems. That being said, this type of reasoning may not be appropriate for attempting to solving less straightforward problems that require a more inductive approach.

In various quantum theories, it may seem as though evidence and conclusions are mutually exclusive, this is not true, but it certainly seems as though it is at first glance. An example of this is what is known as the double slit experiment, this was an experiment first used to prove that light travels in waves, long before the advent of quantum mechanics. The double slit experiment was done to show wave-particle duality, essentially the notion that certain particles called electrons could behave like a wave and a particle.

The notion of the experiment builds on the fact that waves create several lines on a screen when passing through parallel slits in a piece of metal in front of a screen as seen in figure 1[1] , whilst particles create just two lines, this is because waves interfere with each other, effectively canceling some parts of it and amplifying others whilst particles such as marbles or sand for example, simply fly through the slits and impact the screen bend it, creating two lines. When it comes to tiny particles such as electrons, they create the pattern associated with waves when fired at, even when fired one by one. Thus, the obvious conclusion is that a single electron passes through both slits, then interferes with itself. To provide evidence for this conclusion, scientists placed a detector in front of each slit then ran the experiment again; the detector registered that electrons were passing through one slit at a time, interestingly, However, with the detector present, the pattern observed on the screen was that of 2 lines, not multiple lined as was observed without the detector, thus it is apparent that the very act of obtaining evidence for a conclusion may change the conclusion itself. What this actually shows is that particles as small as electrons may not

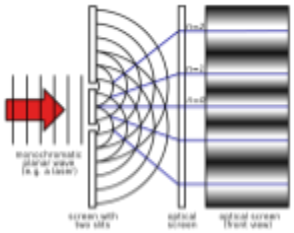
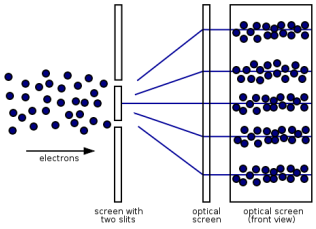
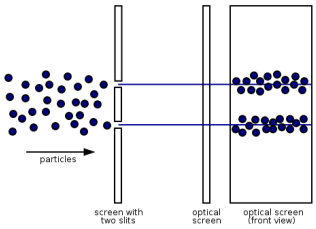


Fig 1





[1] *Freiberge. Mr;Schrödinger's equation — what is it?; plus magazine; https://plus.maths.org/content/schrodinger-1; date last accessed 21/02/2019*

have direct evidence of their positions since it is impossible to gather this evidence without changing the outcome, however, this in itself is evidence of the conclusion, since there is a change between the two situations (with detector: electrons pass through one slit at a time, and create two lines, Without detector: pattern of multiple lines), Thus, since the only possibilities are that electrons pass through one slit and electrons pass through both slits; the changing of the outcome when electrons are passing through one slit must mean that without the detector, they bust be passing through both.

This shows that it is not the evidence that causes threats to the validity of the conclusions but rather the particularities of the way by which evidence is found, it is always important to consider critically the interference between all parts of a system. As a result of this, knowledge in natural sciences can be a lot more subjective, in addition to this, expressing this knowledge becomes much harder as a result of the need to describe all the preexisting conditions required to be put in place in order for the conclusion to be true. This inductive approach to knowledge which is used in certain facets of natural sciences provides the possibility to solve a huge amount of problems which are too complicated for using deduction. Though, this is at the expense of clarity and certainty; making it impractical for use in AOK's such as math.

As such, in terms of the question: "does the production of knowledge require accepting conclusions that go beyond the evidence provided for them?" such assertions may be based on an incomplete assessment of what classifies as evidence and what classifies as a conclusion. In this sense, one may confuse inductive reasoning for providing a conclusion without evidence, however, what is important to note is that the "conclusion" provided when using inductive reasoning is not the same as a conclusion provided from a subject requiring deductive reasoning. The important difference being that by definition a conclusion has to be conclusive meaning that it should not include any assumptions; if this is true, then how is it possible to come to a conclusion when using inductive reasoning? Very simply, the conclusions in inductive reasoning are conclusions which conclude a theoretical realm and thus have no assumptions in them, since what would otherwise be an assumption, is used as a condition in the theory itself, as a result of this, by its very definition, a conclusion must be caused by something, that something is the evidence, thus, what can specifically be considered evidence for a particular event is very variable and may change as a result of any change in the setup of the event, it is not something fixed to the event but rather fixed to the mechanism by which the event may

operate. In the example of quantum-mechanics previously spoken of the mechanism by which the events operate is linked with it is not the electron itself that is used as evidence, but rather the light that bounces off it, as well as its interaction with the optical screen, as a result, an ambiguity arose where the collection of evidence affected the conclusion, this leads to the idea that the evidence for an event should not always be collected in a direct was, as this decreases the accuracy of the evidence and conclusion, an example of this may be a thermometer measuring the temperature of a cup of tea, since the thermometer is at a lower temperature than the tea, when it is put inside, the thermometer actually slightly decreases the temperature of the tea, thus making the conclusion inaccurate.

What I'm trying to say is that: in no situation is the statement: “ the production of knowledge requires accepting conclusions that go beyond the evidence provided for them” true, however, what does happen is that the pieces of knowledge which may qualify as evidence may change depending on the situation, whether the situation is real, theoretical, or fictional. The evidence is always, and always will be present in some form whether direct or indirect. This evidence must be presented in order for a conclusion to truly be conclusive. The word “requires” suggests that there are situations in which a conclusion can be assumed to be true without there being any reason for it to be true, this is logically incoherent, suggesting that the statement is not true and that all conclusions need evidence to be provided for them in order for the conclusion to hold ground.

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BIBLIOGRAPHY

Bastien S; *Theory of Knowledge*; (Pearson education; 2008)

Freiberge M; *Schrödinger's equation — What is it?*; plus magazine; (https://plus.maths.org/content/schrodinger-1; 21/02/2019)