

## ARGUMENTS, COUNTERARGUMENTS, EVIDENCE, and EXAMPLES

The following as a set of thoughts and remark on the structure of arguments, along with evidence for them and examples designed to bring out their main features. The focus is on questions to do with the nature of scientific knowledge and scientific enquiry, some of the methods used, and the much more philosophical question of the relation between our knowledge of the world gained via science, and the world itself.

The main purpose of this exercise is to get you thinking about how to formulate your arguments. So this class will be somewhat open-ended, with lots of scope to add your ideas to what is written below.

We will look at the following questions:

1. Our sense impressions/experiences and the world they relate to.
2. The nature and structure of our scientific knowledge, and how these compare with other kinds of knowledge.
3. Nature of scientific enquiry – its methods and practices, and limitations – and how they compare with other kinds of enquiry.

### 1. EXPERIENCE and the REAL WORLD

The idea here is that I introduce an argument, and then try to pull it to pieces. This is a very useful exercise in trying to formulate arguments and counter-arguments, and to adduce evidence for or against them.

**ARGUMENT 1:** Suppose we argue that our sense impressions – which are a key component up our experience – are in some sense “real”. We want to argue this even if we accept that it is possible that everything we experience may be just dreams, or hallucinations; and even if we accept that we need to mix in an intrinsic mental component (ie., our experience is not just disorganized sense data, but is somehow organized and given a pattern by our mental faculties). Note that many have tried to argue this (eg., the empiricists).

**Remarks:** We can try putting together an argument there; and we can also try to find arguments that show this view to be incorrect. But for a question as abstract and general as this, it is terribly important to come up with examples and/or “thought experiments” designed to bring the main points out.

**Some examples/thought experiments:** Here are a few:

- The “malicious demon” of Descartes.
- A baby, whose sense impressions are still completely disorganized

- A creature very different from us – eg., an octopus (which is highly intelligent), or a bat, or an alien.
- A self-aware computer
- The “Matrix” (from the film), in which we and the world we experience are really just sub-routines.

Note some key features of these examples. They are designed to shoot down many of the assumptions we typically bring into discussions of general questions like this. They force us away from anthropocentric views or prejudices; and they force us to formulate arguments that are really general, by removing many of the unspoken and/or unquestioned assumptions we make when we argue carelessly. Essentially they take away many of the mental crutches we use in everyday thinking, and force us to think for ourselves, and re-examine many of our unquestioned assumptions.

Let’s see how someone might try to deal with these examples, bringing in arguments and counter-arguments:

The “malicious demon” of Descartes was one he used to great effect – this demon was at every turn trying to fool him into believing that he was indeed who he thought he was, that the world was exactly what it seems, and that everything was fine. But in reality this was all a fake world synthesized by the demon. So Descartes asks – is there *anything at all* that he could be sure of? The answer he gave – “*cogito ergo sum*” – is of course famous. Directly translated it reads “I think, therefore I am”, but what he meant by this was roughly the following: pretty much any thought or sense impression might be an illusion (I might have the experience of eating a tomato, but this could be nothing but an experience synthesized by devilish trickery); however this is one experience that can’t be faked. This is the experience that I am actually thinking. The idea is that it is self-contradictory to think that I am thinking if I am not.

A standard answer to this is to point out that there is a hidden assumption here – that there exists a “self” which is having these experiences – and that this can also be questioned. One could simply rewrite Descartes’s famous dictum as “there is a thought now, therefore I am”, which does not at all follow necessarily.

The idea of the example of the baby is that the sense-data are nothing but a completely jumbled mass, with no organization whatsoever – so that, eg., the visual impressions are nothing but disorganized random pattern of lights, which are eventually organized into what we call vision. This example apparently demonstrates the enormous role of our mental apparatus in producing what we call “visual input”, ie., the images we think we see.

The example of the octopus further reinforces this message. These animals are very intelligent and have, in experiments, shown remarkable problem-solving ability. Typically they use their highly developed visual and tactile senses in doing this. And yet it seems very unlikely that they think in a way remotely connected with how humans think. So what do they experience? Bats are also fairly intelligent and have the ability to navigate, at extremely high speed, as they fly, at a level far beyond human abilities – and yet this is done almost entirely through sound. It is hard to imagine the nature of their experiences. One can then simply postulate an alien intelligence and give it arbitrary sensory and mental powers – including the ability to sense and think about things that are in principle beyond humans (in the same way that, say, a colony of bacteria is unable to grasp or sense what we can, and indeed is utterly unaware that we even exist, and incapable of grasping what we are).

One can then go from this to the example of an incredibly powerful self-aware computer, and from there to the idea of the Matrix, a computer of such power that we are nothing but minor sub-routines in its functioning. This is Descartes’s demon with a vengeance – everything that “we” experience, including the idea that we ourselves exist, and think, and feel, and have experiences, is nothing but some feature of the programmes that

are running, reducible in the end to code. One can add here that in the sense that since, in this picture, we are merely a small part of the whole, the whole is for us in principle unknowable (cf. Godel).

One key thing to notice here is that we are dealing with a subject so abstract, in which we are trying to get “behind” everything we think we know, that we are forced to deal with “thought experiments” in place of “real” examples, simply because it is the “real” that is under question. Another thing to notice is that modern physics has been driven inexorably, in the last 100 yrs, to a view which endorses the idea that behind the simple façade of our sense experience is something utterly different. Plato would not have been surprised.

So then, if it is all so uncertain, how does science work at all? Why do experiments tell us anything? Let’s leave this question for the moment, and go to science itself.

**ARGUMENT 2:** Let us try to argue that (i) scientific enquiry is a special kind of enquiry, and that (ii) it is distinguished by certain features that make it special – these being

- Experiments and often special equipment or instruments are crucial to science. They serve to make discoveries of new phenomena or features of Nature, and also to test theories and suggest new ones.
- Theories typically involve some set of general principles or even “laws” which are supposed to govern a large variety of phenomena in the world.
- Theories can explain past experiments and predict the results of future ones.
- Theories can be verified or falsified by experiments.
- Experiments are usually quantitative, involving measurements of some sets of quantities, with a view to finding correlations or regularities in the results.
- Any experiment requires a large body of theory to formulate – so results which do not conform to predictions may test the theory they are supposed to be testing, or be showing that some other theory is incorrect.
- Theory and experiment work in symbiosis in science. Indeed, all experiment comes laden with theory, and all theory refers to some set of experiments (possible or actual). Or, as Kant said, “Experience without theory is blind, but theory without experience is mere intellectual play”

Now, this is an argument. The next thing you need to do is try and demolish it, with a combination of counterargument and examples. Let’s see what you can do!