

7. Our senses tell us that a table, for example, is a solid object; science tells us that the table is mostly empty space. Thus two sources of knowledge generate conflicting results. Can we reconcile such conflicts?
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Here we are presented with a situation where something is explained in two complete opposite ways, which seem to be equally convincing. No person with standard perceptual reactions (i.e. not a synaesthete or someone with a lack of proprioception) would doubt that a table is solid. Likewise scientists, especially physicists (here we need to specify science as natural science), would not doubt that a table is mostly empty space, because they believe that all atoms, which structure all mass (including tables), are mostly empty space themselves. On the surface, there seems to be little possible reconciliation between our senses (perception) and science (natural science). However we may pose systematic questions; Is there something wrong with one of the claims? Are they both false, or are they both true? Are we overly trusting our intuition and ignoring the existence of two seemingly opposite truths¹? With these questions and by looking at the conflict in different angles, it may be shown that the two claims aren't in fact opposing each other.

A person with standard perceptual reactions relies on sense perception (way of knowing) to conclude that a table is solid. By definition, perception is the awareness of things through our five senses; touch, sound, smell, sight and taste; and it is an indispensable way through which we experience the external world. Of these five senses, touch and sight provide us enough certainty that a table is solid. We can feel solidity in a table when we touch it with our hands, and we can also look with our eyes that our hands don't go through the table. However, this conclusion seems less convincing when one looks at the theory of perception and perceptual illusions.

Perception, in its essence, is the representation of information about the reality

¹ For the purpose of this essay, I am defining truth as a claim that can be verified empirically

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through our neural system, not reality itself.² This is significant problem in perception because representations can often be turn out to be false. These false representations can be seen in perceptual illusions. While the neural system may perceive the information correctly, the final picture of that information depends on the interpretation by the brain. In the process, the brain links missing parts or omits information, to make the final picture satisfy our expectations our intuition. For example, when one looks at a picture of two men of equal height at either side of an enlarging tunnel, the man at the far end of the tunnel seems to be larger than the other man. Here, the brain tries to make sense of objects at different distances by interpreting their relative sizes. Thus, it is a possibility that our senses are being fooled by an illusion to believe that a table is solid, when it is actually mostly empty space.

There are limitations in relying on perception also because our nerves and organs are only sensitive to a limited spectrum of information. The colors we see – i.e. visible light – are simply electromagnetic waves in a given range of wavelengths. In fact, there is a whole scope of other waves that exist; e.g. ultra violet light that bees see, or infrared radiation that snakes perceive. Hence the information we perceive through our senses is only a fraction of the absolute reality, just like the old Chinese proverb states; “Two thirds of what we see is behind our eyes.”³ If we developed more complex senses, could we be feeling emptiness in a table rather than solidity?

Natural science is similar to perception for the fact that both are empirical knowledge (knowledge that comes from our experience of the world through the five senses); i.e. the observations, investigations and experiments that scientists undertake,

² Philosophy Online. 2 Mar. 2008 <<http://www.philosophyonline.co.uk/tok/perception5.htm>>.

³ Richard van de Lagemaat. Theory of Knowledge for the IB diploma. Cambridge: Cambridge University Press, 2005. p. 85

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are based on empiricism. A factor that distinguishes natural science from perception would be that the knowledge acquisition in the natural science is more indirect and sophisticated. Scientists observe and investigate a number of samples, using precise instruments, and incorporate logic or mathematical formulae to derive generalizations. Such sophistication enables natural sciences to unveil the complex truths of our universe.

However the natural sciences also holds several flaws. Firstly there is a problem with induction - i.e. drawing a generalization from a selected sample. For example, physicists believe that a table (or all mass) is mostly empty space on the basis of Rutherford's gold foil experiment. This experiment demonstrated that when small particles (alpha particles) are accelerated toward a gold foil, a majority of them went through the foil with little deflection. Although we may be certain that the gold foils are mostly empty space, it doesn't show if tables or other mass are mostly empty space also. Secondly, if there is a problem with perception, it means that there is a problem with empiricism, which in turn, means that there is a problem with the natural science which bases itself on induction.

Due to the problems discussed about perception and natural science, one has many reasons to reject the knowledge acquired from them. Nevertheless the claims from the two sources of knowledge seem to be true when we apply them to certain "tests of truth"; the correspondence, pragmatic and coherence theories. Firstly, saying that a table is solid satisfies the correspondence theory, because we can confirm with our senses that it corresponds to reality. The same claim also satisfies the pragmatic theory because the results drawn from it are pragmatic in reality; e.g. because the table is solid, it holds a cup and doesn't let it fall through to crash on the ground. Thirdly, the claim that a table

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is mostly empty space satisfies the coherence theory, because what is known in atomic physics or in other areas of science, demonstrate that all mass is mostly empty space.

Under these circumstances – given the highly level of certainty that the two knowledge claims are true – one may question if language is causing the conflict between the two conclusions? Language enables human beings to communicate their thoughts, ideas, and emotions and to reach the utmost intellectual capacity. However, language may also be a source of miscommunication, because our interpretations or definitions or certain words can vary from people to people. A general description of solidity would be; an object that feels hard. This is not so different from the scientific definition of solidity which states that solidity is mass in which the constituent atoms and molecules are aligned in a fixed position relative to each other, with some vibration. In such case, the force of the bonds keeps the rigid shape; and when one touches an object with one's hand, the electric repulsion gives a "hard sensation" to the nerves. Hence, if we apply the scientific definition of solidity, a table can be both solid and mostly empty space. Consider the Sydney Harbor Bridge or the Eiffel Tower; although both of these architectures seem to be full of holes and empty space, they have a solid shape and a rigid structure.

All along this essay, I have tried to reconcile two seemingly opposite conclusions. But then, is this reconciliation all that necessary? Here is a quote by the physicist Niels Bohr (important contributor to today's quantum physics); "the opposite of a fact is falsehood, but the opposite of one profound truth may very well be another profound truth."⁴ This quote states that there can be two truths for one situation. This

⁴ "Quantum Physics: Niels Bohr." On Truth and Reality. 3 Mar. 2008 <<http://www.spaceandmotion.com/quantum-physics-niels-bohr-quotes.htm>>.

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theory exists in quantum mechanics (a field of study in physics) where physicists claim the existence of a cat state; a cat can be alive and dead simultaneously; a particle could be at two different places, or up and down, or moving clockwise and anticlockwise at the same time.⁵ This cat state, or the existence of two seemingly opposite truths, still remains as a theory. Nevertheless, if two different realities do exist simultaneously, there would be no need to reconcile the claim that a table is solid or mostly empty space.

What about perspective? It is possible that the same reality is interpreted differently. This is true with human beings; the way different people view a situation can vary greatly, as everyone has a different life experience, culture, character and intellectual capacity. William Blake once said, "A fool sees not the same tree as a wise man sees."⁶ This disparity in perspective doesn't only apply to different people but also applies to different sources of knowledge. As shown through the previous explanation of language and definition of solidity, perception and the natural sciences only appear to conflict because of their context. Another example of the conflict between two different sources of knowledge would be the conflict between math and intuition. According to math, the number 0.999999.... (continuing to infinity), is equal to 1. On the other hand, our intuition tells us that this number will never equal 1. These conflicts occur, simply because different sources of knowledge hold different values.

After all this discussion, a fair reconciliation has been made between the claims of the two sources of knowledge. Although both perception and natural science hold problems, we can have a high level of certainty that the two knowledge claims are true. Under these circumstances, we saw that the terminology of "solidity" was causing

⁵ Dennis Overbye. "Quantum Trickery: Testing Einstein's Strangest Theory." New York Times 27 Dec. 2005. 4 Mar. 2008 <http://www.nytimes.com/2005/12/27/science/27eins.html?_r=1&oref=slogin>.

⁶ Lagemaat, p. 85.

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confusion, when actually the two claims were saying the same thing. Also, it seems unnecessary to reconcile the two claims as “the opposite of one profound truth may very well be another profound truth.” And most importantly, assertions from different sources of knowledge would always hold some conflict because of the difference in perspective and the values that each source of knowledge holds. With these explanations, the conflict between perception and natural science, no longer seems to be a dilemma.

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