IB TOK **Sir Arthur Eddington's Ichthyologist**

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1. In our quest for knowledge, humans use various tools or "nets" to selectively filter pieces of information which can be considered knowledge, and which cannot. In the physical sciences particularly, this "net" is nothing but our sensory and intellectual equipment. More specifically, we humans use our perception and our observational skills to acquire knowledge. This is true for the common physical sciences. However, when we go to look at the human sciences, we find that we use certain other tools besides sensory perception to acquire knowledge.

   The "net" in the ichthyologist's analogy serves two purposes. One is to selectively filter and be left with "knowledge" — much like a fishing net. The other purpose—most often seen used in the physical sciences—is to selectively filter *out* unnecessary information, much like a tea strainer. Organized repetition of this process leaves us with useful knowledge *sans the extra miscellany.* It is not new that a physical science experiment can be considered successful if it has managed to simply disprove wrong hypotheses. The fact that the "net" can be used to get rid of unwanted or irrelevant information is easily overlooked in the human sciences. The human sciences therefore use a much specialized "net" — one that can filter both ways. Still, most of the features of the physical science net remain the same. Data collection, observation, analysis, interpretation, experimentation, etc. are common features of the "net" for both the human sciences and the physical sciences.

   This being said, we probably have more intricate weaving in our human sciences net. There is a bit of a lay-by in the human sciences, because, after all, human are studying humans. In the human sciences, intuition plays a major role in determining results and forming conclusions. Would intuition work in a similar way in the physical sciences? I don't think so. Newton could certainly not have explained his revolutionary ideas claiming that his intuition told him so. He had to present some concrete evidence. Intuition is therefore not an accepted source of knowledge in the physical sciences. The net for human sciences is therefore much broader when the respective nets are juxtaposed. Although this broadness exists, can it be said with certainty that the net will come up with the same catch each time it is put to use?

4. If we were to go fishing with the same net the next day around, would we catch the same fish? We might catch the same *kind* of fish in the same area, but not the same fish. The same is true for knowledge. Each time we use our senses, there is going to be some variation in the knowledge we obtain. Another scientist may use *his* net, and come up with results that are very similar to that of mine, but probably not exactly the same. This kind of experience is more evident in the human sciences when compared to the physical sciences. Consider going

fishing with the same net 10 years from now. The net has turned rusty, and the sea creatures caught are now less than 5 inches long. The same analogy applies to knowledge too.

The importance of our knowledge withstanding the ultimate test of time is more of importance in the physical sciences, than is in the human sciences. If the ichthyologist's net was specially designed to catch fish *only* greater than 2 inches, the net will only catch sea creatures larger than 2 inches, no matter how hard he tries or how frequently he tries. This is a problem of the net, not of the catch. The exception, therefore, is that our "net" or our senses may not be of top-notch quality or may not be adapted well enough to withstand the test of time.

However, this is not to say that it is then of no use to try to maintain consistency in results. The defining characteristic of science, after all, is that experiments can be repeated however often, and scientists should come up with if not same, at least similar results. This is particularly important in the concrete physical sciences. But it is also equally important to keep in mind that tomorrow, our future generations' sensory organs may be better-developed through evolutionary processes. Or tomorrow, they might be able to build improved technology to assist their perception Al and intellectual equipment.

The human sciences are a different case altogether. Take the political sciences for instance: the laws that govern the body of political science may not hold true a couple of years from today. Trends are changing, and new laws are being developed over previous ones. In the context of human sciences therefore, the knowledge gained need not necessarily be consistent over an extended period of time. But for the immediate present, yes. Besides the two types of "nets" that we've seen, are there any further "nets" used to acquire knowledge?

2. The "net" itself is a simple metaphor for our sensory and intellectual skills and equipment. Intuition is a special net that I've already discussed. In addition to this, there are a myriad other "nets" commonly used in various areas of knowledge. Sometimes, knowledge isn't as easy to obtain in certain fields, as is possible in the physical sciences. Such metaphysical knowledge derived from abstract reasoning can only be obtained by using a more sophisticated net. There are a variety of nets out there, and most nets share common features and tasks. The nets, nevertheless, are particularly designed to serve one specific purpose — to gain a specific kind of knowledge which would otherwise be impossible to acquire through the use of conventional physical or human science nets.

   Can imagination constitute as a source of knowledge? Perhaps not in the sciences, but certainly in the field of arts. Imagination opens a whole new realm for knowledge seekers. The two specialized nets—intuition and imagination namely—are difficult to use, as they add another layer of complexity. However, problems with these nets are unavoidable, and certain problems are harder to rectify than it is with the use of physical science nets.

   Because of the complexity of these specialized nets, they are able to selectively filter only a reserved set of knowledge. It would thus be wrong to assume that what is not possible to be caught with this new net cannot be classified as knowledge. "Is what my net cannot catch not fish?"

5. If the so-called "nets" are designed to serve a specific purpose, then the chances of it not being able to filter a vast majority of information is considerably high. Take imagination for example — it is not usually possible to gain a certain type of knowledge using the 'imagination net', but can be easily gained by means of our sense organs. Knowledge that cannot be obtained with

our 'imagination net' cannot therefore be readily classified as "rubbish from the wilderness." There might be some essence to it, when observed with new eyes. The converse stands true too. What cannot be observed with a simple 10x microscope, can be observed with much finer detail using a 40x microscope.

However, there is catch to this situation. In the physical sciences, scientists cannot accept an idea or a fact to be true, unless they can observe and experiment with it. And in order to observe and experiment, it must be possible to perceive it with one's senses. What is it that separates knowledge from data? If the act of perceiving knowledge is not possible, then the collected data cannot be categorized as knowledge. This does not, however, rule out the fact that such data cannot be knowledge at all. We need to observe the same data with different kinds of "nets" to see if we can see something different.

This brings us back to the question as to whether knowledge that couldn't be perceived and classified is allowed in sciences other than the physical sciences.

3. Concrete natural sciences play a fundamental role in our understanding and acquisition of knowledge. There is nothing surprising about that. Physics, in general, requires careful observation. But most of these observations are made through our senses. If for some reason, our senses aren't capable or aren't adapted properly enough to filter out knowledge from the vastness, then the probable knowledge tends to be rejected by the community, as no further investigation can be conducted. Intellectual capacity is another hindrance to the physical sciences. "Anything uncatchable by my net is *ipso facto* outside the scope of ichthyological knowledge." Surely enough, valid physical science can arise only if it can be obtained by observation.

   But where do all the rejected garbage go? Out of this large dump, there is a very large probability that some useful knowledge does indeed exist, and can be put to effective use in areas other than the physical sciences. The human sciences is a prime candidate for this. And so is the arts, or any creative science for that matter. This is possible because, for example, history deals with unique and unrepeatable events. But there are certain epistemological problems that need to kept in mind when using such non-observational or supposed knowledge. At times, general modifications may be deemed necessary. For example, astrological sciences are rarely observed with the senses; but a large part of its foundation is built using the unproved theories proposed by an astronomist or astrophysicist.

   Conjectures which have thus been rejected to be out of the scope of the physical sciences, do have a choice to be re-studied in other areas of knowledge. Sometimes, this 'other area' may be a different form of science other than a physical science such as the human sciences, or may be of a different category altogether, such as an art — the architectural sciences or the entertainment sciences, or for all we might know, it may even be the study of knowledge itself.

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