As you know, the Institute for Advanced Physics is tackling the core of our deep cultural problems, which is our science not being clearly grounded in the principles that every child knows. IAP is repairing the core of our culture by grounding its core thinking, modern science, in our knowledge of the physical things that we know directly through our senses. To give people insight into this deep need (which is currently only addressed by IAP), Dr. Rizzi here addresses the core of a question that has been in the news. *(This article may not be reprinted without written permission from the author.)*

Complexity versus Simplicity: Richard Dawkins, IAP Members, and Ourselves

by Anthony Rizzi, IAP

Most people's understanding of complexity and simplicity is fundamentally confused. Richard Dawkins reveals this confusion when he claims that "…a God capable of designing the universe, or anything else, would have to be complex..."[1,2] Leaving aside the core of Dawkins' argument, which follows (along with many of his opponents) the mistaken route of William Paley (1743-1805AD), this line of argument would block a central principle[3] in the proofs of God's existence. This thinking is not, as many might believe, a function of Dawkins' atheism, but of a cause that affects us all, namely the ungroundedness of our *scientia*, our knowledge. Because we all grow up in and live and breathe the modern scientific worldview, we, at some level, are all confused in ways that people who lived before the scientific revolution did not have to worry about.

The misunderstanding implicit in Dawkins' statement is sometimes made evident to IAP's faculty as they teach our new members (all IAP members have to complete some course work to learn the fundamentals that everyone's education leaves out and to begin the requisite integration of these fundamentals into their thinking). What is incorrect about Dawkins' usage and some of our members' spontaneous usage?

As with nearly all such confusions, distinctions need to be made in order to answer this question. Indeed, many arguments arise from *not* making proper distinctions. There are two different senses of complexity. The one that is almost universally used is the complexity of parts. We say a computer is very complex, while a block of silicon is not. In this sense, complexity has to do mainly with quantity, i.e., parts one next to another in a whole. The dominance of this definition is not a random accident but arises because mathematics, which studies quantity, is at the heart of the modern scientific method. It is very natural for a culture built on modern science to think of everything in terms of quantity. Thus, it is very natural for us to think of complexity as an arrangement of extended parts as it is very natural for us to think in terms of extension, that is, in terms of physical parts one next to another.

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[1] Page 183 of Dawkins' book "*The God Delusion*"

[2] There is more to say given that this quote comes in a larger context that would further make the point that those on *all sides* of current debates need to return to first principles, but addressing this larger context is outside the intent of this article.

[3] For those who know the vocabulary (which is not necessary to understand this article), I note that, technically, the line of thinking in the quote does not correctly keep the distinction between formal and material causes.

However, even though our deeply ingrained habits of focusing our attention on quantity and rules dealing with quantity make us seldom consider it, there is another meaning of complexity. Something is complex if it is hard to understand. It is simple if I can understand it with ease. More precisely, a thing is simpler when it is more intelligible, more understandable in itself, not necessarily just to us. But, we, of course, start with what is commensurate with our understanding to see what we mean by intelligibility, i.e. understandability.

When is something simple to understand? Well, it depends on how much we know and how much time we have spent trying to understand it. What I'm talking about here is after we have put in all the time and thought required to understand something. Only after we have invested a sufficient amount of time and thought can we say whether something is really simple or not. To a child everything appears complex, even basic addition. However, the first time a child really understands 1+1=2, he sees it is very simple. When I understand what an ordinary plant is generally, i.e. a living thing that doesn't have senses, it is simple. Again, it is simple in terms of its single existence as a substance able to grow and take nourishment, not in how its cells, i.e. its main *parts*, act so as to keep it alive. By contrast, no matter how I try to think about a handful of randomly collected rocks, it will always seem complex, because there is no internal unifying principle making them one existing thing. So, from the point of view of the unifying principle of a thing, or "what the thing is in itself," a plant is simpler than a pile of rocks. This is true even though the pile of rocks has a less complex arrangement of its parts. The pile itself has no internal unifying principle; it's a bunch of separate things. The rocks, for example, could be different sizes and shapes and still be "a pile." Or again, the rocks could be stacked totally differently and still be a pile. The rocks of the pile are not coordinated by an *internal* principle to act together as whole, but are rather simply many substances in a certain region. So, we can say a thing (or, by analogy, a system of things) is simpler than another in two different ways:

1) When it has an internal unifying principle. The more complete the unification, the simpler the thing is. In *this* sense, a plant is simpler than a pile of rocks, which has no internal unifying principle.
2) When it has only a few and/or a not very elaborately arranged and interconnected system of parts. In this sense, a pile of rocks is simpler than a plant.

Returning to our two definitions above, notice that, though we introduced the second meaning first, it really is the less important of the two. The first meaning of complexity, since it directly pertains to the essence of the thing, is the most important. Of course, simplicity is the opposite of complexity, so we can talk in terms of either. For example, we can say X is simple, or X is not complex. However, given the primacy of the first definition listed above, simplicity is the primary concept. Simple things are more unified, have more to them. Thus, in the first sense, we say a squirrel is simpler than a rock. We could express this in a different way. A squirrel has higher level of existence than a rock. Now, this is where many people would like to think that higher equals more complex. They would like to say a squirrel is only higher because it has a more complex relation between its parts than a rock. For physical things, it is true that the higher they are, the more complex they are in the second sense of the word. However, having recognized ***only*** the second definition of complexity, which is in a sense inversely related

to the first, they then must conclude that spiritual things, such as God, that cause the complex arrangement of parts that we see must be even more complex.

In fact, because a squirrel is alive and has sense knowledge, it is more unified than a rock. And, because a man has a mind, he is more unified than an animal, which only has sense-type knowing. That is, because he has a mind and a will, a man has a qualitatively higher level of control of himself than does an animal, which simply responds by instinct. This means a man is simpler, in the first sense of the word, than an animal. God (who must exist to account for the physical things, including man, that can change and thus cannot account for their own existence[4]) has to be even simpler (first sense) than a man. These crucial facts are not directly addressed by the second definition; they relate to the primary definition of simplicity.

Notice again that if we were to follow the second definition, we would have to conclude God is more complex than man! This path fails because, having to do with the arrangement of parts, it focuses on the parts not the whole. The parts as such have more to do with what the thing can become than what it is. It is by taking the thing a-part that we make it into something else. Having no parts either one outside the next that is involved in height, width and length or in any other way, God is completely simple. He is completely one lacking nothing and thus having no tendency to be other than He is. Indeed, notice that God cannot be said to be complex (or simple) in the *second* sense because He has no extension and thus the second definition ceases to have any meaning.

Now, the first sense of simplicity has *not* been totally lost. Physicists use the first sense in an analogical way. We will often say, for example, that Einstein's Theory of Relativity is simple, and this is some of the evidence for its truth. Well, anyone who has worked with the myriad symbols and equations that come out of that theory would dispute this from the point of view of the second definition. However, once one *understands* the equations and their theoretical context, their simplicity in the first sense shines clearly. The theory has a tight logical coherence.

Notice how, in our analysis of simplicity and complexity, we started from physical things that we see and did not use advanced notions in science. We started with ordinary things that we know; we started with ordinary thinking and made it more precise by making the right distinctions. This is what needs to be done to all of our thinking in order to recover from our current deep confusions.

I want to emphasize that this does not mean modern science is bad. In fact, it is very good, and we want people to realize how important it is. It is because of modern science's centrality to our thinking and growing in knowledge that it is so important that it be firmly grounded in its starting points in the things we know directly through the senses. If it is not, we will continue to generate false conundrums that will contaminate our ability to think and make good decisions.

[4] See chapter 8 of my *The Science Before Science: A Guide to Thinking in the 21st Century*.