What about 'information'?

In some quarters, 'information' seems to be a magical word: Intelligent Design proponent Bill Dembski, for example, keeps repeating that evolutionary theory cannot explain the production of new information; mind-body dualists of every stripe declare the death of 'materialism' on the basis of the idea that information is neither matter nor energy; and, of course, singularitarians and transhumanists think that the key to immortality is to 'upload' our consciousness to a computer because, after all, what is human consciousness other than information?

There are many technical definitions of information. Perhaps the most commonly cited is that of Claude Shannon (1916–2001), which is related to the physical concept of entropy. At the most basic level, however, in order to talk meaningfully about information there has to be either an organism or a man-made device involved. For instance, when we say that plants act on information about the position of the sun to orient their leaves, or that DNA carries information from one generation to another, or that a satellite in orbit gathers information about the weather, we mean that there is a causal input of some sort that interacts with a receiver of a given type.

Another way to put this is that information is any type of pattern of matter and/or energy that causes or contributes to causing the formation or transformation of other patterns. Again, think of the examples above: the light falling on the plant (energy) alters the orientation of the leaves (matter); the DNA carried by germ cells (matter) contributes to the formation of a new organism in the next generation (matter); and the photographs taken by a satellite (either energy or matter), depending on the medium used to record them, influence whether you will pick up an umbrella (matter) on your way out the door.

If we see information in this way, there is no requirement for a conscious mind to interpret it. Neither plants nor DNA are conscious;

nor the satellite, although of course it was put together by conscious beings.

What, then, is the difference between possessing or not possessing consciousness in the process? The involvement of consciousness transforms information from the neutral sense of the word into knowledge, or 'understanding'. Plants and pieces of DNA have no knowledge of things; only humans and other relevantly similar conscious beings have knowledge. Of course, one can say that plants 'know' where to turn their leaves for light, but my point is that they do not; their response to the information is the result of natural selection to increase their chances of surviving and reproducing.

While Shannon-type information theory tells us that information cannot be destroyed without increasing the entropy of a given system, the analysis above suggests the philosophical point that information is a type of energy/matter. That being the case, there is nothing mystical about information, and the concept cannot therefore be invoked as a way to defeat materialism.

As for the claims that Dembski and others make about information and evolutionary theory, it is well understood that biological information of the type stored in DNA is created and destroyed all the time. Destruction comes, for instance, with the death of a given organism—which, accordingly, corresponds to a sudden increase in the entropy level of that organism. Creation and change of information occur every time there is a mutation in DNA, that is, a random alteration to the structure of the molecule. Again, nothing magical is going on, and there is certainly no need for conscious agents to be involved—be they supernatural or otherwise. It is, of course, perfectly possible for a conscious agent to alter genetic information: it is called genetic engineering, and we do it all the time.

What about the possibility of uploading one's consciousness to a computer? My objections to that notion have been detailed elsewhere (bloggingheads.tv/

diavlogs/28165). Briefly, though, I think the burden of proof is on the singularitarians and transhumanists to show that consciousness is entirely a matter of logical inputs and outputs of the type that can be simulated—at least in principle—by a computer. Like philosopher John Searle (plato.stanford.edu/entries/chinese-room/), I think it is more reasonable to consider consciousness as a biological phenomenon akin to, say, photosynthesis: something that does have a logical structure, but that also requires certain kinds of substrate to actually work. You can certainly simulate photosynthesis with a computer, but you are not going to get sugar out of it. I would note in passing that, as Searle pointed out, if one thinks that consciousness can be uploaded, one is committed to a type of dualism—something that singularitarians profess to abhor—because one is assuming that the 'stuff of thought' is independent from the 'stuff of brains'. It should go without saying that this is absolutely not an argument against artificial intelligence (AI) *tout court*, only against the particular type of AI represented by the strong AI programme.

To recap: information is not a third type of thing outside matter and energy—which are, of course, just two aspects of the same type of thing—and it therefore poses no problem to materialism. Also, talk of information does not require the presence or involvement of conscious minds, unless one wishes to talk about knowledge—the latter being a fairly uncontroversial and utterly non-mystical concept.

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