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Figments of Reality

by Ian Stewart and Jack Cohen

How did the animal that we used to be develop into the creature that we now are? This is the central question that Ian Stewart and Jack Cohen pose and address.

It is an ancient puzzle, and one that becomes, if anything, even more baffling as the years roll by. We are considering it at a time when human evolution seems effectively to have ceased, at least in a physical sense. Indeed, we may even be witnessing some degree of deterioration as increases in the general standard of living and advances in medicine combine to ensure that it is no longer just the fittest that survive and breed. The puzzle is many-faceted. There is not just the how and why of our conscious self-awareness. There is also the question of why the brain with which we are equipped seems to be so extraordinarily over-designed, compared to what one imagines would have been needed during our final stages of positive evolution as hunter-gatherers. What conceivable advantage can it have been to our remote forbears, during this evolutionary era, to possess brains able, in principle, to create and grapple with general relativity and quantum mechanics? How can it possibly have helped them that their brains would have been able, in principle, to appreciate the writings of Shakespeare or Bunin, or the late Beethoven quartets? Why should a brain of this complexity and flexibility have evolved? At first sight such a development would seem highly improbable, especially given the huge physiological demands made by the human brain in terms of resources.

Although this is a long book, the answer offered by the authors can be stated succinctly. It is that the human brain and human culture evolved together, through an interactive process that they refer to as “complicity”.

The word culture is taken here in its widest sense, including language and everything else that a new person needs to be taught, from babyhood onwards, in order to become a full-blown human. Culture is an essential component of what the authors call a “make-a-human kit”. Without it, you do not get a fully human being: children brought up by animals, without contact with other humans to beyond the age of about 12, are then incapable of learning to talk or to understand speech beyond the most rudimentary words and phrases.

Ian Stewart is a mathematician and Jack Cohen is a biologist, and they write very much from these two perspectives. They discuss reductionism at length and comment on the limitations of this approach to science. In arguing that the whole is often more than the sum of the parts, and in discussing emergent phenomena, they are on strong ground and speak good sense. But the extreme form of reductionism that they set up in order

to knock down is not one that would be recognized by many physicists. Consider, for example, the following passage about the song of a great tit –

The muscle movements required to produce that simple note are more intricately choreographed than *Sleeping Beauty* – every tiny muscle fibre must contract at the right moment. A vast, unfathomable sea of molecules sloshes around inside the bird’s body in unknown patterns to control those muscles. Electrical pulses flash along its neural pathways...

The sound radiates outwards, conveyed by vibrations in the air. The air exists because it condensed, along with everything else on the planet, from primeval dustclouds surrounding a nascent star...

and so on, for a page or more. It seems that the authors’ idea of reductionism is that one should be able to understand the tit’s “tweetle” in terms of events at the molecular level. But that is not at all how a physicist would be likely to think about such a problem.

Physicists are of course innately reductionist, in the sense that they try to describe observed phenomena in the simplest terms. To do so, they work at whatever is the appropriate level. For example, particle physicists are concerned with the inner structure of nucleons and sub-atomic particles; but a solid state physicist working mostly at the atomic or molecular or band-structure level, never has to worry about the structure of nucleons at all. Someone interested in celestial mechanics will be thinking of matter on an even larger scale. Yet physicists are always aware that the systems they treat as entities can (usually) be analysed at a deeper level although, in a given context, it may not be helpful to do so because it adds nothing to understanding. They are also well aware that reductionism tends to be unidirectional. Nobody would expect, for example, to be able to infer the discipline of chemistry just starting from a knowledge of sub-atomic particles – nor the possibility of a great tit from a knowledge of chemistry.

Naturally, in a book of this kind, the authors spend a fair amount of space on the mind/body relationship and the nature of consciousness. Even if they do not move the debate on very much further, what they have to say is interesting and perfectly reasonable. For example –

If there is a core message to *Figments*, then this is it. Our minds lead a dual existence. Descartes’ mistake was to view this as a duality of *materials*, which it is not: it is a duality of interpretations, just as a map can *be* a sheet of paper but *represent* a world. Features of the outside world are converted, via our senses, into “figments” in our brains. On one level (brain) these are

ordinary real-world processes involving chemicals, electrons, whatever; but simultaneously on another level (mind) they are mental maps of a very different order of reality, tigers and cows and people's faces.

Of course, this insight is of no help in understanding why the real-world events in question should give rise to the subjective phenomenon of mind. One may, of course, choose as an act of faith to accept this interpretation of the origin of mind. Do animals have minds? Those who work a lot with e.g. chimpanzees or dolphins seem confident that they do. But the authors make an interesting cautionary comment. The very act of working with these animals may in itself be creating minds where (little or) none existed before: the creatures are "uplifted" by their close contact with humans. Thus a chimpanzee who has been taught sign-language is in an important sense very different from a chimpanzee in the wild. If the evolution of intelligence and mind are, as the authors suggest, universal features of life wherever it is to be found, why is it only humans that have definitely achieved this state on earth? One possibility, of course, is that we exterminated all possible rivals, such as the Neanderthals – as so chillingly portrayed in Golding's *The Inheritors*.

This is a big book (324 pages, including the Index) that would, in my opinion, have benefitted from a bit of pruning. The subjects addressed are important and quite fascinating but the format, the whimsical style, and the (to me) over-exuberance of some of the verbosity, make the book rather tiring to read and difficult to take seriously. The problems with the format may not be entirely the authors' responsibility (they are perhaps not to be blamed for the footnotes being clumped in a ghetto at the end, rather than being placed conveniently at the bottoms of pages). Yet they have chosen to include dramatic interludes at intervals, mostly at the ends of chapters, that to my mind serve little useful purpose. They are apparently intended to liberate the authors' imagination "by having a standard mechanism for indulging in wild unbridled speculation". They consist of conversations between imaginary, intelligent, yellow, ostrich-like creatures that inhabit an imaginary planet called Zarathustra. Science fiction enthusiasts may possibly enjoy these interludes, but the present reviewer quickly became bored and irritated by the wasted space and consequent dilution of the main arguments and theme of the book. Above all, *Figments* comes over as a collection of digressions and anecdotes. Most are interesting, some are very funny, and there are only a few repetitions; but there are too many of them and it all seems rather self-indulgent. Lengthy diatribes are included, attacking people or organisations or procedures of which the authors disapprove. These include, for example, drunken drivers, the law, the criminal justice system, government officials, and the peer-review system for assessing research grant proposals. In some cases

the authorial censure is clearly merited, and in others probably not – but, in any case, many of the digressions are quite extraneous to the main thrust of the book, and a good editor would have excised them. Redundant material of this kind is nonetheless mostly good stuff, and could have formed the basis of several entertaining articles in popular science journals, some science fiction short stories, and numerous trenchantly expressed Letters to the Editor.

Figments deserves to be recommended to a wide readership. Some will be irritated by its format and style but, if they soldier on, they will surely end up enriched by much of what they find.

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