

EVOLUTION, SELF-DIRECTED NEUROPLASTICITY, AND QUANTUM ENTANGLEMENT

I recently took part in an [online discussion](#) regarding whether recent scientific discoveries about [self-directed neuroplasticity](#) and [quantum entanglement](#) might be relevant to the theory of evolution. Since I've written about these topics before, both in my books and in this blog, I've decided to weigh-in for what it's worth. Indeed, at first sight, [evolutionary biology](#) seems to have no relation with either entanglement or neuroplasticity. Yet, I will argue below that there is indeed a very rational and clear link.

Let us first look at self-directed neuroplasticity. [A book by UCLA Professor Dr. Jeffrey Schwartz](#) summarizes the results of his experiments with patients suffering from [Obsessive Compulsive Disorder](#) (OCD). See video above for an overview. The observations were that, through mindful meditation or other forms of self-directing one's intention and attention, *a patient could physically alter his or her brain* in such a way as to counter the OCD. At first sight, this may sound no more striking than our ability to physically alter our muscles by choosing to exercise more. But there is a crucial difference: When we choose to exercise, that choice is, supposedly, the deterministic result of electrochemical processes taking place inside the brain and affecting a system separate from the brain (i.e. muscles); no form of self-reference is entailed. But in self-directed neuroplasticity the brain supposedly changes itself; it "re-wires" itself. So if the original physical constitution of the brain was wired for OCD, and therefore physically bound to OCD, where do the degrees of freedom come from that allow for it to *intentionally* re-wire itself out of OCD? In a way, this sounds like pulling yourself up by your bootstraps; so *who* is doing the re-wiring if not the brain? The suggestion is thus that it is a form of immaterial mind doing it; a mind that has direct causal efficacy on the inner-workings of the brain. This is called "[downward causation](#)" in philosophy of mind. [Together with physicist Henry Stapp, Schwartz suggests that quantum wave-function collapse at the level of ion channels is the mechanism through which downward causation takes place in the brain.](#) But note: Self-directed neuroplasticity is an empirically observed phenomenon not in dispute; what is in dispute is whether it necessarily entails downward causation.

Now, let me make clear what I *am* and *am not* saying here. Personally, I find self-directed neuroplasticity indeed *highly suggestive* of downward causation. But I don't think it proves it. Indeed, as I wrote in [Rationalist Spirituality](#), self-directed neuroplasticity "suggests that consciousness ... is separate from, and can causally affect, brain functioning. Otherwise, how could something that is merely a result of brain activity choose to, and actually cause, a change in the very brain that generates it in the first place? That would be analogous to saying, for instance, that images of slides projected onto a screen could somehow choose and affect the inner-workings of the projector that generates them in the first place. The more technically astute reader may argue that ... the projector has a built-in digital camera focused on the images projected on the wall, and that the signals captured by the camera are wired directly into the inner mechanisms of the projector, thereby causally influencing its functionality. Strictly speaking, there is nothing illogical or inconceivable with this possibility, though it would require a surprisingly complex and global feedback mechanism in the brain that neuroscientists

today could not begin to explain.” Therefore, even though self-directed neuroplasticity, in my view, does not *prove* that mind is independent of the brain, it raises sufficiently difficult questions that it is certainly a legitimate point of debate.

What we need to do now is link downward causation to evolutionary biology. Indeed, an underlying premise of evolutionary biology is that, apart from the environment, genes are the only determinant of the survival fitness of organisms. By determining the anatomy, function, and behaviour of organisms, genes determine how effectively they survive and reproduce. Whether an organism has higher fitness because of an opposing thumb, or because its more sophisticated brain allows it to make more sound choices of action, it is the underlying genes that determine both characteristics. *If there were another determinant of survival fitness, then evolutionary lines would be (partially) determined by something other than the supposedly random mutations of genes.* This, if true, would contradict current thinking in evolutionary biology in a quite fundamental way.

Now, [we know that genes largely determine the anatomy and function of our brains](#), which in turn largely influence our survival fitness. We also know, experimentally, that self-directed neuroplasticity (whether it implies downward causation or not) can also determine the anatomy and function of our brains, thereby influencing our survival fitness in exactly the same manner as some genes. Therefore, *if* downward causation could be shown to be the causal factor behind self-directed neuroplasticity, *then* a new determinant of survival fitness would come into play. This new determinant would be a form of immaterial mind imbued with intention. If the intention of an immaterial mind could (partially) regulate survival fitness in a way that does not depend on genes, current thinking on evolutionary biology would indeed need to be fundamentally revised. For instance, it is conceivable that a sufferer of OCD would have lower survival fitness than someone not suffering from the condition. If downward causation through self-directed neuroplasticity (partially) corrected the OCD, the entire fitness equation would be changed for that individual in a way that transcends genetics.

Note that the anatomical or functional brain changes induced through self-directed neuroplasticity are [acquired characteristics](#) and, as such, not passed on through genes (unless [Rupert Sheldrake’s morphic resonance hypothesis](#) – see video above – is correct, in which case they could well be passed on). But the point is that these anatomical or functional brain changes, through altering the fitness equation, would influence how genes that potentially have nothing to do with the brain get passed on. For instance, even though someone cured of OCD through downward causation would still have the same “OCD genes” (in case these exist) in his or her genome, the individual’s *other* genes would stand a higher chance of being passed on after the cure. So downward causation would be an additional determinant of naturally selected genomic lines, in a way that is completely independent of genes themselves. This, if true, would bear relevance to the current thinking in evolutionary biology.

Now let us move on to the second point: quantum entanglement. [A paper published in Nature magazine in 2007](#), was highly suggestive that reality is *not* objective and separate

from mind the way we normally think. The scientists arrived at such conclusion through studying the phenomenon of quantum entanglement: two subatomic particles whose states remain correlated beyond space-time constraints (see video below). [This phenomenon has been experimentally observed since 1981](#), with the initial Aspect experiments in France. But for over 25 years two potential explanations were on the table: (a) that reality and mind were fundamentally intertwined; or (b) that the subatomic particles were somehow “spookily connected at a distance,” as Einstein put it. The relevance of the 2007 *Nature* paper is that it eliminated most versions of explanation (b). The issue is still under debate, but the paper does place the idea of [philosophical realism](#) – the assumption that matter and its arrangements are independent of mind – in a precarious position.

Now, how does this link with evolutionary biology? Well, it is an underlying premise of mainstream evolutionary science that minds *necessarily correlate* with nervous systems (many would even say that minds *are* nervous systems); in other words, that there can be no mind without a nervous system. [Recent studies indicate that the first precursors of nervous systems evolved some 600 million years ago](#). Since life had already been evolving for a couple of billion years before that, the implication is that much of evolution took place *before* there were nervous systems and, therefore, *before there were minds*. This requires that arrangements of matter not only existed but were also dynamically rearranging themselves for a few billion years before mind showed up. Such view of evolutionary history seems, at first sight, to be contradicted by the 2007 *Nature* paper. Therefore, the issue of quantum entanglement is indeed of relevance in a discussion about evolutionary biology.

Note that I am stating neither that (a) downward causation *does happen* in self-directed neuroplasticity; nor that (b) quantum entanglement observations *defeat with certainty* the idea of an objective reality independent of mind. What I *am* saying is that (a) there is enough scientific substance behind both hypotheses that they should be taken very seriously; and that (b) there are strong rational reasons to link these hypotheses to evolutionary biology.

My own views on evolution can be found in [this earlier article](#), as well as [this one](#).