

Let's Loosen Up Biological Thinking!

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Think of this brief “editorial” as the commentary piece that the editors of journals such as Nature, Science, and Cell cannot yet write due to the reigning taboo. Sooner or later, however—compelled by ever mounting biological evidence—they will write their own versions of this article.

Nine years ago Richard Conn Henry, an astrophysicist at Johns Hopkins University, published an opinion piece in *Nature* entitled “The Mental Universe.” He urged the scientific community to repeat Galileo’s achievement in “believing the unbelievable,” and recalled Sir James Jeans’ famous remark that “the Universe begins to look more like a great thought than like a great machine.” We don’t know all that this implies, he continued, “but—the great thing is—it is true . . . The Universe is immaterial—mental and spiritual. Live, and enjoy.”

The most dramatic thing about the article was the lack of drama: it produced no visible controversy. After all, physicists have long been accustomed to receive such assertions peaceably, because the science itself seems tolerant of them.

But suppose Henry had made a narrower and more modest claim—just a small part of what he implied in “The Mental Universe.” Suppose he had written only of “The Mental Cell.” Would the occasion have been equally unremarkable? Most molecular and cellular biologists, I suspect, will readily picture the unseemly consequences likely to follow upon the appearance of words like *immaterial*, *mental*, and *spiritual* in their published papers. It would be as if an unspoken taboo were violated.

It seems ironic. Physicists, students of the *inanimate*, have long been free to speak of mentality—for example, the mental activity of the observer in quantum experiments. Biologists, students of *life* (and, all too often, enviers of physics) have hardened in their resistance to such language.

Or have they? It depends on what you look for in their literature.

An outsider could be forgiven for thinking that the “mindful organism” is what biology is all about today. Even molecular biologists speak about sensing, signaling, and well-gauged responses. They describe calculation and the pursuit of ends; communication and the sharing of information; efficacious or harmful folding of proteins; correction of errors in DNA replication; and, more broadly, adaptation, behavior, and the performance of complex tasks such as cell division or RNA splicing.

Streams and volcanoes do not signal each other or correct errors, they do not respond to stimuli, and they do not carry out tasks. That the characteristic language of biology suggests some sort of mindfulness—for example, cognition and the purposeful or intentional coordination of means toward the achievement of ends—is not controversial. Any controversy has for several decades been stifled by a widespread expectation that the discomfiting language is somehow inessential and on its way to being “naturalized.”

Despite ongoing and even intensifying usage that seems to belie that expectation, a common line of thought runs this way: “Yes, there is an appearance of mindfulness in all organisms, but this is a *mere* appearance, or an *illusion*. And the explanation for the illusion is natural selection.” The idea is that variation plus selection results in adaptation, and adapted behavior possesses a functional effectiveness that looks *as if* it were mindfully guided.

Not all those who say such things would be willing to describe their own minds and intentions as illusions. But, in any case, we are left to wonder how an organism’s apparently purposeful activity is explained by similar activity in previous generations. Selection, after all, requires organisms that grow, develop, compete, prepare an inheritance, produce offspring, and otherwise pursue their seemingly intentional and well-directed lives, judiciously improvising all the way. These are the very activities that raise the *question* of mindfulness. So how does weaving the lives of many such organisms into the infinitely complex narratives of natural selection *explain* this mindfulness?

Many biologists are content to dismiss the problem with hand-waving: “When we wield the language of agency, we are speaking metaphorically, and we could just as well, if less conveniently, abandon the metaphors.”

Yet no scientist or philosopher has shown how this shift of language could be effected. And the fact of the matter is just obvious: the biologist who is not investigating how the organism *achieves* something in a well-directed way is not yet doing biology, as opposed to physics or chemistry. Is this in turn just hand-waving? Let the reader inclined to think so take up a challenge: pose a single topic for *biological* research, doing so in language that avoids all implication of agency, cognition, and purposiveness.¹

One reason this cannot be done is clear enough: molecular biology—the discipline that was finally going to reduce

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life unreservedly to mindless mechanism—is now posing its own severe challenges. In this era of Big Data, the message from every side concerns previously unimagined complexity, incessant cross-talk and intertwining pathways, wildly unexpected genomic performances, dynamic conformational changes involving proteins and their cooperative or antagonistic binding partners, pervasive multifunctionality, intricately directed behavior somehow arising from the interaction of countless players in interpenetrating networks, and opposite effects by the same molecules in slightly different contexts. The picture at the molecular level begins to look as lively and organic—and thoughtful—as life itself.

The hope—epitomized cleanly and algorithmically by “DNA makes RNA and RNA makes protein”—had been that, at the molecular level, we would find the unambiguous relationships, principles, and laws that explain all the complexities of the organism as a whole. Yet now the advice we hear is to step back and see larger wholes—functional modules, networks, and systems—in order to explain or make sense of isolated molecular dynamics. It is when we gain a little distance from the immediate causal interaction between a few entities and begin to survey *narrative* threads in a larger context and over time, that we begin to discern what seems (yes, even at the molecular scale) to be the *intentional* significance of what is going on.

There are, of course, biological disciplines where the challenge of the mindlike is taken up with great seriousness. Cognitive science—bringing together (at least) psychology, neuroscience, linguistics, artificial intelligence, philosophy, and anthropology—is a field upon which advocates of remarkably diverse points of view often joust in free and

bracing intellectual combat. One need only browse the *Journal of Consciousness Studies* to witness the creative ferment now attracting so many researchers.

How many molecular biologists today would feel such freedom—the kind of freedom Richard Conn Henry knew within the physics community? I mean, for example, the freedom to wonder aloud whether intention and agency, so difficult to banish from biological description, might be at least as fundamental to biological understanding as the local causal interactions we are so expert at fingering.

Why should the consideration of mindfulness, which presents such a vivid and stimulating conundrum to researchers in a number of respectable sciences, be absent from what are usually considered the core disciplines of biology? Perhaps most molecular, cellular, and evolutionary biologists are prepared to claim—despite their own heavy reliance upon a mentalese dialect, and despite all those kindred disciplines actively wrestling with the problem of mind—that the conundrum merely reflects an unusually persistent confusion that ought to be clarified once for all and dispensed with.

But if it's this simple, then why a silence that has all the appearance of being taboo-enforced? *Let the conversation begin!*

NOTE

1. Send your proposal to stevet@natureinstitute.org. I may not be able to respond personally, but you can be sure I will be taking up this matter in the future.

REFERENCE

Henry, Richard Conn (2005). “The Mental Universe,” *Nature* vol. 436 (July 7), p. 29. doi:10.1038/436029a