and ate them too. I ate the whole piece, and felt happy." This is how the novel ends—a madeleine with no memory. Instead of confirming Maroun's sense of a continuous self, stretching from the past into the present, it confines him to a blissful but claustrophobic now. Like its ancient model, Jaber's *Confessions* is an indictment of the very pleasures it so convincingly evokes.

For all their bad historical luck, the Lebanese, a small people surrounded by greedy neighbors, have been fortunate in their intellectuals. Jaber and Khoury, along with many others, lived in Beirut throughout its fifteen years of conflict and have refused to forget a war in which 250,000 people were killed and one million were forced out of the country. The Syrian civil war has been at least as deadly and disruptive in less than half the time. It has destroyed any number of cities, including some of the oldest and grandest in the world. One can only hope that when the war ends, if it ever does, there will be some artists and historians left with the courage to sift through the rubble. □

Is Consciousness an Illusion?

Thomas Nagel

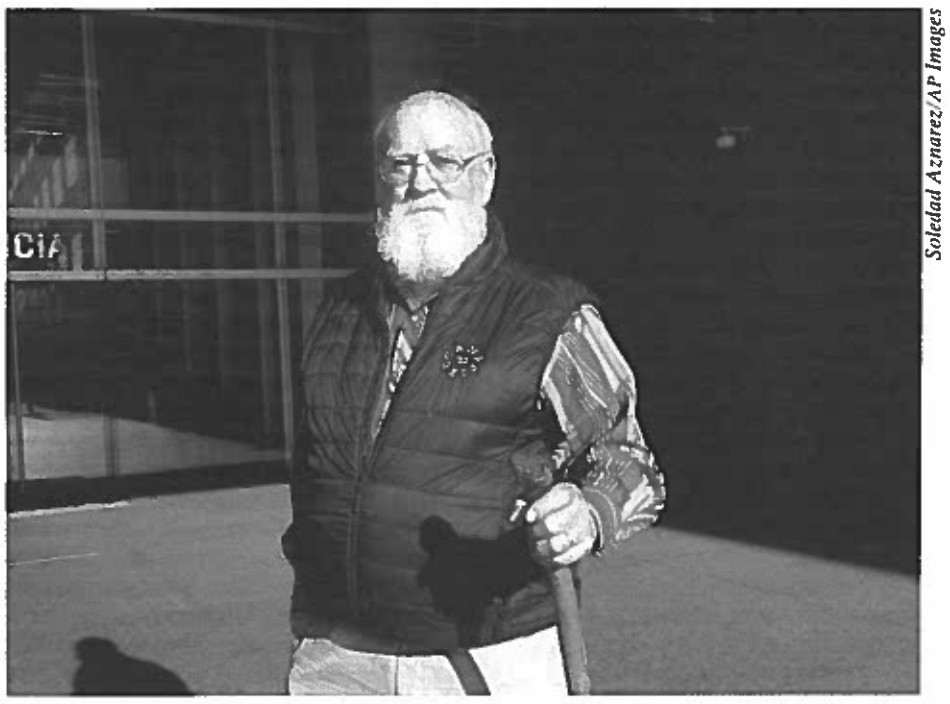
From Bacteria to Bach and Back: The Evolution of Minds
by Daniel C. Dennett.
Norton, 476 pp., $28.95

For fifty years the philosopher Daniel Dennett has been engaged in a grand project of disenchantment of the human world, using science to free us from what he deems illusions—illusions that are difficult to dislodge because they are so natural. In *From Bacteria to Bach and Back*, his eighteenth book (thirteenth as sole author), Dennett presents a valuable and typically lucid synthesis of his worldview. Though it is supported by reams of scientific data, he acknowledges that much of what he says is conjectural rather than proven, either empirically or philosophically.

Dennett is always good company. He has a gargantuan appetite for scientific knowledge, and is one of the best people I know at transmitting it and explaining its significance, clearly and without superficiality. He writes with wit and elegance; and in this book especially, though it is frankly partisan, he tries hard to grasp and defuse the sources of resistance to his point of view. He recognizes that some of what he asks us to believe is strongly counterintuitive. I shall explain eventually why I think the overall project cannot succeed, but first let me set out the argument, which contains much that is true and insightful.

The book has a historical structure, taking us from the prebiotic world to human minds and human civilization. It relies on different forms of evolution by natural selection, both biological and cultural, as its most important method of explanation. Dennett holds fast to the assumption that we are just physical objects and that any appearance to the contrary must be accounted for in a way that is consistent with this truth. Bach's or Picasso's creative genius, and our conscious experience of hearing Bach's Fourth Brandenburg Concerto or seeing Picasso's *Girl Before a Mirror*, all arose by a sequence of physical events beginning with the chemical composition of the earth's surface before the appearance of unicellular organisms. Dennett identifies two unsolved problems along this path: the origin of life at its beginning and the origin of human culture much more recently. But that is no reason not to speculate.

The task Dennett sets himself is framed by a famous distinction drawn by the philosopher Wilfrid Sellars between the "manifest image" and the "scientific image"—two ways of seeing the world we live in. According to the manifest image, Dennett writes, the world is



Soledad Aznarez/AP Images

Daniel Dennett at the Centro Cultural de la Ciencia, Buenos Aires, Argentina, June 2016

> full of other people, plants, and animals, furniture and houses and cars...and colors and rainbows and sunsets, and voices and haircuts, and home runs and dollars, and problems and opportunities and mistakes, among many other such things. These are the myriad "things" that are easy for us to recognize, point to, love or hate, and, in many cases, manipulate or even create.... It's the world according to *us*.

According to the scientific image, on the other hand, the world

> is populated with molecules, atoms, electrons, gravity, quarks, and who knows what else (dark energy, strings? branes?).

This, according to Dennett, is the world as it is in itself, not just for us, and the task is to explain scientifically how the world of molecules has come to include creatures like us, complex physical objects to whom everything, including they themselves, appears so different.

He greatly extends Sellars's point by observing that the concept of the manifest image can be generalized to apply not only to humans but to all other living beings, all the way down to bacteria. All organisms have biological sensors and physical reactions that allow them to detect and respond appropriately only to certain features of their environment—"affordances," Dennett calls them—that are nourishing, noxious, safe, dangerous, sources of energy or reproductive possibility, potential predators or prey.

For each type of organism, whether plant or animal, these are the things that define their world, that are salient and important for them; they can ignore the rest. Whatever the underlying physiological mechanisms, the content of the manifest image reveals itself in what the organisms do and how they react to their environment; it need not imply that the organisms are consciously aware of their surroundings. But in its earliest forms, it is the first step on the route to awareness.

The lengthy process of evolution that generates these results is first biological and then, in our case, cultural, and only at the very end is it guided partly by intelligent design, made possible by the unique capacities of the human mind and human civilization. But as Dennett says, the biosphere is saturated with design from the beginning—everything from the genetic code embodied in DNA to the metabolism of unicellular organisms to the operation of the human visual system—design that is not the product of intention and that does not depend on understanding.

One of Dennett's most important claims is that most of what we and our fellow organisms do to stay alive, cope with the world and one another, and reproduce is not understood by us or them. It is competence without comprehension. This is obviously true of organisms like bacteria and trees that have no comprehension at all, but it is equally true of creatures like us who comprehend a good deal. Most of what we do, and what our bodies do—digest a meal, move certain muscles to grasp a doorknob, or convert the impact of sound waves on our eardrums into meaningful sentences—is done for reasons that are not *our* reasons. Rather, they are what Dennett calls free-floating reasons, grounded in the pressures of natural selection that caused these behaviors and processes to become part of our repertoire. There are reasons why these patterns have emerged and survived, but we don't know those reasons, and we don't have to know them to display the competencies that allow us to function.

Nor do we have to understand the mechanisms that underlie those competencies. In an illuminating metaphor, Dennett asserts that the manifest image that depicts the world in which we live our everyday lives is composed of a set of user-illusions,

> like the ingenious user-illusion of click-and-drag icons, little tan folders into which files may be dropped, and the rest of the ever more familiar items on your computer's desktop. What is actually going on behind the desktop is mind-numbingly complicated, but users don't need to know about it, so intelligent interface designers have simplified the affordances, making them particularly salient for human eyes, and adding sound effects to help direct attention. Nothing compact and salient inside the computer corresponds to that little tan file-folder on the desktop screen.

He says that the manifest image of each species is "a user-illusion brilliantly designed by evolution to fit the needs of its users." In spite of the word "illusion" he doesn't wish simply to deny the reality of the things that compose the manifest image; the things we see and hear and interact with are "not *mere* fictions but different versions of what actually exists: real patterns." The underlying reality, however, what exists in itself and not just for us or for other creatures, is accurately represented only by the scientific image—ultimately in the language of physics, chemistry, molecular biology, and neurophysiology.

Our user-illusions were not, like the little icons on the desktop screen, created by an intelligent interface designer. Nearly all of them—such as our images of people, their faces, voices, and actions, the perception of some things as delicious or comfortable and others as disgusting or dangerous—are the products of "bottom-up" design, understandable through the theory of evolution by natural selection, rather than "top-down" design by an intelligent being. Darwin, in what Dennett

calls a "strange inversion of reasoning," showed us how to resist the intuitive tendency always to explain competence and design by intelligence, and how to replace it with explanation by natural selection, a mindless process of accidental variation, replication, and differential survival.

As for the underlying mechanisms, we now have a general idea of how they might work because of another strange inversion of reasoning, due to Alan Turing, the creator of the computer, who saw how a mindless machine could do arithmetic perfectly without knowing what it was doing. This can be applied to all kinds of calculation and procedural control, in natural as well as in artificial systems, so that their competence does not depend on comprehension. Dennett's claim is that when we put these two insights together, we see that

> *all* the brilliance and comprehension in the world arises ultimately out of uncomprehending competences compounded over time into ever more competent—and *hence* comprehending—systems. This is indeed a strange inversion, overthrowing the pre-Darwinian mind-first vision of Creation with a mind-*last* vision of the eventual evolution of us, intelligent designers at long last.

And he adds:

> Turing himself is one of the twigs on the Tree of Life, and his artifacts, concrete and abstract, are indirectly products of the blind Darwinian processes in the same way spider webs and beaver dams are....

Alan Turing

An essential, culminating stage of this process is cultural evolution, much of which, Dennett believes, is as uncomprehending as biological evolution. He quotes Peter Godfrey-Smith's definition, from which it is clear that the concept of evolution can apply more widely:

> Evolution by natural selection is change in a population due to (i) variation in the characteristics of members of the population, (ii) which causes different rates of reproduction, and (iii) which is heritable.

In the biological case, variation is caused by mutations in DNA, and it is heritable through reproduction, sexual or otherwise. But the same pattern applies to variation in behavior that is not genetically caused, and that is heritable only in the sense that other members of the population can copy it, whether it be a game, a word, a superstition, or a mode of dress.

This is the territory of what Richard Dawkins memorably christened "memes," and Dennett shows that the concept is genuinely useful in describing the formation and evolution of culture. He defines "memes" thus:

> They are a kind of *way of behaving* (roughly) that can be copied, transmitted, remembered, taught, shunned, denounced, brandished, ridiculed, parodied, censored, hallowed.

They include such things as the meme for wearing your baseball cap backward or for building an arch of a certain shape; but the best examples of memes are words. A word, like a virus, needs a host to reproduce, and it will survive only if it is eventually transmitted to other hosts, people who learn it by imitation:

> Like a virus, it is designed (by evolution, mainly) to provoke and enhance its own replication, and *every token it generates is one of its offspring*. The set of tokens descended from an ancestor token form a *type*, which is thus like a *species*.

The distinction between type and token comes from the philosophy of language: the word "tomato" is a type, of which any individual utterance or inscription or occurrence in thought is a token. The different tokens may be physically very different—you say "tomayto," I say "tomahto"—but what unites them is the perceptual capacity of different speakers to recognize them all as instances of the type. That is why people speaking the same language with different accents, or typing with different fonts, can understand each other.

A child picks up its native language without any comprehension of how it works. Dennett believes, plausibly, that language must have originated in an equally unplanned way, perhaps initially by the spontaneous attachment of sounds to prelinguistic thoughts. (And not only sounds but gestures: as Dennett observes, we find it very difficult to talk without moving our hands, an indication that the earliest language may have been partly nonvocal.) Eventually such memes coalesced to form languages as we know them, intricate structures with vast expressive capacity, shared by substantial populations.

Language permits us to transcend space and time by communicating about what is not present, to accumulate shared bodies of knowledge, and with writing to store them outside of individual minds, resulting in the vast body of collective knowledge and practice dispersed among many minds that constitutes civilization. Language also enables us to turn our attention to our own thoughts and develop them deliberately in the kind of top-down creativity characteristic of science, art, technology, and institutional design.

But such top-down research and development is possible only on a deep foundation of competence whose development was largely bottom-up, the result of cultural evolution by natural selection. Without denigrating the contributions of individual genius, Dennett urges us not to forget its indispensable precondition, the arms race over millennia of competing memes—exemplified by the essentially unplanned evolution, survival, and extinction of languages.

Of course the biological evolution of the human brain made all of this possible, together with some coevolution of brain and culture over the past 50,000 years, but at this point we can only speculate about what happened. Dennett cites recent research in support of the view that brain architecture is the product of bottom-up competition and coalition-formation among neurons—partly in response to the invasion of memes. But whatever the details, if Dennett is right that we are physical objects, it follows that all the capacities for understanding, all the values, perceptions, and thoughts that present us with the manifest image and allow us to form the scientific image, have their real existence as systems of representation in the central nervous system.

This brings us to the question of consciousness, on which Dennett holds a distinctive and openly paradoxical position. Our manifest image of the world and ourselves includes as a prominent part not only the physical body and central nervous system but our own consciousness with its elaborate features—sensory, emotional, and cognitive—as well as the consciousness of other humans and many nonhuman species. In keeping with his general view of the manifest image, Dennett holds that consciousness is not part of reality in the way the brain is. Rather, it is a particularly salient and convincing user-illusion, an illusion that is indispensable in our dealings with one another and in monitoring and managing ourselves, but an illusion nonetheless.

You may well ask how consciousness can be an illusion, since every illusion is itself a conscious experience—an appearance that doesn't correspond to reality. So it cannot appear to me that I am conscious though I am not: as Descartes famously observed, the reality of my own consciousness is the one thing I cannot be deluded about. The way Dennett avoids this apparent

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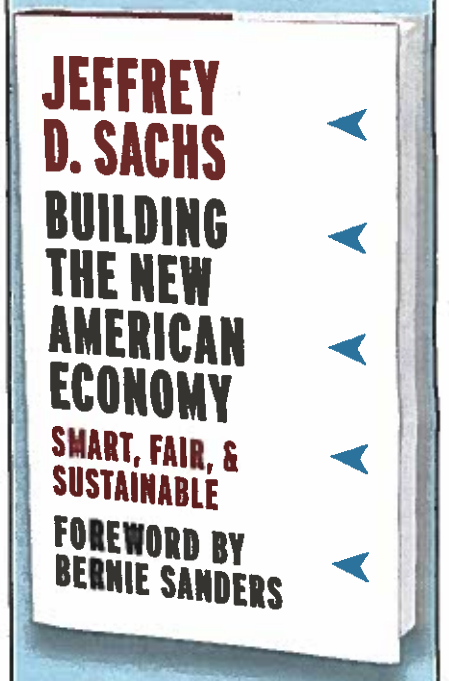

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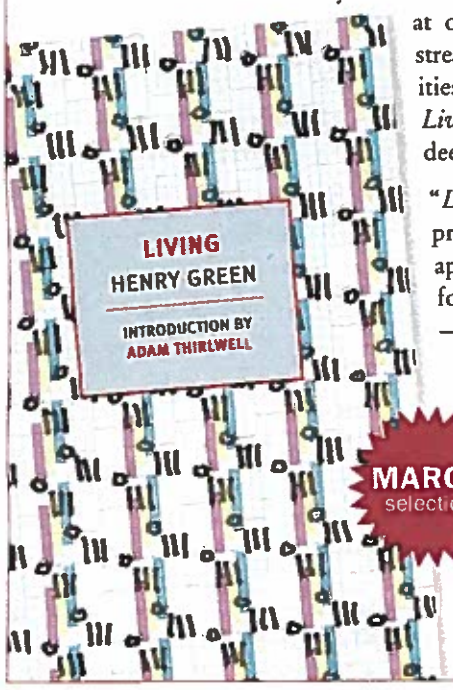

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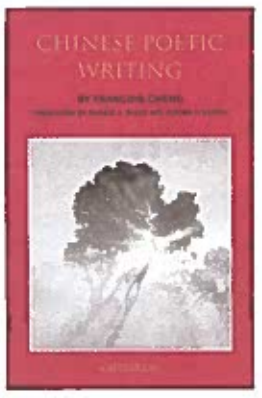

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contradiction takes us to the heart of his position, which is to deny the authority of the first-person perspective with regard to consciousness and the mind generally.

The view is so unnatural that it is hard to convey, but it has something in common with the behaviorism that was prevalent in psychology at the middle of the last century. Dennett believes that our conception of conscious creatures with subjective inner lives—which are not describable merely in physical terms—is a useful fiction that allows us to predict how those creatures will behave and to interact with them. He has coined the term "heterophenomenology" to describe the (strictly false) attribution each of us makes to others of an inner mental theater—full of sensory experiences of colors, shapes, tastes, sounds, images of furniture, landscapes, and so forth—that contains their representation of the world.

According to Dennett, however, the reality is that the representations that underlie human behavior are found in neural structures of which we know very little. And the same is true of the similar conception we have of our own minds. That conception does not capture an inner reality, but has arisen as a consequence of our need to communicate to others in rough and graspable fashion our various competencies and dispositions (and also, sometimes, to conceal them):

> Curiously, then, our *first-person* point of view of our own minds is not so different from our *second-person* point of view of others' minds: we don't see, or hear, or feel, the complicated neural machinery churning away in our brains but have to settle for an interpreted, digested version, a user-illusion that is so familiar to us that we take it not just for reality but also for the most indubitable and intimately known reality of all.

The trouble is that Dennett concludes not only that there is much more behind our behavioral competencies than is revealed to the first-person point of view—which is certainly true—but that *nothing whatever* is revealed to the first-person point of view but a "version" of the neural machinery. In other words, when I look at the American flag, it may seem to me that there are red stripes in my subjective visual field, but that is an illusion: the only reality, of which this is "an interpreted, digested version," is that a physical process I can't describe is going on in my visual cortex.

I am reminded of the Marx Brothers line: "Who are you going to believe, me or your lying eyes?" Dennett asks us to turn our backs on what is glaringly obvious—that in consciousness we are immediately aware of real subjective experiences of color, flavor, sound, touch, etc. that cannot be fully described in neural terms even though they have a neural cause (or perhaps have neural as well as experiential aspects). And he asks us to do this because the reality of such phenomena is incompatible with the scientific materialism that in his view sets the outer bounds of reality. He is, in Aristotle's words, "maintaining a thesis at all costs."

If I understand him, this requires us to interpret ourselves behavioristically: when it seems to me that I have a subjective conscious experience, that experience is just a belief, manifested in what I am inclined to say. According to Dennett, the red stripes that appear in my visual field when I look at the flag are just the "intentional object" of such a belief, as Santa Claus is the intentional object of a child's belief in Santa Claus. Neither of them is real. Recall that even trees and bacteria have a manifest image, which is to be understood through their outward behavior. The same, it turns out, is true of us: the manifest image is not an image after all.

There is no reason to go through such mental contortions in the name of science. The spectacular progress of the physical sciences since the seventeenth century was made possible by the exclusion of the mental from their purview. To say that there is more to reality than physics can account for is not a piece of mysticism: it is an acknowledgment that we are nowhere near a theory of everything, and that science will have to expand to accommodate facts of a kind fundamentally different from those that physics is designed to explain. It should not disturb us that this may have radical consequences, especially for Dennett's favorite natural science, biology: the theory of evolution, which in its current form is a purely physical theory, may have to incorporate nonphysical factors to account for consciousness, if consciousness is not, as he thinks, an illusion. Materialism remains a widespread view, but science does not progress by tailoring the data to fit a prevailing theory.

There is much in the book that I haven't discussed, about education, information theory, prebiotic chemistry, the analysis of meaning, the psychological role of probability, the classification of types of minds, and artificial intelligence. Dennett's reflections on the history and prospects of artificial intelligence and how we should manage its development and our relation to it are informative and wise. He concludes:

> The real danger, I think, is not that machines more intelligent than we are will usurp our role as captains of our destinies, but that we will *over*-estimate the comprehension of our latest thinking tools, prematurely ceding authority to them far beyond their competence....
>
> We should hope that new cognitive prostheses will continue to be designed to be parasitic, to be tools, not collaborators. Their only "innate" goal, set up by their creators, should be to respond, constructively and transparently, to the demands of the user.

About the true nature of the human mind, Dennett is on one side of an old argument that goes back to Descartes. He pays tribute to Descartes, citing the power of what he calls "Cartesian gravity," the pull of the first-person point of view; and he calls the allegedly illusory realm of consciousness the "Cartesian Theater." The argument will no doubt go on for a long time, and the only way to advance understanding is for the participants to develop and defend their rival conceptions as fully as possible—as Dennett has done. Even those who find the overall view unbelievable will find much to interest them in this book. □