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The blind Bach-maker

Review of *From Bacteria to Bach and Back: The Evolution of Minds by Daniel C. Dennett*. W.W. Norton; 496 pages.

Keith Frankish

Human neurons are distant relatives of tiny yeast cells, themselves descendants of even simpler microbes. Yet they are organised in structures that are capable of astonishing feats of creativity. How did the world get from bacteria to Bach, from fungus to fugues? Daniel Dennett, an American philosopher and cognitive scientist, tells the tale in his new book, revisiting and extending half a century of work on the topic.

The story is one of Darwinian natural selection: of complexity emerging gradually as beneficial mutations are preserved and harmful ones weeded out. It requires the reader to make some "strange inversions of reasoning"—bold changes of perspective on the nature of design, purpose, and consciousness—to loosen the pull of "Cartesian gravity", or the human propensity to think of the mind as mysterious and non-physical.

One of Mr Dennett's key slogans is "competence without comprehension". Just as computers can perform complex calculations without understanding arithmetic, so creatures can display finely tuned behaviour without understanding why they do so. The rationale for their behaviour (diverting a predator, say, or tempting a mate) is "free-floating"—implicit in the creatures' design but not represented in their minds. Competence without comprehension is the default in nature, Mr Dennett argues, even among higher animals.

How then did human intelligence arise? People do not have a special faculty of comprehension. Rather, the human mind has been enhanced by a process of cultural evolution operating on memes. Memes are copyable behaviour—words are a good example.

Initially, memes spread in human populations like viruses, selected simply for their infectiousness. Some were useful, however, and the human brain adapted to foster them: genetic and memetic evolution working together. Words and other memes gave humans powerful new competences—for communication, explicit representation, reflection, self-interrogation and self-monitoring. To use a computer analogy, memetic evolution provided "thinking tools"—a bit like smartphone apps—which transformed humans into comprehending, intelligent designers, triggering an explosion of civilisation and technology.

Mr Dennett sees human consciousness, too, as a product of both genetics and memetics. The need to communicate or withhold thoughts gives rise to an "edited digest" of cognitive processes, which serves as the brain's own "user interface". The mental

items that populate consciousness are more like fictions than accurate representations of internal reality.

"From Bacteria to Bach and Back" concludes with a look ahead. Mr Dennett expects that computers will continue to increase in competence but doubts that they will soon develop genuine comprehension, since they lack the autonomy and social practices that have nurtured comprehension in humans. He worries that people may overestimate the intelligence of their artefacts and become over-reliant on them, and that the institutions and practices on which human comprehension depends may erode as a result.

This only hints at the richness of this book. Mr Dennett provides illuminating explanations of the ideas he employs and cites fascinating experimental work. Many of his claims are controversial, and some readers will be more persuaded than others. However, Mr Dennett has an excellent record of predicting developments in cognitive science, and it would be rash to bet that he is far off track. Persuaded or not, readers will find their minds enriched with many powerful thinking tools.