

WHAT MAKES US

THINK?



A NEUROSCIENTIST AND A PHILOSOPHER ARGUE ABOUT
ETHICS, HUMAN NATURE, AND THE BRAIN

JEAN-PIERRE CHANGEUX
AND PAUL RICOEUR

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Philosopher Argue about Ethics,
Human Nature, and the Brain

Jean-Pierre Changeux
and Paul Ricoeur

translated by M. B. DeBevoise

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Translator's Note

As with Jean-Pierre Changeux's earlier book of conversations, with Alain Connes, also published by Princeton University Press, I have taken minor liberties with the French text in the interest of making it read more smoothly in English; and, with the approval and assistance of both authors, added a certain amount of new material, particularly to the notes, in order to give a fuller picture of the current state of research on the various topics they discuss. Changes in the location and description of several of the illustrations have been made as well, and a number of errors in the original edition corrected. I owe thanks, finally, to Chris Westbury, at the University of Alberta, who looked at a draft version of the translation, and to Larry Kim and Janis Sawyer for research assistance.

M. B. DeBevoise

Prelude

Was it unreasonable for a publisher to ask a scientist and a philosopher to examine the achievements and prospects of the neurosciences, in particular the capacity of these sciences to provide a basis for discussion of morality, social norms, and peace? On the one hand, it meant having to confront the prejudices of a public that places its trust in science—indeed, shows enthusiasm for science—while at the same time fearing its influence over modern life and the threat it is imagined to pose to the future of mankind. On the other hand, it meant having to contend with the narcissism of philosophy, a discipline concerned above all to assure its own survival and, preoccupied by an immense textual heritage, one that is uninterested for the most part in recent developments in the sciences.

To overcome popular resistance to critical scientific knowledge, Odile Jacob called upon a working scientist whose research is concerned primarily with the brain and whose work has been familiar to the general public since the appearance of *Neuronal Man* (1983). To draw philosophy outside of its ivory tower, she chose a philosopher who, having summarized the main themes of his thought in *Oneself as Another* (1990), has continued to take an interest, together with judges, physicians, historians, and political scientists, in what during the medieval period were called “disputed questions.”

The publisher’s wish, then, was to have a dialogue in two voices. It ought to have been an exercise in contradiction. Indeed it was, with all that implies in the way of testing the composure of each participant: the philosopher found his devastating arguments undermined, the scientist his incontrovertible

facts overturned. Ultimately, our encounter represents a vote of confidence in the maturity of the judgment of the reader, who is invited to enter into the debate as a partner rather than as a referee. Candid and honest discussion of ideas is seldom found in the world today. Peremptory assertion, unilateral criticism, incomprehensible digression, and facile derision stand in the way of fair debate, with no regard for the need to make arguments that, before they can be convincing, must aspire first to be thought plausible, which is to say worth defending.

In the event, the chance to engage in a wholly free and open dialogue proved to be an exceptional experience for each of us. First there was unstructured conversation, followed by recorded debate. Once transcribed and edited, the dialogue assumed a more incisive—sometimes more acerbic—aspect. The result is an example on a small scale of the difficulties that every debate encounters once it submits to a demanding standard of argumentation. Our hope is that, by sharing this dialogue with a wide audience, an exchange between two people will lead to understanding among many.

We would like to thank Juliette Blamont, who helped harmonize our voices in written form, and Odile Jacob herself, who inspired, encouraged, and closely monitored the progress of this dialogue, for their devoted efforts in bringing it before the reading public.

Paul Ricoeur

Jean-Pierre Changeux

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1 — A Necessary Encounter

Knowledge and Wisdom

Jean-Pierre Changeux: You are a well-known and admired philosopher. I am a scientist. My professional career has been devoted to the theoretical and experimental study of the elementary mechanisms involved in the functioning of the nervous system and, particularly, the human brain. If I seek to understand the brain by approaching it through its most microscopic structures, which is to say the molecules that compose it, this hardly excludes a desire to understand its highest functions, which traditionally come within the domain of philosophy: thought, the emotions, the faculty of knowledge, and, of course, the moral sense. As a molecular biologist I find myself confronted with a formidable problem: how to discover the relationship between these elementary molecular building blocks and highly integrated functions such as the perception of beauty and scientific creativity. After Copernicus, Darwin, and Freud there remains the conquest of the mind, one of the most formidable challenges facing science in the twenty-first century.

Since the most ancient antiquity, philosophers have argued about what traditionally in France is called *l'esprit*—not *l'Esprit* with a capital E, or “Spirit,” but what Anglo-American authors mean by “mind.” Even though our respective positions may seem as far removed from each other as they could be, the encounter between philosophy and neurobiology seems to me not merely welcome but necessary. I have enormous admiration for your work. I have not found many authors in France—perhaps owing to the fault of my own ignorance—

who have thought as deeply about the problems of morality and ethics as you have. Why should we not work together to try to construct a common discourse on these topics? Perhaps we shall not succeed. But our attempt will at least have the value of identifying points of agreement and, still more importantly, of exposing areas of disagreement and throwing into relief the gaps that one day or another will have to be filled.

Paul Ricoeur: I wish to respond to your words of welcome with an equally warm greeting addressed to a renowned man of science and the author of *Neuronal Man*,¹ a work worthy of the closest and most respectful attention.

What we are undertaking is a discussion, in the strong sense of the word. It is motivated first by a difference in our approach to the phenomenon of human life that has to do with our training, respectively, as a scientist and a philosopher. But it is motivated also by a desire, if not to resolve the differences related to this difference in our points of view, at least to raise them to a level of argumentation permitting the reasons of one to be regarded as plausible by the other, which is to say worthy of being defended in the context of an exchange governed by an ethic of debate—what the philosopher Jürgen Habermas calls *Diskursethik*.

I want to make my position clear at the outset. I am a partisan of a current of European philosophy that contains three distinctive approaches, typically referred to as “reflective philosophy,” “phenomenology,” and “hermeneutics.” The first approach, reflectivity, emphasizes the mind’s attempt to recover its power of acting, thinking, and feeling—a power that has, so to speak, been buried or lost—in the knowledge, practices, and feelings that exteriorize it in relation to itself. Jean Nabert is the leading representative of this first branch of the tradition to which I belong.

The second, phenomenology, refers to the ambition of going back “to things themselves,” which is to say to the manifestation of what presents itself to experience as the least encumbered of all the constructions inherited from cultural, philosophical, and theological history. This concern, by contrast with the reflective approach, lays stress on the *intentional* dimension of theoretical, practical, and aesthetic life and defines all consciousness as a consciousness of something. Husserl is the eponymous champion of this branch.

The third term, hermeneutics, refers to an approach that derives from the interpretive method applied first to religious texts (exegesis), classical literary texts (philology), and legal texts (jurisprudence), and stresses the plurality of interpretations associated with what may be called the reading of human experience. The masters of this third branch, which challenges the claim of any philosophy to be devoid of presuppositions, are Dilthey, Heidegger, and Gadamer.

Henceforth I will use the generic term “phenomenology” to designate the philosophical tradition that I represent in this discussion in each of its three branches—reflective, descriptive, interpretive.

Changeux: In my case the experience of belonging to the world of scientific research, and more particularly of biological research, has profoundly influenced my thinking.

While still quite young, as a student, I took part in what might be called the molecular biology movement. Its aim, in the 1960s, was to elucidate the structure and function of the molecules that are situated at the ultimate boundaries of life. This program met with success, as is well known,² and led to further research. Certain of these molecules, called allosteric proteins, possess a crucial and dual feature: they serve, on the one hand, to determine a particular biological function, for example a chemical synthesis; on the other hand, they obey a

signal that regulates this function. These proteins introduce flexibility into cellular life, acting as switches that help to coordinate the functions of the cell but also to promote the cell's adaptation to the conditions surrounding it.³ To understand in strictly physico-chemical terms biological functions that are essential to the life of the cell has been, and continues to be, the objective of a tradition of research of considerable scope and vitality with which I enthusiastically align myself.

More unexpected was the demonstration that followed. The brain was shown to possess molecules that are very similar to these bacterial switches—receptors of chemical substances known as neurotransmitters that assist communication *between* nerve cells.⁴ Our cerebral functions, from the most modest to the most elevated, are also rooted in physico-chemical nature by virtue of the fact that they are mediated by these molecular switches.

The extreme complexity of cerebral organization and its development became accessible to the methods of molecular biology by the end of the 1960s, opening up a second line of research. It was no longer possible to think of the brain as a computer composed of circuits prefabricated by the genes. To the contrary, connections between nerve cells are gradually established over the course of development by a process of trial and error. The selection and elimination of such connections are regulated to a substantial degree by the newborn infant's interaction with the environment and with itself. In short, the brain cannot be viewed as a strictly genetic machine; it incorporates, within a defined genetic envelope peculiar to the species, a series of nested "epigenetic" imprints that are established by variation and selection.⁵ Another way of stating this hypothesis is to say that evolutionary (epigenetic) competition inside the brain takes over from the biological (genetic) evolution of species and creates, as a consequence, organic links with the physical, social, and cultural environment.

A very fruitful interface is produced in an entirely natural way, then, with the human sciences and society.

A third line of research, so far theoretical for the most part, relies on the new methods of modeling made possible by computer technology to try to further exploit our still quite partial knowledge of the functional organization of the brain. It consists, for instance, in devising the simplest plausible neural architectures that constitute a formal, or artificial, organism capable of carrying out a defined cognitive learning task. Two features distinguish this approach. On the one hand, it is “neurorealist” in the sense that it appeals only to known elementary components of the brain, for example the molecular receptors of neurotransmitters I have already mentioned; on the other, it tries to define the minimal degree of complexity that a network of nerve cells capable of carrying out specifically human tasks must possess.⁶ The theoretical program consists in trying to give an account, in a rigorously formal way, of a behavior defined on the basis both of the anatomical organization of a network of nerve cells and of the activity that takes place in this network. This enterprise, known as connectionism, has illustrious antecedents: the cybernetics of Norbert Wiener, the universal computing machine conceived by Alan Turing, and the first neural network model developed by Warren McCulloch and Walter Pitts to represent the “embodiment of mind.”⁷

As a member of the faculty of the Collège de France, I am required to present the current state of knowledge in my field, which is continually evolving, in a didactic form. *Neuronal Man*, to which you referred a moment ago, represented a synthesis of my first seven years of lectures. Its aim was to make the dazzling progress of the sciences of the brain more widely known. I realize today that this attempt to organize the available knowledge regarding the brain, from the molecule to mental activity, has had a powerful retroactive effect on my

own conception of the brain and its functions. In this regard I share with René Thom the view that what counts in the modeling process is its *ontological import*, its impact on our conception of the origin of things and beings—in other words, its underlying philosophy. While writing *Neuronal Man* I discovered Spinoza's *Ethics* and the full rigor of his thought. "I shall consider human actions and appetites," Spinoza says, "just as if it were an investigation into lines, planes, or bodies."⁸ Can anything more exciting be imagined than to try to reconstruct human life in a way that rejects teleology, that rejects anthropocentrism, that rejects all conceptions of the world that take shelter in religious superstition—what Spinoza called the "refuge of ignorance"? This reading came to complete and enrich my acquaintance with the pre-Socratic philosophers. I have always been and remain still very attached to Democritus, in particular, among the ancient atomists.

None of this suffices to explain the very marked interest I have in ethical questions, which led me to read your work *Oneself as Another*.⁹ The decisive event was a talk I gave on the neurosciences shortly after *Neuronal Man* appeared to a working group of the Comité Consultatif National d'Éthique dans les Sciences de la Vie et de la Santé, the committee that advises the French government on issues in bioethics. In the very lively debate that followed I found myself driven into a corner. How can neuronal man be a moral subject? I have not ceased since to reflect upon this question, to make a serious attempt to give new meaning to an ethics of the good life—a joyful, humanist ethics compatible with the free exercise of reason. It is this attempt that sparked my interest in talking with you today.

The cleavage between scientists and philosophers is relatively recent. In antiquity, philosophers such as Democritus and Aristotle were also excellent observers of nature; mathematicians such as Thales and Euclid were philosophers as