

Your Brain and Your Self

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What You Need to Know

Translated by Laurence Garey

 Springer

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For Christiane

*If the brain was simple enough to be intelligible,
we would not be intelligent enough to
understand it.*

Anonymous graffiti

Preface

Jacques Neiryck and I arrived in Lausanne at about the same time, respectively in 1972 and 1973, he at the Swiss Federal Institute of Technology in Lausanne (EPFL) and I at the Faculty of Medicine of Lausanne University. I was there to teach anatomy and carry out research on the brain. He pursued a very varied career: engineer, researcher and teacher, but also journalist (including a reputed consumer advice program on Swiss television), author (both of science and fiction), and politician.

I was very pleased when he agreed for me to translate the book he had just written: *“Tout savoir sur le cerveau et les dernières découvertes sur le Moi”*. The book had been inspired by a number of discussions with neurologists and biologists at the newly created Brain Mind Institute of the EPFL.

In this translation, the concepts and descriptions are preserved, although some of the original interview material has been abbreviated to try to make the text flow and to impart a more “international” feeling. This in no way minimizes the essential contributions of the interviewees

Throughout I have tended to use the masculine pronoun, but of course the feminine version is just as much implied. Equally, the generic “man” is used rather than try to find a more cumbersome alternative. We are here dealing with biology, not political correctness.

August 2008

Laurence Garey
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Introduction

How does my brain work? Why am I conscious? Where is my memory? Is what I perceive around me reality or just an illusion? We all ask these questions, which we could sum up in a single question: who am I? How is it that I have memories and that I feel I exist? What does it mean that my mind is free in time and space, and yet I am imprisoned in a body that is doomed to disappear? What happens to my mind when my body disappears? What are the risks of my suffering from a brain disease? Could my whole being eclipse because of a disease in which my body survives but my mind ceases to exist? What remedies are there? What hope does research hold out? Recent discoveries about the brain allow us to ask such questions more pointedly, hoping to define more clearly the relations of the brain with the mind, of man with his body.

I see this book as an “instruction manual” of myself. Our brain is an essential body organ, for the slightest defect in its function prevents us from using the others properly, even if they are healthy. Without a properly functioning brain, my “self” is deranged and may be completely destroyed.

If we wish to look after our digestive or cardiovascular systems we take care to exercise, pay attention to our diet and take medication against hypertension or cholesterol. That is all important, but we must also realize that our brain deserves just as much, if not more, attention. We need mental hygiene, just as much as bodily. Abuse of drugs or medication, intellectual or spiritual barrenness, mental idleness, cultural sterility, all leave indelible traces in our brain and, therefore, in our mind.

This book hopes to guide the reader, irrespective of their knowledge of science. The general public is often unaware of the quality and importance of today’s research. Now that infectious diseases are largely mastered, although some menace us again, and cancer is more and more under control, diseases of the nervous system are becoming one of the principal causes of invalidity and death.

Nevertheless, a feeling of mistrust, even hostility, toward cutting edge medicine is marking certain political decisions. So, it is important to inform public opinion about the organ that differentiates human beings from other animals: about its fragility, about its accessibility to proper care, and about the research that is both possible and necessary. In this way people will be able to make informed decisions when called upon to comment on scientific matters as part of the democratic process.

This book is based on numerous discussions with specialists, and not on the opinion of the author. It attempts to determine the state of the art. There are few notes or references to intimidate the reader to simply shut it. It is organized in chapters that can be read in continuity, but it is equally possible to discover the chapters in a different order or to skip any which may be of less interest. The reader's absolute right is to not read everything! For instance, as an appetizer he could read the case histories that punctuate the chapters. After a description of the brain and the tools used to investigate it, we progress to a consideration of four major pathologies, the diseases of Parkinson and Alzheimer, then stroke and tumors. We next reflect on those strange states of consciousness that are the "out of body" and "near death" experiences. We end by exploring current openings in the research on simulating brain function.

This venture into the world of neuroscience began by concentrating on the very special centers of excellence provided by the university milieu of Lausanne and Geneva. At the EPFL (the Swiss Federal Institute of Technology in Lausanne) a Brain Mind Institute was created in 2002, based on a novel fusion of technology and medicine, of engineers and biologists. The former are learning to study the phenomena of life, and the latter to exploit the artificial brain to penetrate the mysteries of the natural brain.

I want to thank all those who gave me their time, especially Patrick Aebischer, Olaf Blanke, Julien Bogousslavsky, Stephanie Clarke, Nicolas de Tribolet, Touradj Ebrahimi, Wulfram Gerstner, Rolf Gruetter, Pierre Magistretti, Henry Markram and Jean-Philippe Thiran, as well as to Sylvie Déthiollaz, Andrea Pfeifer, Béatrice Roth and Bernard Roy, for providing me with very useful documentation.

Chapter 1

The Controversial Seat of Myself

“As human beings we are possessed of a fundamental desire to understand, on the one hand who we are, and on the other where we come from. Two disciplines, neurology and cosmology, have strived to clarify these two metaphysical questions. Until recently only philosophers tackled the first of these, that of consciousness, and they approached it exclusively by using the capacity of their own minds. But how can we understand objectively that most subjective part of ourselves? For a long time philosophical musings have given us contradictory answers, between which it has been impossible to choose on a rational basis. What has changed today concerns the tools we possess for measuring and investigation, which allow us to begin to formulate these questions more rigorously. As specialists in natural science, we cannot claim to provide an unequivocal reply to a metaphysical question, but we can offer to ask the question better, in order to avoid wrong answers.”

This scientific profession of faith was made to me by Patrick Aebischer, President of the EPFL one morning in November 2005 as I questioned him about the creation of the Brain Mind Institute, the existence of which in the heart of an engineering school was a surprising novelty. The aim of technology is usually to make life easier, not to penetrate its secrets. Now technicians are beginning to be interested in that most hermetically sealed part of nature, the human being. What can they offer that is new? What is the concrete benefit of their research? Can we better understand how we function by penetrating the very depths of our personality? Will engineers build more highly performing computers by imitating the biological systems of our brain?

Within the confines of our skull resides our whole being, a succession of thoughts and feelings to which each individual has sole access, if we exclude phenomena such as telepathy or clairvoyance that some claim exist. We perceive the outside world from our inside world, that is distinct from it and which stirs up a host of memories, prejudices, habits, emotions and desires. This intimate universe is not subject to the constraints of time and space of the outside world. We can project ourselves into the past or the future, revisit all the places that we have known and imagine those we wish to discover. We can invent a fictive world of stories that never happened but which seem larger than life to us. We can create sculptures, pictures and songs that charm us and which stem from the depths of this bottomless pit that we call ourselves. We have a sensation of freedom from the constraints of our body.

This consciousness makes us human, but where does it come from? Consciousness is like time. We experience both so intimately and so forcefully that we fail when we try to define them. Swept up by time we can only watch it pass but never stop it to examine it at leisure. Equally, as we perceive our existence through our consciousness we cannot observe it with detachment.

The Dualist Fantasy

The common phantasm that we maintain on this subject divides our being into two distinct parts, body and soul, brain and consciousness. It is that favorite temptation of western culture, dualism: material without a soul, and an immaterial soul. The most radical formulation of this doctrine was by French philosopher, Henri Bergson (1859–1941) in his work on *Matter and Memory* (1896) that “the hypothesis of equivalence between psychological state and cerebral state implies a downright absurdity”. In other words, the feelings we experience, the emotions we undergo, the intuitions from which we benefit, the memories we recall, all, according to him, are independent of any material substrate in our body. On the contrary, they are separate, manifesting themselves in some immaterial entity, invisible and spiritual, which people commonly call the soul. This is a naïve translation of the impression that we all feel of inhabiting a body which is distinct from our consciousness.

Once we have made this mistake of separating our being into two radically different parts, that are contradictory, opposite and irreconcilable, we shall have a hard time trying to put ourselves back together again. When he needed to reconcile the two, the much earlier French philosopher René Descartes (1596–1650) selected the pineal, a tiny organ buried in the middle of the brain, as the seat of the soul within the body. As a seventeenth century philosopher, he had just one reason to imagine this colocalization: the brain is symmetrical (well, almost!), and divided into right and left hemispheres, apart from certain structures such as the pineal. Today we know about its real function in synchronizing sleep with the alternation of light and dark. Certainly an important function, but rather modest compared with what the philosopher had decreed with the unbelievable impudence of an intellectual who is the reprehensible victim of a trick played on him by his own brain, that he imagines he can understand purely by reflection.

For Bergson, Descartes and, much earlier, the ancient Greek philosopher Plato (424–348 BC), all of whom were dualists, the soul is not localized within the brain, but is rather a separate entity, immortal by its very nature and thus immaterial. When a man dies, his soul leaves his body for another world. As a bottle is a container for wine, the body is a sort of fortuitous, ephemeral shell which contains the imperishable part of our being. Western values are marked by an inexorable confusion about the existence of the soul and its immortality. To distinguish between brain and soul reflects a metaphysical option which interferes with scientific investigation. When a neurologist reveals that a psychological condition corresponds to a state of the brain, he seems to undermine the very foundations of our civilization.