



## Essay Review

# *An I Behind the Eye: Donald MacKay's Gifford Lectures*

W. R. THORSON

Department of Chemistry  
University of Alberta  
Edmonton, Canada T6G 2G2

From *PSCF* 44 (March 1992): 49-54.

*Behind the Eye*, by Donald M. MacKay; edited by Valerie MacKay (based on the 1986 Gifford Lectures). Basil Blackwell Ltd., Oxford, UK; Cambridge, MA (1991). [

*Behind the Eye* is based on Donald M. MacKay's Gifford Lectures, given October-November 1986 at Glasgow under the title "Under our own microscope: What brain science has to say about human nature." Donald MacKay died in February 1987: the book, taken from transcripts of the Gifford Lectures and augmented in a few places with other relevant material from the author, was edited posthumously at his request by his wife and frequent co-worker, Valerie MacKay. (Explanatory comments by the editor to clarify points in the text appear occasionally and are set off in italics.) While the enormous difficulties of posthumous publication have left occasional traces, in the end they are minor, and in such places careful reading nearly always makes the meaning plain.

As its title suggests, the theme of the book is the brain, its nature and relation to the functioning individual (seen primarily through extensive work done on the visual cortex and its relation to brain organization)- and the implications of such understanding for our view of human nature, the meaning of freedom and moral responsibility, the knowledge of God, and Christian belief in particular. Donald MacKay was a careful experimental worker in brain neurophysiology, physical psychology and theoretical problems of information processing and systems control related to the brain and observable conscious phenomena; his meticulously logical thinking is evident throughout this book. MacKay distinguishes scrupulously between the sort of understanding we can have of brain function as external observers of neurophysiological data ("the brain story") and the sort of understanding we have as possessors of minds and conscious experience ("the I-story") and he makes it clear that he believes firmly in the legitimacy and reality of both. Having begun with the recognition of the two distinct vantage points for our understanding, the exposition moves from a neurophysiological standpoint toward a presentation of many aspects of the experienced phenomenon of vision, illustrated by examples in the

psychology of visual perception. Many of these are presented in Figures as visual experiments for the reader. Starting with a broad sketch of what is known about the connection between conscious mental activity and physiological observations (in the chapter entitled "Reading the Mind"), MacKay moves to a discussion of the fascinating higher level cerebral organization problems posed by the work of Sperry and others with persons in which the right/left brain connections have been impaired or severed (chapter: "The Divided Brain").

The author next moves toward the general philosophical questions raised by what we now know about the mind and its brain- concerns quite appropriate to the Gifford Lectures on "Natural Theology." He opens this broader discussion by considering the popular analogy of the brain to a computing machine, and examining both the analogy's perceived strengths and weaknesses from the vantage point of his own wide experience as a brain scientist. MacKay's early background as an expert in electronic analog computers, information processing mechanisms and their logic gives him some sympathy with this analogy, but he makes clear it is a critical one: indeed, as a foreword "about the author" states, his perception of differences rather than similarities between brain and computer initially stimulated his professional interest in neuro-physiology.

In the final four chapters of the book, MacKay turns to the questions of freedom and responsibility in conscious, willing agents; the speculative problem of the nature and origin of thought and imagination; reflections on tacit vs. explicit knowledge and their possible bearing on the legitimacy of spiritual experience; and finally an open, personal account of his own thinking as to the meaning of being embodied, and its relation to the questions of life, death and a life hereafter. Those familiar with Donald MacKay's writings on topics bearing on science and Christian faith, or who heard him express these views in person, will recognize the familiar arguments which, even allowing a materialist and physically determinist account of the brain as scientific, set out the principle of logical indeterminacy, and then insist on the logical as well as existential legitimacy of moral agency and responsibility. These topics form the focus of the chapter "My Fault or My Brain's."

The chapter "Where Do Ideas Come From" introduces a later aspect of MacKay's thinking, emphasizing the fact that there is little positive evidence for a determinist view of the brain, and moving instead toward an emphasis on the role of "randomness" in brain processes and its possible relation to imagination and creative mental activity. In the chapter "Knowing More Than We Can Tell" he develops a view of tacit knowledge which he feels is compatible with current approaches to scientific understanding of the brain as a system with massively parallel connective architecture - and recognizes also the possibility that coherence in such processes lies at the base of our awareness of larger contexts of meaning, including the possibility of spiritual awareness. While he makes his own distinctive interpretation of these concepts, an appreciation of their relevance to a scientific understanding of conscious phenomena is a more recent development in MacKay's writing on philosophical themes.

In each of these last four chapters he moves toward a warmly personal apologetic for faith in a personal God revealed in Jesus Christ. As the author himself notes, the terms of the Gifford Lectures rule out reference to "miraculous revelation" as a source of theological truth, so MacKay's presentation of Christian convictions is put rather as a consistent and credible hypothesis to be examined seriously in the light of what has already been presented - and he does a splendid job of it. Knowing (as MacKay must have) that his own death was not far off gives a particular value and depth for any serious reader of the final chapter, "And in the End?"

While this reviewer has never fully shared MacKay's views on some of these philosophical matters (differing at least tentatively, if not absolutely on such issues as the legitimacy of the grounds he tries to provide for spiritual meaning and responsibility, or the elements of a somewhat positivist outlook in his philosophy of science), it must be stated most emphatically that in this book these views get a superb presentation in context- the context of the actual scientific knowledge with which Donald MacKay dealt continually and creatively as a brain scientist. Too often his philosophical views have been dealt with as mental abstractions by theologians or apologists, treated without any understanding of the milieu in which they were held, and then dismissed just as superficially or unfairly. It may be possible to get away with this if one sees them presented in isolation- for example, in short works like *The Clockwork Image* or his essays in *Christianity in a Mechanistic Universe*. As they are presented in *Behind the Eye*, however, one can begin to see the issues and problems with which MacKay was concerned, and can then recognize more fully the depth and content which must be addressed in stating a different view of things. (I do not pretend to be able to do this adequately!)

Secondly, this book, like the collection *The Open Mind and Other Essays* by MacKay (published in 1988 by InterVarsity Fellowship (UK)), shows the development of some new directions in MacKay's thinking about the complex phenomena of consciousness and the brain's physical processes, and a parallel understanding that some new categories of argument and scientific meaning are probably needed to discuss the problems involved. The principle of logical indeterminacy is only a first step of this kind. These shifts of emphasis were almost certainly provoked by the enormous escalation of knowledge about, or relevant to, the brain, and vision in particular, which has occurred since 1980, and to which MacKay himself made important contributions. He was always alert to the changing climate of scientific thinking and its implications for corresponding changes in a philosophical apologetic. *Behind the Eye* reflects these shifts in emphasis in MacKay's apologetics and should commend the book especially to those only familiar with his earlier writings. Overall, the short preface to the present work conveys a biblical wisdom and understanding of our condition as persons with minds and brains which sets a tone maintained throughout the whole, culminating in his closing words in the final chapter- and which faithfully reflects Donald MacKay as the person many of us were privileged to know.

I should like now to make some broader comments on the value of this work as a contribution to understanding the problems of the brain and the associated metascientific and philosophical questions.

Someone has made the waggish observation "by their *Lives of Jesus* you will know them"- meaning that in reading a modern account of the life of Jesus we may learn more about the author's perspective on the world than we do about the person of Christ. This is a true statement for many such biographies and studies. Somewhat analogously, one may suggest that as we get deeper into the study of the Creator's handiwork, especially the study of our own nature and identity, there is again a similar tendency to tell more about our world view than we do about the thing we study. It is precisely on this account that this reviewer found reading *Behind the Eye* a most worthwhile and intellectually helpful experience. Within the past year I have also read a number of other works dealing at least peripherally with many of these same issues: Hans Moravec's *Mind Children*;<sup>1</sup> Roger Penrose's *The Emperor's New Mind*;<sup>2</sup> neurophysiologist Oliver Sachs' *The Man Who Mistook His Wife for a Hat*;<sup>3</sup> a variety of short speculative articles by contemporaries working on problems of artificial intelligence and its possible bearing on biological systems (too numerous and transient to cite here); and finally a most worthwhile technical review article by experimental psychologist Bela Julesz on "Early Vision and Focal Attention"<sup>4</sup> published in the July 1991 issue of *Reviews of Modern Physics*. This last is especially valuable for a wide citation of very recent work on vision, though mostly with the particular biases and concerns its author frankly acknowledges. Other readers will have their own background of recent reading on these subjects, especially with the tremendous spate of interest these days in "neural networks" and parallel organization as a basis for computer simulation of brain function or biological development and organization.

My eclectic citation is deliberate, because it portrays the confused state of modern thinking about the issues. Moravec's work in particular conveys the mirror image of his own heart rather than a faithful presentation of where we actually stand with "artificial intelligence", and for me at least is a chilling reminder that many of the clever people in modern laboratories are devoid of any true wisdom. (Penrose reviewed Moravec's book for the *New York Review of Books* last February, and his comments, which do not arise directly from any acknowledged spiritual base but simply from a more profound respect for the contingency of creation, make very good reading- he can see that Moravec's emperor has no clothes). On the other hand, Moravec's book raises interesting issues arising from the increasing complexity and speed of computing machines, and is worth reading for that reason.

In MacKay's book one finds a balanced appreciation- ready to use what is valid in the analogy with computers of any kind, but thoroughly honest and scrupulous about the problems involved. The development of parallel computing machines and neural networks has mostly occurred in the past decade, just at the end of MacKay's career; he obviously took note of these developments and their implications. One feels that if he were still alive, he would be in the thick of things developing today, but with the same critical judgment- a judgment sadly lacking in wide sectors of the AI community.

Mathematician and cosmologist Roger Penrose's *Emperor's New Mind* is fascinating reading, since it elegantly conveys the author's tacit understanding that the depth and complexity of an intelligible creation seem to have a correspondent puzzle in the depth and complexity of our own minds and their brains. Penrose devotes some space in his book to what is known about the neurophysiology and function of the brain, and one immediately recognizes in his response to those facts the harmony and compatibility with the views expressed in MacKay's more directly professional exposition. Both men are clearly dealing with a common appreciation of reality, even though their detailed concerns and beliefs about it may differ.

I mention Oliver Sachs' book, which gives fascinating accounts of clinical experience with higher-level neuro-physiological brain disorders or anomalies, not only because it is exceptionally well written but because it illustrates (on the "I-story" side, as MacKay would call it) some of the mysterious problems we are still very far from grasping at all in brain function- and is another powerful antidote to closed thinking about analogies with computers. In MacKay's accounts of interviews with some of Sperry's subjects there is an appreciation of the ultimate integrity of personhood similar to that which Sachs conveys more poetically, and again it shows the strong sense of balance in *Behind the Eye*.

Lastly, I cite Julesz' 1991 review article because it shows how very rapidly progress is being made on some aspects of the problem of vision, while other apparently simple puzzles remain largely unsolved. Since I am not a professional in the field but only an interested layman, I have made no attempt to decide whether or not Julesz has given an accurate picture of what he calls "early vision" and focal attention; however, I found his article has the same cautious attitude about interpretation of physiological structure and its relation to psychological observations as is evident in MacKay's book, and therefore feel that readers who are stimulated by MacKay's presentation, and wish to pursue current developments in the problem of vision and brain function, will value the Julesz article as at least a good starting point for further study.

For me, the least convincing section in *Behind the Eye* was the chapter "Where do Ideas Come From?" In it MacKay appeals (somewhat speculatively, as he admits) to the notion that creative mental processes *might be* (from the viewpoint of physiology) the result of brain processes which are in some sense "random", though he is careful to point out that this "randomness" may or may not be fundamentally indeterminate at a physical level- we simply do not know. In this argument MacKay follows much of contemporary scientific fashion on the subject, and again he is thoroughly consistent here with his lifelong attitude toward scientific truth: if this is a valid scientific description of the origin of ideas, he is willing to embrace it. He also follows the fashionable line of thought in suggesting as well that this view is compatible with accounting for evolution as the combination of chance variation with natural selection. Just as in his earlier arguments about mechanistic determinism and the authenticity of personal existence, however, we should understand that this adoption of a tentative interpretation does not necessarily mean he is committed to this particular conclusion,

and I believe a careful reading of his comments in the concluding chapter makes this plain.

However, most people who have disagreed with MacKay about such questions have done so in part because they felt no need to make such sweeping concessions to current scientific fashion; there are always other, more fundamental issues which may be ignored by doing so. For example, take the view expressed in this chapter that the phenomena of mind are fundamentally understandable on the scientific side as "random" in some vital respects. No matter how ably MacKay may then defend the moral authenticity of a creation with "random" as well as "determinate" or "orderly" elements put there at the sovereign will of the Author, such a view *does* impact our understanding of what science is about, and, in fact, assumes that we already have a sound notion of the presuppositions of science as an enterprise. It would follow from this general approach that the assertion of a *different meaning* to the events in question is forever separated cleanly from the problem of their scientific intelligibility, and this continues what many have critically called his "dualism." Yet MacKay himself recognized elsewhere in the book that the strictures of an earlier extreme and positivist behaviorism (which refused to accept the psychophysical phenomenon of vision as legitimate scientific data) actually hindered the discovery of important truths about the way the brain really works. Why, then, should we be too eager to accept the current dogmas of a scientific mentality which seeks to reduce all the world's phenomena to the laws of physics (and at the same time increasingly lacks an adequate respect for contingency as an overriding fact of creation)?

I am unconvinced of even the scientific merit of such a reductionist position. There are a great many significant and objective phenomena in the world, and if it is the goal of science to offer valid explanation for many of them, I see no essential need for a dogmatic belief that all of these things need even be scientifically intelligible as the result of "chance" plus physics. Such belief is essential to modern Darwinist religion, but I see no reason why it need be true (it has certainly not been established): I remain an agnostic on the matter. It seems to me that a real belief in the contingency of the created order, to which Donald MacKay ultimately subscribed, would allow us to remain open to the possibility that (for example) there may be perfectly valid scientific laws which account for the unfolding of life on this planet and which have no necessary connection to physics as such, even though they are compatible with it.

To deny that possibility at the outset may indeed be unhelpful, particularly when so much fruitful work on living things and their function today assumes operationally that they function and develop according to discoverable and orderly "programs." Our business now is a lower order one: it is to find out how the programs actually work- what their logical structure is. Only afterward are we going to be even in a beginning position to show how they might have come into being. I stress that this does *not* deny the possibility that everything is derived from the physics via the sort of "randomness" to which MacKay and others ascribe such creative potential; it's just that I see no reason to believe dogmatically that this is necessarily so in advance of a real understanding. The fact is that we still know precious little about living things.

After this choice, the discussion of tacit knowledge given in the chapter "Knowing More Than We Can Tell" is, to a considerable extent, constrained by the author's assumptions. As a notorious fan of the ideas of the late Michael Polanyi, this reviewer is forced to disqualify himself from extended commentary- except to state that it is my opinion that MacKay misunderstood what Polanyi really meant at certain points (notably, the comments at the top of page 239 strongly suggest such a misreading to me.) On the other hand, whether or not one thinks that MacKay really "gets some of the steam pressure out of the idea," what I found most interesting in the chapter is the extent to which MacKay acknowledges the reality of the tacit as valid knowledge, indeed perhaps the only sort of knowledge we can have of some realities. He gives his own distinctive argument for the reasons why tacit knowledge is an important conception: he emphasizes the connection to parallelism in the organization of brain responses to a set of inputs, and the ability of such a system to recognize coherent patterns while ignoring irrelevant discordances. Indeed, he even goes on to suggest that awareness of spiritual realities must be more like tacit than like logically explicit knowledge. This line of development seems to be a more recent element in MacKay's philosophical thinking about scientific understanding, and will be welcome to many readers.

Throughout his book, MacKay emphasizes a distinction to be made between the notion of the brain's perceptual activity as entailing *representation* of the external world mapped somewhere within, and the notion (which he prefers) of a conditional readiness to respond to the external world. At the most fundamental level, he makes his point: it is not the case (and cannot be, for reasons of informational economy and efficiency) that representation is the goal of brain processing of retinal signals. The same conclusion is evident in reading Julesz, and of course its justification lies in recognizing the role of extensive parallel connectivity in the brain's processes and the associated psychobiological phenomena.

I sense, however, that this persistent emphasis in the exposition may be intended by MacKay to convey some still deeper points about functioning living creatures, and the phenomena of conscious minds in particular. For example, MacKay returns to this point in the chapter on brains and machines; since computers also must be designed in terms of such conditional readiness to respond, he seems to argue that there may never be a *scientifically* intelligible basis for belief in the authenticity of mind and consciousness. Readers of the book will appreciate that while MacKay is not quite saying this, such perspectives may be another reason why he preferred his very particular kind of "dualism" to any attempt to bring "the I-story" and "the brain story" together illogically or prematurely. After two or more critical readings of many sections in *Behind the Eye*, I remain unsure what the author is really getting at in this general theme, and still more unwilling to accept some of the philosophical conclusions which he may feel it warrants. I expect to continue reading the book with this and related critical questions in mind.

I am convinced, however, that anyone who wishes to argue against what they consider to be an unacceptable dualism in MacKay's philosophical apologetic must ultimately understand and deal with the unresolved nexus in this conception and its centrality to his argument; any critique of MacKay's views cannot do less and be either fair or adequate.

That undertaking will be no mean task. While I am inclined to feel that such a critique can be made in the long run, nobody should suppose that it can be a valid one without taking a thorough look at the intellectual and scientific questions which moved Donald MacKay to take the positions he did. Donald has given me and others the privilege of continuing the argument with him for some time to come as we read and think through *Behind the Eye*.

I confess that I did not always *enjoy* reading this book. I have the same reaction to some writers on physics or mathematics- a feeling that I am being argued into some wild conclusion or other against my better judgment. It tends to make me uneasy and put me on my guard, since I am by nature an intuitive, fuzzy sort of thinker. Nevertheless, MacKay's is an argument with warm-hearted integrity throughout, and as a scientist I have learned the benefit of sharpening wits with very different minds.

MacKay's *style* may not please one's esthetic taste, either; as his wife comments in her editorial note, he "always chose his words with precision." This shows his profound respect for the objectivity of scientific knowledge and a wish to convey neither less nor more than the sober truth as he understood it.<sup>5</sup> Some of us like a more heady style which stimulates the imagination, dangerous as we know it may be; but in the end we also need precision of thought and statement. Readers therefore should know that they are in for a serious challenge in this book; the pleasures it affords will be more like nutmeats than nectar.

Finally, I did not find that all the figures and examples of visual phenomena worked well. I could not, try as I would, experience some of the effects described, either because the procedure was not fully prescribed, or because at my age there is a focal length problem and difficulties result in achieving binocular vision or stereopsis for close objects without artificial aids. However, I had as much or more trouble with some of the figures and experiments in the article by Julesz from *Reviews of Modern Physics*. I conclude that there may be a general tendency of people in this field to be so familiar with the visual effects they describe that they neglect to tell those of us who have never experienced them the elementary points of technique involved- something like the amazing omissions by authors of computer manuals, though not so devastating in their results. More extended instructions in Figure captions for viewing what is meant to be viewed would greatly help the understanding.

## REFERENCES

<sup>1</sup> Hans Moravec, *Mind Children: The Future of Robot and Human Intelligence*. Harvard University Press, Cambridge, MA (1988).

<sup>2</sup> Roger Penrose, *The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics*. Oxford University Press, Oxford, UK (1989).

<sup>3</sup> Oliver Sachs, *The Man Who Mistook His Wife for a Hat, and Other Clinical Tales*. Originally published by Summit Books, Simon & Schuster (1970); published in paperback edition by Harper, New York, NY (1987).

<sup>4</sup> Bela Julesz, "Early Vision and Focal Attention," *Reviews of Modern Physics* 63, 735-772 (July 1991).

<sup>5</sup> MacKay could certainly write in a more pleasing style when he thought it appropriate - as is shown by a number of very relaxed and enjoyable essays in *The Open Mind and Other Essays* (Valerie MacKay, Ed.), InterVarsity Press, 38 De Montfort Street, Leicester, UK (1988).

---

---