Memory as a Life

Walking Down Memory Lanes

S Krishnaswamy

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The Making of Memory
From Molecules to Mind
Steven Rose
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Often the blurbs on book jackets are inserted by eager and hungry publishers with both eyes on sales. This book belongs to that rare and endangered species where the back cover tells you what to expect up front. "Are there molecules of memory? Can we understand the brain best as a computer? What is locked into the interactions of the brain cells and the molecules composing them, that carries the memories that make each person unique?" Steven Rose gives you your money's worth of answers (plus many tit-bits to laugh at and/or thoughtfully chew on). In *The Making of Memory*, Rose retraces the road he and his fellow researchers have followed to a new understanding of the cellular mechanisms of memory and learning. Combining a richly detailed account of scientists at work with a highly readable explanation of cutting-edge neuroscience, the book offers fascinating new insights into the links between brain and mind."

The book is a must for libraries and a personal treasure to have. In a casual but lucid style Rose explains how the study of memory is likely to provide the link between the brain and the mind. In the process he places our science and its symbiotic relationship with society in perspective. He describes how every culture and period in history has offered its own analogy for memory. Take for instance our tendency to picturise the brain in terms of computers. He shows how none of these analogies captures the richness of real memory whose understanding lies in the biology of the brain itself, the dynamics of the structural, chemical and electrical interactions between its molecules and cells, but which cannot be reduced *merely* to these.

Rose takes you through the day-to-day routine of a scientist, in particular that of a scientist studying memory using chicks, which is what Rose himself does. Full of spirit and irreverence, the exercise, and much of the book - for example his description of conferences and writing research papers - helps to bring science back to the human being outside, or borrowing from R K Laxman's cartoons, to 'The Common Man'. Steven Rose chooses appropriate words in his writing and so with his philosophical permission I reproduce, with a bit of editing, his words which I think carry the spirit of the book. To get to the science in the book I sug-

gest that you buy the book or–if you can–get somebody else to buy the book for you, and read it.

"Although this book is primarily about individual memories and their biology, in writing it I have found myself continually confronted with the phenomena of collective memory, and you will find them forming a subtext through many chapters... This book has a further purpose, integral to every chapter. Each act we make within our laboratories is dependent for its meaning on the cultural and ideological assumptions of the world which surrounds the lab, just as the lab would not exist without the technological underpinnings of machinery, chemicals, power and money which are omitted from the conventional accounts of science. And no act within the lab is a mere passive contemplation of nature; the products of our work themselves generate new technologies just as certainly as they generate new understandings... that can potentially transform the quality of our lives - at least for those living in relative abundance in technologically advanced societies - from cradle to grave... I write this book at a critical juncture. Simplest would be to ignore the philosophical and social issues and to tell a straight story... But I want to do more than that; I want to describe what it feels like to be a neuroscientist, to design experiments, to train animals, to study their biology, to build - and reject - theories, to demystify the workings of my sort of science. I am not writing this as an observer from outside, nor yet as a textbook or state-of-the-art review. I want to share with you, as the reader, something of the excitement and frustrations of my life in the lab over the past twenty years. And in doing so, I want also to go some way towards bridging the gap in my own life, between the would-be objective observer in the laboratory and the subjective human outside. Bridging this gap, I maintain, is essential if we are to move beyond our fragmented culture towards a new synthesis which transcends both the ruthless reductionism of a science indifferent to human values and a subjectivism for which truth is but one story amongst many of equal worth." Not mere words these, as seen in the pages of the book where his passion for communication carries you along.

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This book was intended for the general public and the practitioners of science; it fits the bill perfectly and enjoyably - from type font and quality of illustrations to the way molecules, neurons, experiments, politics and scientific theories are handled. Rose describes one of his experiments on

chicks, which fits in with the theories of memories, describes his subjective memories and personal development as a neuroscientist. He shows how biochemistry branched into neurosciences, and what we can learn about human memory by studying those disorders of memory caused by diseases or accidents - and the limitations of this approach. Subsequently one learns why people erroneously believed that there were specific 'memory molecules' which could be transferred along with the memories they carried, the reasons for this error and the fallacious experiments on which it was based. He also describes how scientists, like him, learn to design experiments to avoid such errors. Then one learns how different organisms from sea slugs and sea horses to day old chicks are used in modern memory research and in the process we learn how molecules are actually involved in memory formation, although not as thought earlier. Take, for example, communication at the pre - and post - synaptic junctions of neurons. During memory formation, transmitter molecules ('glutamate') released from the pre-synaptic side interact with the receptor molecules on the post-synaptic side, resulting in addition of phosphate groups to some proteins in the membrane and the triggering of calcium entry. The calcium provides a signal to the nucleus for the activation of certain genes and synthesis of protein and glycoprotein molecules. These are transported and inserted into the membrane at the junction thereby changing it's size and shape. Later Rose goes on to show how the molecular aspect is merely one level at which we learn about memory. Memory is a property of the entire brain, the whole organism, and in the case of humans - also of recorded social thinking.

Finally, borrowing from Rose his words used in a slightly different context best epitomises the usefulness of this book. "Let me revert to a more domestic example. Understanding the biochemistry of cooking and the physiology of digestion will surely never reduce the enjoyment of the meal to 'mere' biology - but it undoubtedly enriches and improves both our cooking and our eating."

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