

PREFACE

A prophecy may be fulfilled either by chance or by sensing the forces that generate the foretold event. A self-fulfilling prophecy, however, sets the forces in motion that drive the events to fulfillment. Looking back, it is clear that half a century ago Warren McCulloch set thoughts into motion that over decades had fascinated minds who were doing science as if it were a branch of poetry, thoughts that culminate today not only in intellectual but also in financial fireworks as well. For the pursuit of one of his ideas alone, neural-nets-as-parallel-computers, the Government of the United States has set aside no less than \$300 million for research on this topic over the next six years (1).

Many contributions in this collection of papers reflect, explain, comment upon, and praise McCulloch's depth, breadth, the kaleidoscopic variety of his ideas, and the Shakespearian richness of the vocabulary of his writings. I want to praise those who encouraged Rook McCulloch, some years after her husband's death, to realize her vision of a more complete representation of the lifework of this giant than could be found in other collections (2), and who cooperated closely with her so as to allow this collection of papers and commentaries to emerge.

Rook was faced with the formidable task of selecting from McCulloch's opus of 216 scientific articles, philosophical essays, and poetry, those publications that could stand as exemplars for each of his many facets of interest, without overlap and repetition, organizing this very diverse material so that the ideas were presented coherently, and selecting reviewers for the many groups of publications. In this, she was helped greatly by those friends, colleagues, co-workers, and former students of McCulloch, including those whose names and commentaries appear explicitly as the contributors to this collection.

Instrumental in this effort was Jerome Y. Lettvin who, as a young man, was with McCulloch in his laboratory at the

University of Illinois, and who followed him to the research Laboratory of Electronics at MIT. Because of this lifelong participation in McCulloch's work, Lettvin knew not only the philosophical and scientific milieu in which so many of McCulloch's ideas originated, but also precisely which papers were necessary and sufficient for a full appreciation of the significance of the emerging notions and insights.

A few months after McCulloch's death, *Innovations* published a superbly researched article, *The Birth of Cybernetics - An End to the Old World*, with the subtitle, *The Heritage of Warren S. McCulloch* (3). Its author, Nilo Lindgren, was one of the first to collaborate with Rook in creating an annotated comprehensive collection of McCulloch's work. Lindgren, in hundreds of calls, discussions, and interviews, atuned the large and extended network of McCulloch's friends and congenials to the forthcoming venture.

Since Lindgren's article of 1969 looks back at the McCulloch work with the aim to look ahead for the consequences of this heritage, it is fascinating to compare it with an article by Donald H. Perkel, written in 1988, almost twenty years later. In this article, *Logical Neurons: the Enigmatic Legacy of Warren McCulloch* (4), Perkel not only contemplates the enigmatic McCulloch but also ".....examine[s] the intellectual legacy of McCulloch today in the light of the current recrudescence of his ideas and program." He traces the developments of the post-McCulloch era, may they be the analytic interest of neuroscientists, or the synthetic efforts by members of the *Artificial Intelligencia*, to the effects of the "immanent ideas" paper [51] of 1943 on thinkers who think about thinking.

Because of Perkel's report on recent (1988) neurological findings with theoretical implications that this ".....would represent an unequivocal vindication of McCulloch's approaches;" of his absorbing story of reinventing the wheel, in this case the "new, hot field" (5) of neural networks; and of a comprehensive bibliography of more than 50 references, we hoped to persuade him to update the reflections on McCulloch for this collection. He never answered this invitation. As it turned out, he never received it: Donald H. Perkel died of cancer early in 1988.

In the course of the development of this publication, through the happy intercession of Cornelia Bessie, I became the obstetrician for Rook McCulloch's brain child, and I was fortunate that Axel Duwe of Intersystems Publications offered me his good offices for the final realization of this book.

Thanks to Cornelia's assistance, Letty Duwe's aesthetic sense in typesetting more than half of this collection, and Axel Duwe's patience, my running through this last leg of a relay that took more than a decade made this not a labor, but a pleasure of love.

Heinz von Foerster
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