After his immigration, first to Germany and then to Bohemia, Tycho's preoccupations—aside from the difficulties of suitably relocating himself and his family—were to publish the works that would guarantee his fame and to defend his priority in what he seems to have regarded as his chief claim to fame: the Tychonic system, a transformation of the Copernican system that kept the Earth at rest in the center while the Sun revolved around it carrying the accompanying planets. Similar schemes had occurred to more than one thinker of the time, but Tycho regarded one of them, Nicolai Reymers Ursus, as an out-and-out plagiarist and pursued him with lawsuit and counter-publication until his prey escaped by death. Ironically, Tycho's chief reason for acquiring Kepler as an assistant was to have him prepare an *Apologia contra Ursum*. Once more, Tycho's egoistic striving had consequences that went far beyond what he had envisaged, blinkered as he was by the limitations of time, place and social context.

Thoren's biography is likely to remain the definitive work on Tycho for a long time to come. And it makes a very good read.

Introduction to the Theory of Neural Computation

John Hertz, Anders Krogh and Richard G. Palmer
Addison-Wesley, New York, 1991. 327 pp. $44.25 hc
ISBN 0-201-50395-6

The growing interest in neural computing is based on the hope that computational architectures resembling in some sense the structure of our brain can perform tasks that are difficult for conventional computers and algorithms but that appear easy for the brain. Among those tasks are the abilities to deal with information that is fuzzy, noisy and inconsistent, to learn from examples and to operate independently of a specific program. These hopes are almost certainly bound to be disappointed unless one understands at least some of the brain's basic functions.

Introduction to the Theory of Neural Computation can be viewed as a first guided tour through many of the concepts, ideas and models that have evolved in this field over the last one or two decades. It starts with the pet of theoretical physicists, the Hopfield model—a fault-tolerant associative memory—and some of its various extensions. The book continues with single- and multi-layer feed-forward networks, the type most widely used in technical applications, including supervised learning. The book's next topic deals with various aspects of unsupervised learning in a variety of network architectures. The last chapter, reflecting the background of the authors, shows how methods of statistical physics can be applied to studying models of neural networks.

The title of the book is somewhat misleading because there is nothing like *the* theory of neural computation. Some of the topics covered have a quite elaborate theoretical background; others do not. Those theories that exist are described as simply as possible but are not oversimplified. This is one of the strong points of the book. The book's other virtue is its quite complete coverage of the various attempts to understand the computational capabilities of different types of networks. Even those readers who do not have much background in mathematics can understand almost any chapter. Thus, the book is a pleasure to read. Although parts of some of the chapters have the character of a warehouse catalog, they provide a good and complete reference to the literature.

Because the aim is to provide those interested in artificial networks with some basic knowledge of the field, the book contains only a few basic facts about the biological aspects of neural networks. Nevertheless those who are primarily interested in biological networks also may find useful information and thoughts.

This first guided tour through a rapidly evolving and fascinating field has been accomplished successfully. I recommend this book highly to those who want to do more in this field beyond playing around on a personal computer.

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Electroweak Interactions: An Introduction to the Physics of Quarks and Leptons

Peter Renton
Cambridge U. P., New York, 1990. 596 pp. $110.00 hc
ISBN 0-521-26603-3; $37.50 pb
ISBN 0-521-36692-5

The great success of the "standard model" as a compact intellectual foundation for understanding elementary particle interactions has encouraged the writing of a number of expository textbooks during the past decade. Peter Renton's book is a recent addition to a collection of graduate-level texts that includes Lev B. Okun's *Leptons and Quarks*, Ian J. R. Aitchison's *An Informal Introduction to Gauge Field Theories*, Kerson Huang's *Quarks, Leptons and Gauge Fields*, Chris Quigg's *Gauge Theories of the Strong, Weak, and Electromagnetic Interactions*, and *Quarks and Leptons* by Francis Halzen and Alan D. Martin. *Electroweak Interactions*, the longest and most comprehensive of these books, is somewhat mistitled because it also includes a fairly extensive discussion of quantum chromodynamics, the physics of strong interactions.

Renton's book is based on a course of lectures given to first-year postgraduate students at Oxford, most of whom were experimentalists in high-energy physics. His text is, however, written entirely from a theoretical perspective, albeit starting from a very basic level. The first 145 pages are devoted to a general overview of particle interactions and symmetries and to a summary of nonrelativistic quantum mechanics, special relativity, angular momentum, group theory and the basic concepts of the field theory of elementary particles of spin 0, $\frac{1}{2}$ and 1. The introduction includes a derivation of propagators in configuration and momentum space, while fundamental issues in perturbative field theory, such as higher-order calculations and renormalization, are addressed in a later section.

The central part of the book consists of a very comprehensive and systematic discussion of many scattering and decay processes involving electromagnetic, weak and strong interactions. A list of topics includes electron–proton scattering, Compton scattering, muon decay, electron–positron annihilation, photon and hadron structure functions, neutrino–nucleus scattering, Cabibbo theory, tau–lepton decays, W and Z boson decays, mixing phenomena and many others. For most processes, the author presents the appropriate Feynman diagrams, first-order matrix elements and the resulting cross sections or decay rates. Derivations are not exhaustive but they do show several intermediate steps sufficient for reconstructing the final result; Renton provides a number of technical appendixes that assist the reader in this task. A very nice feature of the book is that the spin and polarization dependence is derived explicitly for many of the interactions listed above.

The last section of *Electroweak Interactions* discusses some of the open or unanswered questions in the