But the swarm-founding polistines are more advanced in certain respects. Though they have multiple egg-layers and often lack morphological castes, they are the most obligately social wasps (lacking a solitary colony-founding stage) and have the most sophisticated division of labor. Additional systematic and behavioral studies should help reveal where and perhaps why these kinds of socially advanced traits have evolved.

Readers of *The Social Biology of Wasps* should be warned of the considerable overlap in coverage, particularly between early chapters organized by taxa and later ones organized by theme. Also, there is no overview chapter that collects the main themes and places wasps in a larger context. Those desiring such a chapter should turn to the recent review of eusociality by Alexander, Noonan, and Crespi in *The Biology of the Naked Mole Rat*, (P. W. Sherman, J. U. M. Jarvis, and R. D. Alexander, Eds., Princeton University Press, 1991). While we are only beginning to understand the complexity of sociality in wasps, *The Social Biology of Wasps* provides a thorough and up-to-date account. It is fertile ground for graduate students seeking thesis topics and a great resource for anyone attuned to the tension between conflict and cooperation that makes social animals so interesting.

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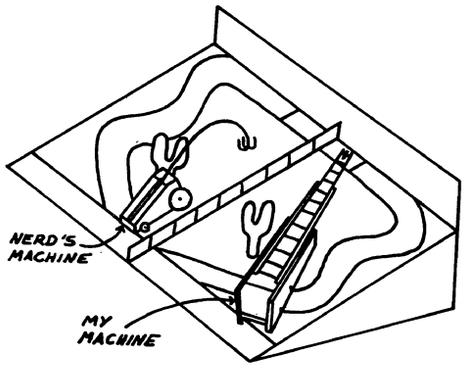
Engineer in the Making

The Idea Factory. Learning To Think at MIT. PEPPER WHITE. Dutton (Penguin), New York, 1991. xviii, 313 pp., illus. $21.95.

The premise of this unabashedly autobiographical book is simple: a young man with a bachelor's degree in environmental engineering from Johns Hopkins and a year and a half of experience in Europe (including one year working at the von Kármán Institute in Belgium) goes to graduate school at MIT. Although admitted into the school's Technology and Policy Program, White transfers to "Course 2," which is mechanical engineering at MIT, even before classes begin. The bulk of the book is descriptive of various of the courses White takes (with varying degrees of success) and of graduate and undergraduate student life in Cambridge.

After his first semester White secures a research "assistanceship" on a project involving a rapid-compression machine, for which it is his task to raise the compression ratio. Since his master's thesis work revolves about this project, it understandably plays a significant role in the story's development. In his second year, White moves into Senior House as a tutor, or resident assistant, and this position provides much of the focus for the book's descriptions of undergraduate life at MIT.



Entries in a contest where "some weight had to go to the top of a ramp in twenty seconds, and with just a little tiny electric motor and two little tiny springs . . .". [From *The Idea Factory*]

White's self-consciousness about what it means to be a student trying to distinguish himself, and an MIT student in particular, pervades *The Idea Factory*. This self-consciousness is especially explicit in an account of a televised contest in which a team of three MIT students is pitted against a team of three Berkeley students in attempting to explain the workings of an alleged perpetual motion machine. Tensions between concern for form and substance manifest themselves in how the students choose to dress and how they behave before the camera, but in the end it is the technical aspects of the competition that clearly determine the outcome.

Although *The Idea Factory* appears to be targeted toward a general readership, the technical detail White gets into in describing homework assignments in such courses as advanced fluid mechanics would seem to appeal to and be most accessible to a technically initiated readership of engineers and scientists. Indeed, this book provides a rare and welcome opportunity for more mature academic engineers and scientists to see materials and methods that have long become second nature to them from the point of view of a student. White's struggle with the concept of "model," for example, reveals how difficult it can be for some students to pick up even what might appear to be among the most fundamental aspects of the engineering and scientific method.

Many well-known personages are encountered in the pages of *The Idea Factory*, and the reader is given glimpses of the classroom style of several MIT professors. We spend an extended time in the labs of the legendary Doc Edgerton, to whom White goes for advice on the use of high-speed photography to capture the diesel fuel spray in the ignition chamber of the rapid compression machine. There is also much name-dropping in the book, and some of the names get damaged. Thus Vannevar Bush's name becomes "Vannebar" (on p. 7 and in the index, but not elsewhere), and Newton's Second Law is misnumbered the First (on p. 177). It is hard to know what to make of such lapses in technical detail in a book about technical detail, but they do give a touch of humanness to an account that at times borders on being overly mechanical.

The human side of the story of being a student in *The Idea Factory* is full of pathos, and White seems less sure of himself in trying to explain it. An awkward juxtaposition of personal tragedy and engineering calculation, for example, may leave the reader wondering if there really is something dehumanizing about technical education. But because White has, even with its flaws, told such a human and gripping story, it would be a disservice to potential readers of this book to reveal too much of the plot. Suffice it to say that in the end this is one articulate student's attempt to communicate across gaps in experience that have remained generally unbridged. White is to be applauded for his candid and hard-nosed account of his years at MIT, and his book is sure to reach a wide readership among those who have been through, at whatever level, the rigors of engineering and science education. Many will find this book hard to put down and will find much in it with which their own experiences can resonate.

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Children's Theories

Understanding the Representational Mind. JOSEF PERNER. MIT Press, Cambridge, MA, 1991. xiv, 348 pp., illus. $35. A Bradford Book. Learning, Development, and Conceptual Change.

Most people, even most scientists, spend much of their time figuring out what other people think: "Why did the lecturer explode about that trivial question?" "What does the peculiar behavior of the grants officer mean?" "Does he really love me?" In asking and answering these questions we rely on an enormous store of ordinary, common-sense psychological knowledge. Where does this