Craftsmen "do not consider the product's usefulness to society" (p. 137). However, the "dutiful craftsman" says that his "goals for America were 'conquering disease, increasing the life span, lessening of poverty, lessening of lawlessness, increasing productivity, and making able-bodied individuals who can work, work' " and he feels that "the computer he is helping to create should help lead to these goals" (p. 56).

Seventeen pages are devoted to a description of a "rare craftsman," unusual by virtue of his position in high middle management, where he exercises high-level administrative ability as the major part of his daily tasks. The reader wonders whether the rest of the craftsman category is filled with people opposite in character and behavior from the example. Why was the case categorized as it was and chosen as the chapter's major example?

Historically, the jungle fighters have been entrepreneurs and empire builders. Not cooperative, they best others, using any means possible. The 11 cases in this category are "lions" dominating through superior ideas, courage, and strength or "foxes" operating by seduction, manipulation, and betrayal. The brief chapter is chiefly devoted to a discussion of Andrew Carnegie and to a card-by-card description of one subject's Rorschach responses. The bases for the subdivisions are unexplained.

The company man is essential to the company, is loyal to it, and cares about it and its future. He lacks risk-taking ability, toughness, detachment, and other qualities necessary to reach the top.

The gamesman enjoys competition with others, wants to win, is innovative, flexible, and risk-taking, and has a zest for the game of work itself. "His main goal is to be known as a winner, and his deepest fear is to be labeled a loser."

Compared to the gamesman, the company man comes off a poor second. Some gamesmen, however, are evidently company men in disguise. In a key chapter entitled "The head and the heart," the author finds that "heart" qualities (for example, compassion, generosity) are not encouraged by the company and remain undeveloped for different reasons for each of the four types. For the gamesman the problem is "careerism."

Overly concerned with adapting himself to others, to marketing himself, the careerist constantly betrays himself, since he must ignore idealistic, compassionate, and courageous impulses that might jeopardize his career. As a result, he never develops an inner center, a strong, independent sense of self, and eventually he loses touch with his deepest

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strivings. . . . To stand up to others requires courage and to know what you want implies the sense of volition of a strong heart [p. 193].

This description of gamesman as careerist does not seem to fit the lengthy description of the gamesman as risk-taker, wanting to win, welcoming change and wanting to influence its course. It does, however, match the description of the company man, who exemplifies

what Fromm has called the "marketing character." When they describe themselves, they seem to be trying to give the right impression, to sell themselves to the interviewer. . . . Company men's self-descriptions often sound as though they are trying to satisfy everyone's view of what they should be with the result that there is hardly any self to describe [p. 92].

The author seems unaware, in his disarming statements about the necessity for psychoanalytic training to examine character traits, that there are methods that could help prevent confusion of traits between categories or provide some firmer basis for the categories themselves. Maccoby may be trying to make some statement about an aspect of American national character as it is shaped by the large corporation. In this sense one might wish to consider his description of types more seriously, even though the methodological base for the descriptions is very weak. For validation he cites the enthusiastic agreement of various managers who have read or heard about the categories, but the categories provide few possibilities of serious analysis of relationships between character types and work roles. Furthermore, although the categories are described, however unclearly, there is no attempt at explanation of how character types were developed by the "psycho-structure of the corporation," despite assertions that such is the case.

In his final chapters the author swoops from a base of few relevant data to stirring statements calling for a change in society, recommendations that are themselves vague but unarguable (it is, after all, hard to knock "strengthening life-giving attitudes in society"). The book concludes abruptly with brief but glowing references to two corporation presidents, "managerial mutants," who have developed their hearts, their heads, and their companies. The restructured companies themselves are not described.

These two books, then, represent different approaches to the question of the relationships between people and their work. Most of all they represent vastly different levels of execution. Both books are currently popular. *Men and Women of the Corporation* will be providing the

basis for research in organization theory and policy experiments for years to come. *The Gamesman* will make its major contribution to a better society by affording people at cocktail parties a chance to glibly label friends and coworkers, until the next set of catchy phrases comes along.

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A Memory Theory

Most theoretical controversies in psychological research on memory have had to do with the nature of memorial representations—semantic features versus propositional networks, analog versus propositional representations of visual information, and so on. There has been much less emphasis on the processes involved in the utilization of stored information, even though it is widely acknowledged that such processes will have to be a central component of any reasonable theory of human memory.

The book under review describes an example of a new generation of memory theories that attempts to provide a more detailed development of utilization processes. In 1973, Anderson and G. H. Bower published an influential book entitled *Human Associative Memory* in which they expounded a theory of memory that they called, for short, HAM. The theory Anderson presents in the present book, ACT, is a descendant of HAM. ACT and HAM make similar assumptions concerning the representation of knowledge, but, unlike HAM, ACT incorporates specific processes for the utilization of information stored in memory. ACT is a synthesis of several important concepts that have been incorporated in other models of cognitive processes: propositional networks, productions, processing-capacity limitations, and activation processes defined on a memory network. In ACT, declarative knowledge, knowing that, is represented in a propositional network similar to that used in HAM. Procedural knowledge, knowing how, is represented in condition-action pairs known as productions. The processes necessary to utilize the in-

formation stored in the network are specified as productions. The action components of productions can add structures to the network and activate nodes in the network. The conditions of all productions are matched against the activated part of the network. Those productions whose terms are satisfied by information contained in the activated portion of the network are executed.

Language, Memory, and Thought is a diverse book. It contains excellent summaries of previous theoretical work, discussions of the logic of theory construction and evaluation, and a detailed specification of the formal semantics of ACT representations. Of course, the author's primary objective is to describe ACT and to present various theoretical and empirical results that support the theory. Included are analyses of fact retrieval, inferential processes, encoding specificity, depth of processing, language comprehension, and induction of procedural knowledge. I give ACT high marks for generality; I was impressed by some of the theoretical analyses of various phenomena, finding them insightful and provocative.

Anderson is very much concerned with the problem of evaluating complex theoretical systems like ACT. He asserts, and I agree, that it is not possible to develop direct, decisive tests of such systems. One method of evaluation is to derive models of specific experimental paradigms from the general theory and to compare their predictions with empirical data. In ACT, such a model has two major components: (i) the subject's representation of the materials of the task in long-term memory is described in terms of the propositional network, and (ii) the processes by which the subject performs the task are described as a set of productions. The complete ACT theory, realized as a computer program, can be used to simulate performance. The theory includes activation-rate and storage parameters that would have to be estimated by Monte Carlo methods in order to fit empirical data. Unfortunately, Anderson does not show us any quantitative predictions obtained by simulation from the complete theory (he points out that the necessary Monte Carlo runs would be prohibitively expensive for a simulation program as complex as ACT). His predictions, which are calculated from approximations whose values are determined by the assumed network structure and the activation process defined on the network, are derived by ignoring the interactions and complex dynamics of the complete system. I don't want to leave

the impression that Anderson has not been able to provide strong empirical support for some of the basic mechanisms incorporated in ACT. In particular, I think the results of his fact-retrieval experiments give strong support for the hypothesized network structures and the activation process.

Some positions concerning memory representation that have been advanced with great vigor in recent years have not seemed worth pursuing because their proponents have not yet given us any reasonable explanation of how the proposed representations could be utilized. ACT, with its emphasis on detailed description of processes of utilization, makes a needed contribution to the field.

Anderson's analyses of various experimental paradigms provide another illustration of the utility of his emphasis on process. The production formalism in essence defined a programming language that reminds me of PLANNER or QA4 (D. G. Bobrow and B. Raphael, *Comput. Surv.* **6**, 155 [1974]). A model of an experimental paradigm is a program that performs the task. Such programs make explicit the relationships between hypothesized structures and processes and subjects' performance. In addition, the analyses make clear the task-specific components of the psychological processes underlying performance in the particular paradigm.

Finally, some comments about the book itself. As I said earlier, it deals with a wide range of topics, from cognitive psychology and artificial intelligence to automata theory and model-theoretic semantics. Anderson gives his reader a good deal of assistance in detouring around those sections of the book that are not directly relevant to the development of ACT as a psychological theory. However, the reader is going to have to learn a new programming language, the production formalism. A word of warning to those whose knowledge of programming is limited to FORTRAN: All those nested parentheses are significant; you will have to understand what they mean. Here again, Anderson gives the reader a great deal of assistance in understanding the productions that make up a given model. This is a difficult but excellent book. Anderson's proposals concerning the processes that utilize stored knowledge are important developments. I strongly recommend this book to all students of language, memory, and thought.

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Rain-Forest Prosimians

Ecology and Behaviour of Nocturnal Primates. Prosimians of Equatorial West Africa. PIERRE CHARLES-DOMINIQUE. Translated from the French by R. D. Martin. Columbia University Press, New York, 1977. x, 278 pp., illus. $17.50.

This book is concerned with five little-known sympatric species of nocturnal prosimian primate indigenous to the equatorial rain forest of Central West Africa, one of the most complex of the world's ecosystems. The result of nearly 10 years of meticulous work involving direct observations by means of headlamps, trapping, marking, and releasing, and, more recently, radio-tracking, as well as ingenious experimental interventions under natural conditions, it goes well beyond mere description of behavior and related ecological factors to show how intricately and inextricably behavior and ecology are intertwined.

The species studied are Allen's bushbaby, the needle-clawed bushbaby, the dwarf bushbaby, the potto, and the angwantibo. For each there emerges a detailed picture of food preferences and feeding strategies, locomotor patterns, activity patterns, diurnal sleeping sites and habits, antipredator tactics, and, most important, aspects of social behavior, including complex repertoires of communication, social relationships, and territorial behavior.

The five species occur together in a single, complex ecosystem which contains, in addition, some 120 other mammalian species and well over 200 avian species. In these circumstances the primate species are potentially in competition with each other for space and available food resources. The author presents his subject in such a way as to show clearly how the five species manage to avoid such competition by fine adaptations to niches the others are unable to exploit. Each exploits a "precisely determined spectrum" of food resources in a specific and well-defined biotope. The five species occupy ecological niches not very different from those occupied by the earliest nocturnal primates at the beginning of the Tertiary.

Ecologically speaking the book brings out very clearly the difference between the nocturnal and the diurnal worlds, which require quite different means of, for example, communication and location of food. The author points out the importance of this difference both for the study of the evolution of social behavior and for the interpretation of many other