government to come to terms with the realities of the thermonuclear age. The worldwide protest against atmospheric testing and its deadly by-products stemmed from the outcry of such concerned scientists as Albert Schweitzer, Linus Pauling, and Ralph Lapp. Refusing to accept the assurances of the AEC, these men informed the people of the danger facing mankind and brought to bear the pressure of world opinion that persuaded Eisenhower that American interests would be best served by entering into a ban on testing. That President Eisenhower rose above the narrow concerns of Strauss, McCone, and the AEC is testimony not only to his good judgment but to the determination of scientists dedicated to what was best not just for the United States but for the entire human race.

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Cognition and Its Disorders

From Neuropsychology to Mental Structure. TIM SHALLICE. Cambridge University Press, New York, 1988. xvi, 462 pp., illus. $59.50; paper, $24.95.

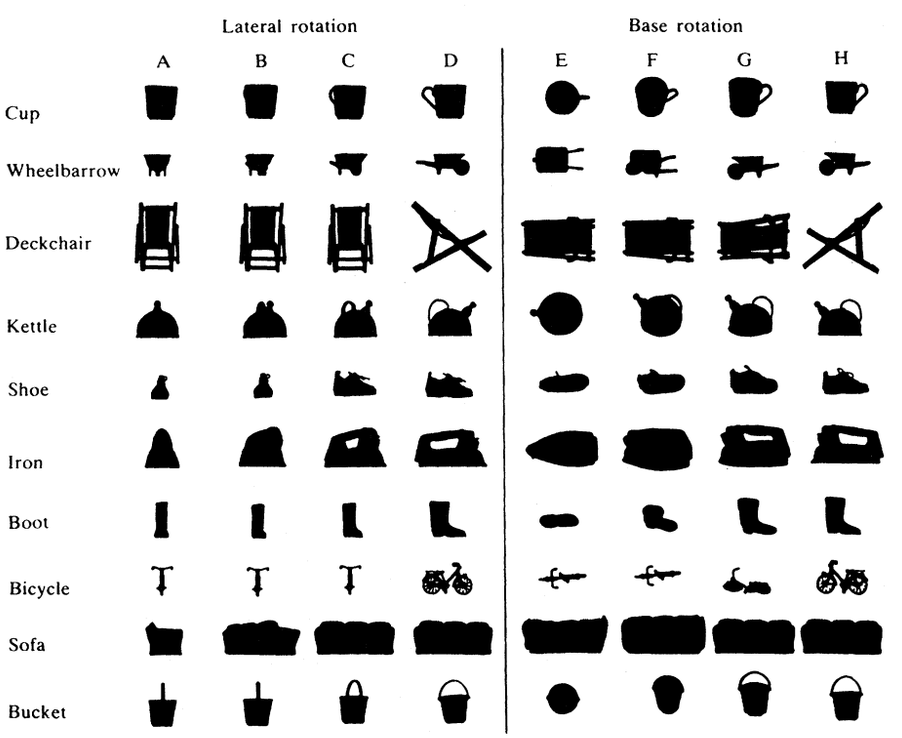
Shallice's book belongs to a branch of cognitive psychology (designated cognitive neuropsychology) whose aim is to learn more about normal cognition by studying patterns of impairments to cognition that have been caused by brain damage. Such patterns of impairment can be remarkably selective—hence remarkably informative. In some people with defects in the comprehension of words, the comprehension impairment can be confined to animate objects, with intact understanding of words referring to inanimate objects. Difficulties in producing words can be restricted to the production of proper nouns. Some patients whose reading of content words such as *elephant* or *chrysanthemum* is good cannot read even the commonest function words such as *the* or *and*. Examples of such selective deficits are now legion in cognitive neuropsychology. They show that cognition must be profoundly modular. Our semantic systems must have separate subsystems for animate and inanimate concepts; our knowledge of names must involve one subsystem for proper nouns and another for common nouns; and there must be separate lexical systems for content words and function words. These are claims about normal cognition; but they are made on the basis of studies of people with damaged cognitive systems.

In this book Shallice attempts two tasks. First, he expounds and scrutinizes theoretical ideas about major cognitive abilities, including memory, the perception and production of spoken and written language, attention, visual object recognition, the planning of action, and consciousness. Thus the book is a book about cognitive psychology; the fact that all the empirical results discussed in it happen to have been gathered from neurologically impaired people rather than from college students is, a cognitive neuropsychologist would argue, of no particular significance.

The second task of the book is to explain in detail basic ideas underlying the practice of cognitive neuropsychology and to subject these ideas to critical analysis. The emphasis on the single-case study, the structure of inferential arguments based upon double dissociations of function, the syndrome and the symptom complex, the Fodorian claim that modularity cannot be a property of such "central" processing systems as the calculation system—these are some of the fundamental ideas to which Shallice devotes attention. Hence the book is intended to contribute generally to cognitive psychology as well as to the understanding of clinical phenomena.

There is much in the book for cognitive neuropsychologists to argue about; let me give a couple of examples. A good deal of work in this field is characterized by an insistence upon single-case studies coupled with an indifference toward neurological information about the patient under investigation. The argument for this goes as follows. Any interesting cognitive system (the language-processing system, say) will consist of a very large number of individual processing components. If so, the likelihood of any two brain-damaged individuals having suffered precisely the same pattern of impairments and preservations of this set of components must be very small. Averaging over patients will thus not be justified, since each of the patients in a group will be different.

As for neurological information such as etiology or location of damage, the cognitive neuropsychologist may argue that what matters is what components of the system are damaged, not what the cause of the damage is—what difference does it make whether, say, the letter-recognition system was damaged by stroke, cerebral hemorrhage, or gunshot wound? And of what use, for the purposes of cognitive neuropsychology, is information about lesion location—how could such information assist in the task of learning more about normal cognition from studying acquired impairments of cognition? Shallice refers to this position—the complete rejection of group studies and the indifference to neurological data—as "ultra-cognitive neuropsychology" and



Two types of rotation, A–D and E–H, studied by Warrington and James (1986) . "The task of the subject was to identify the object at the smallest possible angle of rotation. Two groups of subjects were used: patients with right hemisphere lesions and normal controls. As expected, the right hemisphere patients were impaired on the task." [From *From Neuropsychology to Mental Structure*]

wishes to distance himself from it, arguing that neurological data can sometimes make a contribution and that there are circumstances under which group studies are valid. Any cognitive neuropsychologist will want to ponder the arguments here, even if ultimately disagreeing with them—as I do.

Another belief held by many cognitive neuropsychologists is that assigning patients to syndromes such as "Broca's aphasia" or "amnesia" is unhelpful: if every patient has a unique constellation of impaired and preserved processes, why group patients into categories? Shallice's line here is to distinguish between "mixed syndromes" (where the patient exhibits a variety of symptoms that are caused by more than one impairment of the relevant processing system) and "single-component syndromes" (where the symptoms are all due to a single underlying impairment of processing). I find it difficult to accept this defense of the syndrome concept, simply because I doubt that examples of single-component syndromes can be clearly demonstrated. One such syndrome that Shallice would offer is pure alexia: patients with this condition can have normal spoken-language processing, normal writing and spelling, and normal vision but severely impaired visual word recognition. One might be inclined to group all such patients together, claiming that they all have exactly the same processing impairment, namely, damage to the visual word recognition system. As Shallice himself notes, however, a different functional lesion—impaired access to the visual word recognition system—would produce the same symptoms (as indeed would impairment of the procedures that pass information on from the system to subsequent processing stages). Thus in any plausible model of the language-processing system, different pure alexics will have different loci of impairment, and so treating them as a homogeneous group is unjustified. Since, I believe, this is a perfectly general argument, applying to any condition that Shallice would regard as a single-component syndrome, I remain dubious about the utility of the concept of the syndrome.

But I am not dubious about the value of this book. The interesting and profound things it has to say about many different kinds of cognitive processes make it important as a contribution to cognitive psychology. The meticulous analyses of the methods and inferences used to draw conclusions about normal cognition from studies of abnormal cognition make it crucial as a contribution to cognitive neuropsychology.

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Rain Forests from Inside

The Tropical Rain Forest. A First Encounter. MARIUS JACOBS. Remke Kruk *et al.*, Eds., with a chapter by Roelof A. A. Oldeman. Springer-Verlag, New York, 1988. xiv, 295 pp., illus. Paper, $39.95. Translated, with revisions, from the Dutch edition (Muiderberg, 1981).

In this book, a tropical botanist tries to convey to students and educated laypersons the beauty of rain forest, the delicately interwoven relationships among its plants and animals, and the wasteful profligacy with which humanity is progressively destroying it. Jacobs introduces us to how rain forests work, to the diversity of their plant forms and the multitude of their species, and surveys the status and discusses the peculiarities of rain forest on different continents. He also discusses its exploitation and the devastating consequences thereof and wrestles with how to justify its preservation.

Jacobs deliberately evokes E. J. H. Corner's vision of rain forest as a magnificent culmination of evolution, an epitome of mutualism. Jacobs shows how rain forest regulates its environment, how its plants inveigle animals into pollinating them and dispersing their seeds and enable them to do so more easily, and how the forest is organized to recycle nutrients with minimal loss.

Jacobs is much influenced by Corner's worldview. Like Corner, Jacobs shows little interest in the mechanisms of evolution. His discussion of speciation is cursory, his remarks about the defenses of plants against herbivores minimal, and his interest in any aspect of competition practically nil. Many American biologists will seethe to see him ignore so many topics we consider important. There are, however, other ways to approach biology, and attending to them might broaden our own perspective. Perhaps we need reminding that Adam Smith and Howard Odum, both quite interested in competition, viewed competition simply as an engine for the development of more perfect mutualism. Corner and Jacobs were surely right to see mutualism as the key to understanding the interdependence of rain forest organisms, as it is, as Regal has argued, to understanding the evolution of flowering plants.

In other aspects as well, Jacobs offers glimpses of an unfamiliar world. Readers will be jarred to learn that this lover of the rain forest considers it quite normal to cut down a tropical tree bearing flowers or fruit if there is no other way to identify it. Readers will rejoice at the wealth of references to Dutch work in Indonesia (and Suriname)—a tradition of which most English-speaking biologists know far too little. Readers will puzzle over the lovely drawings of tropical scenes, some quite strange, from the *Flora Brasiliensis* of Martius, which Jacobs scattered through his book in the view

"A biologist's camp in the rain forest. Shelters have been made of poles cut nearby; tarpaulins give protection from the rain. Note the hammocks: in the lowlands, like here, it is much too warm to sleep in a closed space." [Photograph taken north of Manaus, Brazil, 1982; from *The Tropical Rain Forest*]