observations of Freud, as a source of hypotheses for experimentalists to test. Some of the earlier ideas have indeed been tested in this way, the theory of embarrassment for example, and some of the new ones here could be. Some of this material may lead to research in another way, for instance by suggesting the different forms that territoriality may take. Other hypotheses are virtually untestable—the idea that there is a need for public order, or that self-presentation is usually deceptive. Goffman does not seem to be trying, however, to build up a body of empirical laws and verified hypotheses; he seems to be elaborating a conceptual scheme which will enable us to understand everyday social behavior.

The ideas presented here are of fundamental importance, but I find it difficult to understand precisely what the author's theoretical position is. He stresses the diversity of behavior in different settings, as if the rules for each setting are the result of historical trial and error in different cultural groups. At other points he suggests empirical laws which could apply to all situations. He stresses the similarity with animal behavior, suggesting now that the capacity for these different kinds of social performance is innate. He uses ideas from linguistics, suggesting that there is a kind of grammar of nonlinguistic behavior, though the elements and the rules are not spelled out. This leaves open a host of basic problems. On the more specific topics of rules and rule-breaking with which the book is concerned, what exactly is the difference between basic interaction rules and social conventions, between rules that when broken lead to the breaker's being regarded as mad, criminal, amusing, an innovator, or just as a deviate? And does all social behavior fit this model, which seems most appropriate for rather stereotyped rituals?

What is the importance of studying such apparently trivial behavior as hand-holding? In the first place it provides us with a clearer understanding of the extremely important matter of interpersonal relations, and how they are managed, signaled, and negotiated. Second, it has practical application in the analysis of the behavior of mental patients. Goffman's earlier book *Asylums* was influential in the reform of these institutions—so that his account there has ceased to be correct. In the last chapter of the present book he presents a most illuminating analysis

of the social behavior of manic patients as people who have what are taken to be the wrong definitions of themselves, who break rules of access and territoriality, in an attempt to create a certain pattern of social relationships. Goffman can explain why this upsets other people who are dependent on the normal system of rules and relationships, but he does not explain how patients develop this particular style, and it is not very clear what the implications are for treatment.

It is a little disappointing not to find in this book more convergence between Goffman's idiosyncratic approach and the enormous body of experimental and allied material in this area. In his citations Goffman still prefers comic books and offbeat memoirs to solid empirical data. For example he makes no reference to social psychological experiments on deviance or to experimental work on nonverbal communication, both of which are highly relevant to the main themes of this book. Perhaps the real problem is that there are still fundamental differences of approach between those who regard human social behavior as a kind of language, as an extension of animal social behavior, or as a branch of experimental psychology, and those who see it as an intricate social system requiring the collaboration of the actors in ritualized interaction sequences.

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A Paradigm Shift in Psychology

Mental Imagery. ALAN RICHARDSON. Springer, New York, 1969. xii, 180 pp. $6.75.

Imagery. Current Cognitive Approaches. SYDNEY JOELSON SEGAL, Ed. Academic Press, New York, 1971. xiv, 138 pp., illus. $7.50.

Imagery and Verbal Processes. ALLAN PAIVIO. Holt, Rinehart and Winston, New York, 1971. xii, 596 pp., illus. $13.

At one time, psychology was the study of the contents of the mind. Among the most interesting items available to introspection were (and are) *images*, that is, phenomena very like actual sensations and perceptions which occur in the absence of adequate stimuli. It seemed important to determine how many different kinds of imagery there were; to categorize people in terms of the frequency and vividness of their images in various sense modalities (vision, hearing, and so on); and to discover the introspective differences between images and perceptions. In addition, there was a good deal of interest in the functions of imagery and its role in the higher mental processes.

Unfortunately, it turned out that the methods of introspective psychology were not up to the task set for them, and none of these questions has ever received a satisfactory answer. The inconclusive experiments and conceptual confusion which characterized the early work on imagery helped to assure the

success of behaviorism, at least in America. Introspective psychology disappeared, and the study of imagery vanished with it. For about 30 arid years respectable psychologists considered it almost indecent to speak of mental processes. When they had to deal with problem solving and other complex activities they took refuge in "covert verbal responses"—words supposedly spoken by the subject to himself, which were connected by bonds of *association*. The only kind of memory studied was verbal memory; thinking was nothing but "verbal mediation"; both were simple examples of associative processes.

In the last ten years this situation has changed remarkably. The behavioristic taboos have been broken, and the mind suddenly seems worth studying after all. Ideas and images are once again discussed in respectable journals. What contemporary cognitive (or "information-processing") psychologists mean by "the mind," however, is very different from what their predecessors meant. The definition is no longer in terms of conscious, introspectively given phenomena. Instead, it is in terms of a flow of information in the organism. Theoretical terms like "storage," "retrieval," "recoding," and "selection," now in common use, do not refer to elements of consciousness but to hypothetical stages of activity or processing. Because of this paradigm shift, contemporary

psychologists feel able to attack many crucial and long-neglected problems and have a new array of methods and concepts with which to do so. To be sure, it must not be thought that all those who exercise this new-found freedom are in theoretical agreement. Many accounts of cognition are being put forward, including some (as we shall see) which are essentially restatements of associationism.

No manifestation of these changes is more striking than the resurgence of interest in mental images. As might be expected, the new study of imagery uses very different methods than the old; most of its goals are different as well. There is little contemporary interest in typologies of either images or imagers, and equally little in defining and differentiating conscious events. The important questions concern the *function* of the image: there is a proliferation of hypotheses about the mechanisms and stages of processing in which imagery is used and much experimental testing of these hypotheses. These experiments have already generated a great deal of important information about imagery: how long it takes, what systems it competes with, how it facilitates problem solving, what part it plays in mnemonic devices, and so on.

The three books reviewed here are striking illustrations of these changing conceptions. Richardson's *Mental Imagery*, though it appeared in 1969 and takes account of many modern experiments, is organized entirely in the classical mold. Segal's more recent collection of readings includes papers that seem to be drawn from both sides of the watershed. Paivio's massive volume, the most important of the three, reviews the new work on imagery systematically from the perspective of associationism.

Richardson defines "mental imagery" at the outset. It refers to

(1) all those quasi-sensory or quasi-perceptual experiences of which (2) we are self-consciously aware, and which (3) exist for us in the absence of those stimulus conditions that are known to produce their genuine sensory or perceptual counterparts, and which (4) may be expected to have different consequences from their sensory or perceptual counterparts [pp. 2–3].

His first chapter expands on this definition, and the others are called "After-imagery," "Eidetic imagery," "Memory imagery," "Imagination imagery," and "Conclusions and speculations." As this list would suggest, he is primarily concerned with describing and categorizing.

	Piano	Justice
	Snake	Ability
	Clock	Ego
	Pencil	Moral
	Lobster	Bravery
	Cigar	Amount
	Star	Theory
	House	Freedom
	Pipe	Grief

Examples of pictures, concrete nouns, and abstract nouns used as stimuli in memory experiments by Paivio and his collaborators. Recall is usually far better for the concrete material. [From *Imagery and Verbal Processes*]

For example, there is a good account of the "recurrent" images experienced by many persons after prolonged performance of a visually demanding task like driving or berry picking (upon closing one's eyes, one may "see" a vivid and endless procession of the objects one has been looking at all day). The description is valuable; such images are ignored in the other two books under review and in most similar works. But once they have been described there is little else to do except to wonder whether to class them with the after-images or with hypnagogic phenomena. The mnemonic uses of imagery, to which Paivio devotes many chapters, take up only four short pages in Richardson's book, while the subjective phenomena observed under conditions of sensory isolation get nine. In short, while *Mental Imagery* is a useful reminder of the subjective fascination of its topic, and of the many phenomena for which the information-processing conception has no present place, it does not reflect the current state of the art.

Sydney Segal was one of the very few contemporary American psychologists who conducted experiments on imagery before it became fashionable to do so. She combined a consistent interest in a classically conceived problem—the distinction between imagining and perceiving—with a readiness to use modern experimental and statistical methods. A review of her work on this problem is among the five symposium papers which comprise *Imagery: Current Cognitive Approaches*. Also included are an article in the modern idiom by Paivio, another by Ralph Haber which deals with brief visual persistence rather than imagery proper, a review chapter by Bugelski, and an essay by Barber which contrasts the "hallucinations" characteristic of LSD intoxication with the very different "hallucinations" produced by hypnotic suggestion. The sum makes a very useful little book, which will long remind us of its editor. Sydney Segal's accidental death a few months ago was a severe loss for all those who knew her and knew her work.

Paivio's *Imagery and Verbal Processes* is a systematic attempt to integrate imagery into the framework of modern association psychology, by assigning it a status precisely equivalent to that which verbal mediators have enjoyed for a theoretical generation.

Imagery and verbal processes are viewed as alternative coding systems, or modes of symbolic representation [p. 8].

Where the associationists of the 1950's had to account for learning and transfer and thinking and meaning in terms of bonds between "verbal responses" alone, Paivio offers a second type of element that can play a similar role. He believes that associationism, thus enriched, provides a satisfactory approach not only to the classical problems of learning and memory but also to those of language and meaning.

The theoretical assumptions on which the argument is based are spelled out clearly in the early chapters, and repeated frequently throughout the book. There are said to be four distinct levels of information processing, which the author, alas, insists on calling levels of "meaning." There is first a transient storage system in each sense modality, of the type accepted by most psychologists today, which preserves incoming information in relatively raw form for a brief period. There is then a "representational process," aroused directly by the stimulus pattern, which may be either a visual image or some kind of verbal unit. Activity at this level serves the same function as "trace contact" did in Gestalt psychology; it

corresponds to recognition of a stimulus as familiar. Next, and most important in the theory, is "referential meaning." A word can arouse an image; an image can arouse a word. Finally there is "associative meaning," in which chains or hierarchies of associations among either words or images are activated. Verbal stimuli, whether words or sentences, can be either *concrete* or *abstract*: the distinction is important for Paivio because concrete words easily arouse images at the referential level whereas abstract words do not. Thus the former have access to two symbolic modes rather than one, with a corresponding advantage in many memory tasks. Picture stimuli, of course, are always concrete.

After setting out this framework in the first three chapters, Paivio goes on to survey a wide range of material. Separate chapters review the literature on tachistoscopic recognition, encoding and priming studies, associative memory, other kinds of memory, verbal mediation, image mediation, and so on. This is very useful work: the accounts of experiments are usually detailed and clear, and many familiar effects (for example visual fragmentation, perceptual set, associative symmetry) are given new and interesting interpretations. He gives particularly detailed consideration to the effects of abstractness/concreteness, as compared with such other traditional variables as familiarity or number of verbal associations, because his theory suggests that familiarity should be more important at the representational level and concreteness at the referential level. The data support him handsomely on this point. Among these chapters is also one devoted to the ancient mnemonic systems, whose importance for the psychology of memory is now generally admitted.

Though he is in his element when he reviews experimental results, Paivio is less surefooted when it comes to theories. Somehow the important questions slip unanswered through the cracks. For example, no consistent definition of "image" is ever offered. Images are described on page 12 simply as "*nonverbal* memory representations"; they are later assigned various specific properties (such as parallel processing); by page 439, they have become the psychological correlate of linguistic deep structure. This casual attitude toward definition means that he need never ask whether words and images exhaust the repertory of the mind, that
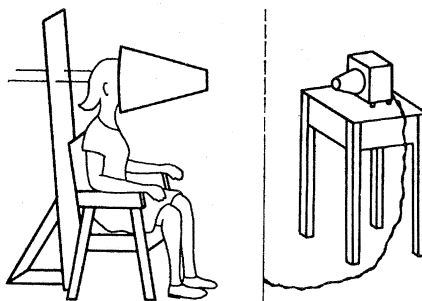
Hood used in imagery experiments by Segal. The subject is asked to form a visual image of something as if it were on the translucent screen, while the experimenter projects a real stimulus onto the screen from the other side. (The projector is usually in a separate room.) In general, imaging reduces the subject's ability to detect the projected stimuli. [From *Imagery: Current Cognitive Approaches*]

is, whether there are "imageless" concepts or thoughts. And indeed, he never does. In general, Paivio seems to take rational argument much less seriously than experimental data: thus he can adopt an imagist theory of meaning after carefully listing several objections to it which are never answered. The basic difficulty confronting this and all mediation theories—how the subject knows just what an image (or word) means in a particular instance—is never

faced. There is a rather undifferentiated acceptance of most contemporary theoretical concepts; the only harsh criticism in the book is directed at Chomsky's linguistic theory, which (predictably) is considered largely on the merits of the "psycholinguistic" experiments popular in recent years. Several chapters are devoted to such matters, and Paivio ends by endorsing the orthodox behavioristic view of language:

The present view, therefore, is that the associationistic model is essentially correct with respect to the intra-verbal contextual aspects of abstract language in particular [p. 439].

He is not worried about Chomsky's well-known criticisms of this "model" because they have all been answered in a recent paper by someone else!

Cognitive psychology cannot afford to ignore images, and cognitive psychologists cannot afford to ignore this book; it is too full of data. But data are not enough; we also need to understand what images are, and what they do, and what goes on when they are used. To these questions, we still have no adequate answers.

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Complexities of the Mind at Work

What Computers Can't Do. A Critique of Artificial Reason. HUBERT L. DREYFUS. Harper and Row, New York, 1972. xxxvi, 260 pp. $8.95.

The dominant theoretical paradigm of American experimental psychology, behaviorism, is recurrently decried for its mechanical conception of man. One of the most persistent critics has been Gestalt psychology, which offers examples of human abilities claimed to be beyond the explanatory power of the behaviorists' concept of stimulus-response associations. Gestaltists note, for example, the sudden appearance in consciousness of recognition, as in perception, and of understanding, as in insightful problem solving. Such phenomena, they claim, must have significant behavioral repercussions for which a behaviorist account is not possible. Though the Gestalt position has not been vigorously pursued for some time, the doubts it raised have never been quelled.

A recent challenger to behaviorism is cognitive simulation (CS), which attempts to define a level of analysis distinct from the matter-moving level of body, the phenomena-experiencing level of mind, and the energy-transforming level of brain. The function of this level is information processing, precisely defined by and simulatable on a digital computer. Though still limited by lack of a theory of programming, the computer is in an exact sense a universal symbol-manipulating device. CS is thus the most powerful precisely specifiable conception of cognitive processes so far proposed.

CS is sometimes seen as offering a rapprochement between behaviorism and Gestalt psychology by maintaining the objectivity of the former without being bound by its limited conceptual tools. For example, in behavioristic analysis problem solving amounts to blind search, and there is thus no plausible account of the success of intelligence applied to difficult tasks. CS proposes selective search to explain how great numbers of possibilities are dealt