elusive, although the perusal of this monograph may bring another investigation a little closer to that objective.

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Subjective Phenomena

Image Formation and Cognition. MARDI JON HOROWITZ. Appleton-Century-Crofts, New York, 1970. xvi, 352 pp., illus. $12.50.

The psychology of cognition has undergone some major reorientations in the last five to ten years, and this book is an important and timely contribution to that active field. Mental imaging—the subjective equivalent of looking and listening—has its equivalents for such experiences as taste, smell, touch, and pain, and images of these various kinds play an important part in thinking, remembering, and fantasy, all concerns of the cognitive psychologist. Horowitz, writing as a psychiatrist, shows imagery to be important also in the practical sphere of dealing with patients, and examines its various forms in their relation to symptoms, treatment, and prognosis.

A new and original examination of the problem of classifying the various phenomena of imagery begins the book. Horowitz deals ably with hallucinations, dreams, and the half-awake (hypnagogic) state and the strange intrusions of dreamlike imagery that some people experience while falling asleep. He discusses the body image—the conception a person has of his own body as a spatial object and of its shape, position, and orientation to surroundings—and offers interesting clinical evidence of disturbances of the body image that may occur in the hypnagogic state or under drug or anesthetic influence. Other phenomena dealt with are synesthesia, with its intersensory blendings of imagery and perception (such as the shape and color imagery some people have on hearing music); "flashbacks" (reexperienced images after drug-induced states); "dream scintillations" (successions of images that intrude in full wakefulness); and *déjá vu*. There is an up-to-date account of experiments involving sensory deprivation and hallucinogenic drugs, and a strong chapter on the influence of the brain in image formation.

Some basically important issues about differences in imagery arise in relation to work with psychiatric patients. For example, it might be assumed that the psychotic patient with auditory hallucination is in other ways primarily an auditory imager. Horowitz shows that the opposite is probably the case; his discussion recalled a low-powered visual imager, not a patient, who once said to the present reviewer, "I've had visual images once or twice, and they nearly frightened me out of my wits." In the wide variations of imagery within the realm of the normal we can find much to comfort the anxious parent, and the author is alert to this need. This book should be read by those psychologists who remain even today introspectively illiterate because of the shadow of an out-of-date form of behaviorism that proscribed introspection; by psychiatrists who wish to understand more of the psychology of imagery and perception; and by those lay to both disciplines who wish to learn more about the subjective mental life of their spouses, their children, and themselves. Differences between individuals can be considerable.

Some minor criticisms may be made of this important and otherwise scholarly book. There is on occasion a hint of resort to the use of imaginary examples; these (known to psychologists as "fantastic anecdotes") are dangerous in exposition and irrelevant to proof. One leading English investigator of such phenomena as synesthesia, Magdalene D. Vernon (p. 70), would doubtless prefer to be cited as "she" rather than "he." Investigators from the side of psychology may be cautious about whether phenomena reported by Iskower, and heavily loaded with theoretical interpretation of a psychoanalytic kind, justify the status given them by the label "the Isakower phenomenon." Finally, it seems a pity that an investigator of the author's caliber should make use of that esthetically barbarous and linguistically impossible term "psychedelic," whose unfortunate associations have often embarrassed rather than helped serious research on the effects of hallucinogenic drugs on imagery.

These are very trivial criticisms, of a comma-spotting kind. The book is an absorbing one, distinguished by originality, theoretical reorientation, and valid inference in relation to available evidence. After a first reading, the reviewer had to borrow it back repeatedly from colleagues working in the same field who proved deeply interested in the intellectual news it contains. He awaits the author's next book with more than usual impatience.

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Perception and Depiction

Optics, Painting, and Photography. M. H. PIRENNE. Cambridge University Press, New York, 1970. xxiv, 200 pp., illus. $13.50.

Artists, experimental psychologists, and philosophers have long been concerned with the puzzling fact that a flat object (a picture) can in some sense substitute for an arrangement of very different objects in three dimensions. As a first step in explanation, we note that any picture and any tridimensional scene that present the eye with the same array of light can thereby substitute one for the other.

Understanding this aspect of the perception of pictorial representation rests, therefore, on some knowledge of physical and anatomical optics. The first seven chapters (about half) of Pirenne's book examine the anatomy of the eye and the geometry of image formation; a discussion of light, linear perspective, and central projection culminates in a description of the painted ceiling of the nave of St. Ignazio. In this painting, Pozzo's painstaking use of the geometry of central projection presents to the eye of an observer, if he stands at one particular point on the floor, an array that is almost identical to that which would have been produced if the church had an additional story with a much higher ceiling and with figures floating in midair. From that viewing point, reportedly, a nearly perfect *trompe l'oeil* is achieved. From off-center viewing points, the depicted scene reportedly appears deformed (nonrectangular), just as one would expect, because the array of light then reaching the eye is what it would receive from the distorted tridimensional arrangement.

Such perceived distortions in a depicted scene should, according to this principle, occur whenever the picture is viewed from any position other than the central projection point: The perspective picture of an object is itself