mals are present in humans. The obverse, however, does not follow; behaviors not found in lower animals may indeed occur in man! One often has the impression that concepts inapplicable at the animal level are for many learning psychologists *ipso facto* of dubious if not disreputable standing. Animal-based concepts have even been incorporated into "behavioral therapy" for disturbed humans or "teaching machines" for uninformed ones. Not that these lack value, but there is the excess meaning carried in these ventures that man's vexing and baffling complexity will yield before the simple, elemental verities made clear in the animal laboratory. Would that it were so!

The problem with Lazarus's book is that he carries this correction, so usefully begun, too far. In the end his position amounts not to a correction really, but to a rather extensive refutation and divorcement. The mainstream psychologists have conceived motivation as an ultimate function of homeostasis. There are problems here —animals and humans often act as if they were seeking imbalance rather than equilibrium. But the concept still has power. Moreover, Lazarus's definition, in which "tissue needs" are divorced from motivation, leaves us asking just why certain "goals" and "routes to goals" become represented in cognition and, subsequently, take on such compelling power to prompt action. If the answer is that these goals, or some number of them, serve to restore homeostasis, then the question of tissue need manifestly is relevant.

The mainstream has, since the work of N. E. Miller, O. H. Mowrer, and R. W. Leeper, viewed emotion as a functional, organizing factor rather than a nonfunctional, disintegrative one. Lazarus considers this issue—of emotions as disorganizing (p. 358)—without openly taking a stand. However, it becomes clear that whether emotions are one or the other is in actuality academic for Lazarus, since he views emotion as a kind of artifact:

> From the present viewpoint, affective processes signify the manner in which the animal or person appraises a situation (because they are consequences of this appraisal). They are not the causes of behavior, but rather the consequences of certain cognitive activity. . . . We say that cognitive activity evaluating the significance of the stimulus-object for the animal's psychological welfare "orients" him toward or against the stimulus object, and the particular orientation is reflected in the affective state elicited by that object [p. 70].

Now perhaps this is what psychologists who speak of emotions systematically as hypothetical constructs are really saying, and we are merely restating it in a slightly different way. *A hypothetical construct, such as anxiety, must not be thought of in systematic usage as causing anything at all* . . . [p. 252].

Thus, Lazarus not only divorces motives from homeostatic processes, he proceeds to divorce emotions from motives! For the mainstream, motivation as a function of homeostasis has provided a broad tie between psychology and biology. Emotion has been conceived as that conditionable component of a physiological (primary) motive state which might become through learning responsive to formerly inadequate cues or signs. Fear, the generic term designating such arousal emotions, thus provides an explanatory base for anticipatory, planful, "looking-ahead" behavior—that form of behavior which in its elaborate, human forms we call cognitive and purposeful. It seems to me that in striking at these two principles (motives as homeostatic and emotions as motives) Lazarus threatens to undo the conceptual avenues that allow us to relate psychic processes to physiological ones and human behavior to that of animals. One can sympathize with the assertion that not enough attention has been given to human cognitive processes without finding it necessary to insist that *all* things psychological are cognitive. Lazarus presses this theme about as far as he can when he says,

> It is altogether possible that the extensive findings of stress biochemists that physiologically noxious agents produce changes in the hormonal secretions of the adrenal cortex are the result of their psychological impact. Few seem to take this idea very seriously; but it cannot be totally disregarded, because even in the animal research in this field, the animal is not prevented from "knowing" what is happening to him [p. 398].

Perhaps for these reasons Lazarus's theoretical treatment often leaves one uncomfortably adrift and in search of firmer footing. There is, for example, more than a hint of circularity in his treatment of appraisal of degree of threat and appraisal of coping. Lazarus advances the rule that as degree of threat increases, coping is impoverished. But it is also true that effectiveness in coping (as evidenced in ego strength, intelligence, and so forth) moderates the appraised degree of threat. The concept of primary appraisal of threat suggests that a man precariously clinging high on a mountainside would suffer an intense degree of threat. But what if he were an experienced mountain climber? Is he constantly moderating the primary appraised threat with secondary appraised coping potential? Or is he just significantly free of threat altogether?

It troubles Lazarus that behavioral scientists heed too little the uniquely complex and subtle in human behavior. The resolution, however, does not necessarily lie in allowing to flower an equally perplexing host of subtle, complex concepts with which to deal with this behavior, or in rejecting apparently simpler concepts formulated on and for simpler (animal) behavior. Elegance and simplicity of theory yet remain virtues so long as they are not preserved by the Procrustean stratagem of chopping off vexing irregularities. Selye managed to overcome just such a profusion of complex puzzles and unveil with considerable directness and clarity a valuable order in the reaction of animals to stress. Does Lazarus build on Selye's start and bring the beginning of clarity and understanding to psychological stress? I wish the answer were not so firmly negative. This is a scholarly, useful book which, in spite of a prefatory delimitation of goals, was aiming very, very high.

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Experience of Visual Distortion

The Nature of Perceptual Adaptation. IRVIN ROCK. Basic Books, New York, 1966. 303 pp., illus. $8.50.

During the last few years there has been a remarkable growth of interest in the behavioral consequences of distorting the visual array. Since the 1890's, when Stratton did his classical experiments, the question has been asked whether a person wearing inverting spectacles ever comes to experience the world as upright. This question has never had a clear answer, and it is now generally realized that the question is ambiguous. The ambiguity becomes apparent when one considers the effects of visual distortions on behavior rather than on the appearance of things. These behavioral consequences include (i) the disturbance of visual-motor coordination (visual-motor discordance), (ii) the

spatial discordance of vision in relation to the other spatial senses (intersensory discordance), (iii) the unusual motion parallax on moving the head, and (iv) disturbances of behavior associated with those objects which normally maintain a constant orientation to the observer (behavioral polarity).

The technique of reversing or inverting the visual array as used by Stratton, Ivo Kohler, and others produced all these disturbances at the same time, making definite conclusions impossible. The recent trend has been to isolate each component and to use behavioral measures rather than observations.

Irvin Rock has been in the forefront of recent work in this area and has now produced a thorough and lucid review. Rock directs his attention to "the problem of how things appear, both before and after prism adaptation." His theory is that memory traces relate the orientation, size, and shape of proximal stimuli to the appearance of objects. Adaptation or recalibration of these systems occurs when a subject wearing the distorting device is allowed (a) sight of his body, (b) movement, (c) sight of familiar objects.

This emphasis on appearance has, in my opinion, sometimes led Rock astray. He does not clearly set out the various behavioral consequences and behavioral measures of visual distortions, and the very title of the book implies that perceptual or phenomenal changes are the one and only problem. Rock ignores behavioral polarity; he writes that "the strangeness or unfamiliarity of objects or of the entire scene is not the issue. The issue is egocentric orientation. . . . With sufficient experience, familiar objects would undoubtedly cease appearing strange, but this does not imply a righting of the scene" (p. 64). But the strange appearance of things must be behaviorally defined and measured to have meaning, and Rock himself discusses how this can be done, for instance by recording the subject's responses to the letters M and W or to ambiguously oriented shapes such as the Schröder staircase. The changes which these sorts of behavior indicate are just those that most people would refer to as "righting of the scene." In any case, there is no reason for considering these problems less important than that of egocentric orientation. Indeed, apparent egocentric orientation is not a distinct category, for it may be defined in terms of visual-motor and intersensory behavior.

Rock's theory of orientation- and size-specific memory traces is best suited to deal with behavior associated with objects having a normal orientation and size, for this must surely be learned. It is more likely than Rock seems to suppose that visual-motor and intersensory coordinations (of which egocentric orientation is an example) are largely built into the organism. This is certainly the case in submammalian species. All animals must be capable of some modification of their coordinations, for they would otherwise be incapable of adapting to changes in the size of their own growing bodies, but this fact is not incompatible with the idea of a basically built-in system. The fact that human beings can learn to grossly modify this basic system does not prove that it was originally learned. It is more likely that this learning depends upon the control of basic mechanisms by higher-order cortical mechanisms.

The chapters on adaptation to altered image size and distortion of form are particularly valuable because much of the material has not been previously reviewed. I find the analysis of straightness and the relationship between Gibsonian adaptation and movement-induced adaptation to distorted shape especially useful. The book as a whole is a valuable discussion, and while the theoretical treatment may not always satisfy those who seek a "harder" behavioral approach, all must agree that Rock has given us many new theoretical insights into one of the most difficult questions in psychology.

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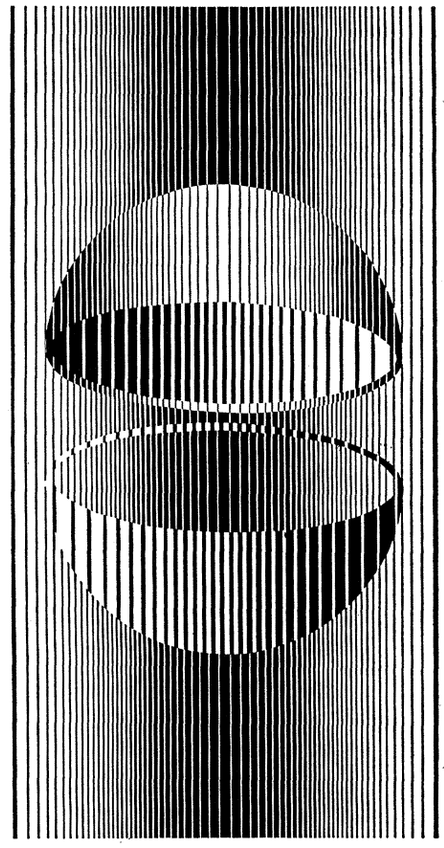
Tricks of a Trade

Optical Illusions and the Visual Arts. RONALD G. CARRAHER and JACQUELINE B. THURSTON. Reinhold, New York, 1966. 127 pp., illus. $7.50.

This book, described as "a creative guide for artists, designers, photographers, teachers, and students," consists of over 100 illustrations and virtually no text. The illustrations are well printed in black and white. They include examples of the traditional distortion illusions; op art pictures, notably ones by Bridget Riley and V. Vasarely with various repeated line effects; ambiguous figures open to alternative perceptual interpretations,



"Conics." Serigraph by Ronald G. Carraher, 1965. "Fascination with this form is related to gradient patterns and the role such unit structures have in creating an illusion of the third dimension. A bowl shape within a system of graduated lines is inverted and reversed to suggest both a solid and a void." [From *Optical Illusions and the Visual Arts.*]

reaching the greatest sophistication in the work of M. C. Escher, represented by one example; and numerous very striking commercial designs. Among the more interesting examples are normal photographs, especially one of contour ploughing in which the curved parallel lines seem to undulate above the field and off the page of the book.

The authors' intention was evidently to produce a portmanteau of visual effects for the benefit of artists and designers; the book is not aimed at scientists interested in the reasons for disturbances of the visual system. Explanations are not attempted, and no references are given to the experimental literature, which is in fact large and in places worthy of consideration. The lack of text is unfortunate, for there is a strong current movement in art schools to consider the underlying processes of visual perception and not to be content simply with learn-