

The Distinction Between Visual Perceiving and Visual Perceptual Experience

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Among the visual perceptual system's modes of functioning is the activity of visual perceiving, also called straightforward seeing, which keeps the perceiver in touch with the world. When the visual system is functioning in this highly adaptive mode, the system produces, and includes as part of it, a stream of visual perceptual experience (awareness). The latter is both a kind of consciousness and an ongoing process in the brain (or cerebral hemisphere; see commissurotomy and hemispherectomy). Absent all visual perceptual experience, the proximate product of the activity of visual perceiving would be simply the visual system's continuously embodying picked-up information from the stimulus flux at the visual receptors. This changing informational status of the visual system could still affect behavior, in the absence of visual perceptual experience; however, the perceiver could not base his or her actions on what was being visually perceived, since no one would be visually aware of anything when visual perceiving was going on. Thus, missing would be a major adaptational payoff of there having evolved a visual perceptual system of the human kind (which other creatures may also share).

The individual engages by means of his or her visual perceptual system (Gibson, 1966, 1979; Reed and Jones, 1982) in various activities that have a visual-experiential dimension. This experiential dimension, a kind of consciousness (Natsoulas, 1978, 1981, 1983a), is the present article's central concern. More specifically, the present concern is with a category of visual experience that shall be called "visual perceptual experience." The stream of such experience is both a product and a part of the activity of the visual system distinguished here as "visual perceiving." Accordingly, the concept of visual perceptual experience at work in this article is a narrower than usual concept of visual perceptual experience. Although there is no doubt that visual perceptual experience in the present sense has primary biological importance, because it is "a keeping-in-touch with the world" (Gibson, 1979, p. 239), visual perceptual experience is one of a number of kinds of visual experience, of which each is a product and part of a different activity of the visual system. To anticipate the discussion to follow, think of the stream of visual experience pro-

duced by the activity of visualizing. Visually perceiving the ecological environment and oneself in it is a different visual activity than, for example, visualizing, along with a physicist, the events proceeding at the heart of matter.

Any actual instance of visual experience, including visual perceptual experience, is both (a) a kind of occurrence or ongoing process in a functioning brain of a human being or other creature and (b) a kind of component of the individual's (or cerebral hemisphere's; see below) stream of consciousness (James, 1890 ; Myers, 1986; Natsoulas, 1985–1986, 1986–1987; Pope and Singer, 1980; Wild, 1969). Both of these descriptions apply to every instance of visual experience since the stream of consciousness proceeds in the brain of the living observer (as argued later; see also Gazzaniga, 1985; Hebb, 1980, 1981; LeDoux, 1985, 1986; Sperry, 1985, 1987). In this regard, the activity of visual perceiving, as distinct from visual perceptual experience, is a more complex matter. A statement to the effect that “visual perception” takes place in the brain may well be considered unacceptable if the reader understands *visual perception* to refer to visual perceiving. As will be seen, a substantial portion of visual perceiving proceeds outside the brain. And there are perception psychologists who will react to the suggestion that “visual perception” occurs in the brain as they would to the claim that bicycling occurs there. For example:

This same line of reasoning applies to understanding the relationship of the brain and the mind. I am reminded of an ingenious title of an article by Bill Mace: “Ask not what's inside your head, but what your head's inside of” (1977). The brain exists within the body and is undoubtedly necessary for perception, but perception (or for that matter any mental function) does not occur in the brain. Perception occurs within an ecosystem. The only way to comprehensively describe what occurs during perception is to describe it at the ecological level of organization. To elaborate on Mace's title, perception does not exist in the head, the head exists within perception (more precisely proprioception). The brain exists at a different level of organization than the mind. (Lombardo, 1987, pp. 330–331)

The scientific significance of the distinction between visual perceiving and visual perceptual experience (which is a stream that, so to speak, runs through the activity) is indicated by apparently paradoxical statements that result from failing explicitly to distinguish them. Consider the preceding, quoted paragraph. If one substitutes *perceiving* for *perception* therein, the statements will make much greater sense. If, however, one reads the paragraph as though the author were describing visual perceptual experience, then the author will appear to be taking a strange position for a psychologist. In fact, he does not hold the idealistic view according to which the perceiver's head is immanent to visual perceptual experience, or constituted by the latter. Also, the idea that the stream of visual experience does not proceed in the brain would be very difficult to reconcile with what we already know from neuropsychology.

Therefore, description of visual perceptual experience at "the ecological level of organization" must amount to description of it in terms of its intentional objects, that is, what in the ecological environment visual perceptual experience is "awareness-of" (Gibson, 1979, p. 239). This would be, of course, a partial description, since visual perceptual experience cannot be identified with that of which one is aware in having such experience.

Although some theorists (see Natsoulas, 1987-1988) conceive of the stream of consciousness as an ongoing process, which expands continuously in the temporal dimension, it seems natural for everyone, including those theorists, to treat of the stream as comprised of components. Depending on the theorist, these components occur only successively, one at a time; or, some of them occur simultaneously, making up a single stream that is wider in some stretches than others (e.g., Brentano, 1911/1973, p. 155; Luborsky, 1967, p. 198; Neisser, 1976, p. 104). The following comment would seem to exemplify the kind of view that holds for a stream of consciousness, at times, of more than minimal width.

Many people are on record [to the effect that] in their experience, they are not "forced to have one thought after another." They may think in a less detailed way when they have multiple strands, but that is different. Experimental studies of their overt behaviour have similarly shown little sign of a limit in the number of "things" they can do at the same time; rather of a trade-off between the number of "things" and the amount of discrimination they can do in each "thing" within a given period. (Broadbent, 1984, pp. 677-678)

The components of the stream of consciousness have been called, among other things, "states of consciousness," "subjective states," "thoughts" (James, 1890), and "conscious psychical processes" (the last by Sigmund Freud; see Natsoulas, 1984a, 1985b, in press-a). In previous articles (Natsoulas, 1985-1986, 1986-1987), it was argued that William James's components of the stream of consciousness were all instances of "awareness." James's famous stream of thought consists of one unitary awareness after another, that is, a succession of temporally adjacent distinct pulses of awareness. Some of these, James considered to be perhaps better designated as feelings, but all of them were instances of the stream's owner being aware (or at least seeming to be aware) of something. In the present article, the stream of visual perceptual experience is conceived of, consistently with Gibson (1979), as a stream of awareness. On this point, there shall be, of course, additional discussion below.

The Cognizance of Visual Experience

The issue of awareness, in the specific form of visual perceptual experience, is an issue that all theories of perception must face, because behavior depends not simply on getting information contained in light into the visual system,

but also on the perceiver's awareness of the parts of the ecological environment that this information specifies. Although discussion of visual perceptual experience did not develop out of the following paragraph, the paragraph has the merit of distinguishing between (a) the stimulus information that human subjects picked up visually in certain experiments that the author had described and (b) the awareness that these subjects were having at the time.

Third, there is *awareness*, a central issue to much of psychology, but I do not believe it relevant here. We may or may not be aware of perceptual processes, pancreatic processes, or pulmonary processes. But because we may be aware of stomach growls or wheezes does not make these indirect digestion or indirect respiration. Why should awareness make perception indirect? Moreover, information is not a term comfortable with the idea of awareness. In the experiments reported here, for example, percipients were aware of rigid and nonrigid planes and of three-dimensional environments. But it seems inappropriate to me to suggest that they were either aware or unconscious of the cross ratio, the index 4 measure of density, or differential motion parallax. As abstract formalisms that reflect regularities in the world, these do not seem to be the stuff that can fill or not fill awareness. (Cutting, 1986, p. 236)

Although the two main points of this paragraph are mainly true, they should not be taken as bearing on the relevance of awareness to perception theory.

1. Consistently with the second point, no one would suggest that light's embodying information about surfaces of the environment is itself a perceiving of those surfaces (or of anything else). Which is not to say that the concept of information lacks compatibility with the concept of awareness, for awareness is a special way in which information can be embodied. To have veridical awareness of anything is for one's stream of consciousness to be "informed" with regard to it. Visual perceptual experience is such that what (or some of what) the contained information is specific to is cognitively grasped by a perceiver. However, for a process to contain information is not necessarily for a process to be awareness of anything; awareness is not reducible to an informational relation.

2. With reference to the first point of the above quoted paragraph, let it be emphasized that the visual perceptual experience (awareness) under discussion in the present article includes the mentioned awareness of "rigid and nonrigid planes and of three-dimensional environments," but no implication is intended, in speaking of this awareness, that the perceiver has, in turn, awareness of it as well. Like a digestive process, visual perceptual experience can flow on without any awareness of it. That visual perceptual experience is a kind of component of the stream of consciousness does not mean that the owner of the respective stream must have cognizance of any instance of visual perceptual experience occurring therein. Necessary to add, however, the latter is not a universal view among theorists of consciousness. For ex-

ample, Freud and his teacher Brentano (1911/1973, 1929/1981) held otherwise, insisting that any instance of visual experience could not occur without its owner's immediate (intrinsic) cognizance of it (on Freud, see Natsoulas, 1984a, 1985b, in press-a). In a well-known critique of this kind of view, Ryle (1949) described the components of the stream as putatively "self-intimating."

The present view is intermediate between ubiquitous self-intimation (e.g., Brentano, 1911/1973) and none at all (e.g., James, 1890). Distinguished in the present article are two categories (among others) of visual experience: whereas (a) visual perceptual experience can occur without the perceiver's awareness of its occurrence, (b) another kind of visual experience, called "visual reflective experience," is self-intimating in every instance. To all visual reflective experiences, the statement applies: "Their intimations of their own occurrences are properties of those occurrences and so are not posterior to them" (Ryle, 1949, p. 160). Nor are the intimations of their occurrences eliminable from them. The reason that visual reflective experiences cannot occur without their owner's immediate awareness of them is that their content is self-referential (Natsoulas, in press-b). Elsewhere, it was argued that the neuropsychological phenomenon of blindsight may amount to (a) having deficient visual perceptual experience in the "blind" areas of one's field of view and (b) no visual reflective experience at all in those areas (Natsoulas, 1982).

It is a contention of the present article that a person engaged, perhaps due to brain injury, in a (deficient) form of visual perceiving that did not produce visual perceptual experience would be blind, whether or not this deficient visual perceiving secured environmentally specifying information that entered into the causation of the individual's behavior. The absence of visual perceptual experience in such an individual would have to be decided at present on the basis of questioning him or her. The following, recent statement by a leading researcher on blindsight calls attention to the latter point.

But even at the operational level, there is a *practical* aspect in the context of blindsight that derives from the disjunction between verbal reports of "seeing" and forced-choice "guessing." Verbal responses, in response to verbal questions by the examiner, are the bread and butter of the clinical assessment of sensory capacity, and one of the points to emerge clearly from blindsight research is that they may seriously underestimate residual capacity. The present topic has arisen, after all, because researchers normally are content to listen trustingly to the subjects' verbal reports. The forced-choice methods, deriving from animal research, may uncover much more than verbal methods, and retraining methods may allow such a capacity to be developed further even if the patient himself has no awareness of the capacity. But, of course, the converse is also true: verbal reports can reveal more than non-verbal reports, and the reason is that the examiner, like all of us in our daily interactions, assumes that the verbal response *does* have content and reference. This is one reason why we learn something from testing the sensory capacities of human subjects that is virtually impossible from testing animals, at least without a very great deal more time, if ever. We shall assume here that such a verbal reference is usually to phenomenal experience (only "usually," because verbal reports can themselves be automatic and devoid of any corresponding experience as a referent). (Weiskrantz, 1986, p. 164)

Unable to question animals, we do not know at present whether or not they are having visual perceptual experiences as they perform various visual discriminations and display visually guided behaviors.

However, all contemporary psychologists will agree that the reports of human subjects do not guarantee that which the reports may state about visual experience. Where there is evidence of behavioral effects responsive to visual information (e.g., a demonstration using a forced-choice procedure), one may even doubt reports to the effect that no visual perceptual experience is taking place. The possibility remains that visual perceptual experience of some quality does occur but the individual has lost the ability to have direct cognizance of its occurring. The individual may not be blind (i.e., may not lack visual perceptual experience) but may be partially, to coin a phrase, "mind-blind." Accordingly, a final judgment as regards blindness would await technological and scientific advances that permit the objective, instrumental observation of visual perceptual experience as it proceeds in the person's brain.

The display of discriminative behavior under visual stimulus control does not rule blindness out, and the sincere denial of visual perceptual experience does not ensure that visual perceptual experience is not in fact taking place. For some psychologists, the latter statement may be controversial. They may object to the very idea of visual experience of which the visual perceiver has no awareness. It should be mentioned that in taking the present view, the obvious self-contradiction has been avoided. That is, it is not suggested here that visual perceptual experience of the environment may proceed without the subject of that experience having awareness of the environment. The controversial case is the perceiver's having particular awareness of the environment with no cognizance of being so aware. The view of the aforementioned psychologists would be something like this: if visual perceptual experience is a kind of consciousness, as stated in the first paragraph of this article, then the one who has the visual perceptual experience must have it wittingly. The next paragraph is one kind of reply to psychologists who take the latter view.

Psychologists are often very critical of problems as stated. They will make short work of a difficult problem without solving it. However, opponents among them to the idea that visual perceptual experience may occur without its owner's cognizance of it should not make their claims without defending some understanding of inner cognizance that makes it essential to every instance of visual perceptual experience. Of the following three views of inner cognizance, the first and second allow for its absence. (a) Two identical instances of visual perceptual experience may occur one with and one without immediate cognizance of it, because this cognizance is a distinct occurrence (e.g., a verbal response) from the perceptual experience itself, and may fail to be evoked when the experience occurs. Freud (1895/1964) called this kind of view of inner consciousness an "appendage" theory and rejected it. (b) There

are two kinds of visual perceptual experience, a reflective kind and a nonreflective kind. They differ by possessing and not possessing, respectively, a self-referential content wherein the perceiver has awareness of the particular experience as well as whatever part of the environment is being experienced. This is the view of the present article, except that the reflective kind of visual experience is called "visual reflective experience." (c) There is only the reflective kind of visual perceptual experience, as just characterized. That is, all instances of visual perceptual experience are intrinsically conscious. They each give to the perceiver who has it awareness of it along with awareness of the environment, simply by their occurrence, with no "appendage." Searle (1983) is one recent author who has adopted such a view. For criticism of the view, see Natsoulas (1984b, in press-b).

A Unique Relation of Special Ownership

In the instance of any visual perceptual experience (and, for that matter, any experience whatever), there is always a subject who (a) possesses the instance in the sense that it is an occurrent part of the subject, or occurs in the subject, and who (b) also, in a special sense, *has* that instance of the experience, which is a unique relation of special ownership. The relation between the possessor of a stream of consciousness and the components of the stream is an essentially different relation from that between the possessor and other happenings that take place in his or her body (cf. Sperry's, 1976, p. 174, reference to the "intimately involved relation" of the first-person perspective). In the following, reference to the relation of having qua subject is signaled by use of italics. Accordingly, a perceiver does not *have* digestive processes in the sense that he or she *has* visual perceptual experiences (and other experiences).

Nor does either cerebral hemisphere of the commissurotomed person *have* the visual perceptual experiences that proceed in the other cerebral hemisphere of the same brain (Bogen, 1985; Gazzaniga, 1987; Sperry, Gazzaniga, and Bogen, 1969; Sperry, 1982). Controversy concerning whether it is the commissurotomed person or some part of him or her that perceives would seem to be best resolved by treating of the person as a system that includes not simply two (disconnected) cerebral hemispheres but also two subjects of consciousness (see Natsoulas, 1987). That is, each cerebral hemisphere of such a person *has* the visual perceptual experiences that transpire within it. (As already suggested, the activity of visual perceiving cannot be as simply localized, since it involves the visual system as a whole; more later.) Worth brief comment at this point are three suggestions with regard to the nature of the relation of a subject's *having* a visual experience.

1. It may be suggested that a subject's *having* the components of a stream

of consciousness amounts to the combination of their taking place in the subject's body together with, at the time, the subject's being directly cognizant of them. It may be suggested that no person has direct cognizance of, for example, any of his or her digestive processes, whereas all intact people have direct cognizance of every instance of their own visual perceptual experience. Accordingly, to *have* a visual experience is to be immediately aware of it. This first suggestion must be rejected unless a distinguishing account of direct cognizance is forthcoming. Until then, one has only to point out that an intact individual or adequately functioning cerebral hemisphere perceives interoceptively certain digestive processes. Despite this direct, immediate access to some of these processes, the individual or hemisphere indeed does not *have* any of them any more than visually experienced parts of the ecological environment. The relation of *having* by a subject is a matter of the subject's living through an experience, that is, of something or other proceeding in a certain particular stream of consciousness. (It is tempting to say "the particular stream of consciousness that the subject is," but that would be reductionistic.) Some interoceptive perceptual experiences have digestive processes as their "intentional objects" (Natsoulas, 1977), but this does not make the digestive processes themselves a part of the stream of consciousness. Relative to the stream of consciousness the perceived states of the stomach are as much part of the environment as the tree in the garden is of which one *has* visual perceptual experience. One possesses the digestive processes in the sense that they are an occurrent part of one's body. One possesses the tree, perhaps, in the sense that one has certain rights with regard to it. However, one has neither of these in the same sense that one *has* one's perceptual experiences of them.

2. It may be suggested that either cerebral hemisphere of the commissurotomed person does not *have* the other cerebral hemisphere's visual experiences because of where these are located (and the fact that the forebrain commissures are completely severed; cf. Sperry, 1976, p. 174). Although visual perceptual experiences can affect, by means of subcortical pathways, what takes place in the stream of consciousness of the other cerebral hemisphere (Cronin-Golomb, 1986), each cerebral hemisphere of the commissurotomed person can *have* only its own visual experiences, namely, those that proceed in that hemisphere. Location matters, of course. As it is impossible for one person to *have* another person's stream of consciousness, it is impossible for one cerebral hemisphere to *have* the other cerebral hemisphere's visual experiences. However, a cerebral hemisphere does not *have* all the processes that occur within it. The great diversity of processes that take place there makes it implausible that a cerebral hemisphere's stream of consciousness includes them all (cf. Popper and Eccles, 1977, p. 512).

3. Therefore, in order for *having* by a subject to be instantiated, it may be

suggested that the particular bodily process *had* must (a) occur in the intact brain or in a cerebral hemisphere of a commissurotomized (or hemispherectomized) person and (b) the individual or hemisphere must have direct cognizance of the process (not including possible observation of it by instrument). A problem for this suggestion is constituted by visual perceptual experiences that occur to an individual lacking the capacity for direct cognizance of them (cf. Rosenberg, 1986, pp. 26-27; Weiskrantz, 1986, for preparations to test for this ability in monkeys). Are not such creatures, equally as we are, subjects of their visual perceptual experiences, though they lack all cognizance of them? Very young human beings, too, may for a time have no cognizance of components of the stream that they no doubt possess. Moreover, the same point may apply to adult human beings under some conditions:

Now, if one who is focused purely on objective nature busies himself in perceiving straightforwardly, he grasps the natural directly as it itself, in its natural properties and relations. At first there are no motives here for distinguishing between merely specific sense-qualities and those which are truly objective. We need not take account of this distinction here since, as is easy to see, it appears only at a higher level. In any case, if we are experiencing in a straightforwardly noticing manner and are looking purely at what is and is such and such in space, everything which comes to be laid hold of in this manner offers itself just as pertaining to spatial things, the shape as shape of the thing, a quality pertaining to it in movement and rest, in change and permanence; likewise also, color as spreading over the spatial figure and thereby over the thing itself, qualifying what is subjective in space. Nothing at all subjective falls within our mental sphere of vision. (Husserl, 1925/1977, p. 116)

We ourselves seem often to engage in the activity of visual perceiving without awareness of visual perceptual experiences that we are *having*, though with intent awareness of that part of the environment or body which we are visually perceiving.

Psychologists will readily acknowledge that the relation of subject to visual perceptual experience (or any other component of the subject's stream of consciousness) is of a special kind, but we do not know as yet how to characterize this relation uniquely, as it deserves (see Natsoulas, 1983b, p. 475, for a try), except to say that the occurrence of visual perceptual experience is a case of an individual's or brain's experiencing something.

Visual Perceiving and Visual Perceptual Experience

Among the visual perceptual system's modes of functioning is the activity of visual perceiving, also called "straightforward seeing" (Natsoulas, in press-b). When the visual system functions in the mode of visual perceiving, it produces a stream of visual perceptual experience. The relation between the

activity of visual perceiving and the product which is visual perceptual experience is more complex than simply the first producing the second. Although use of the word *produces* is correct as far as it goes, visual perceptual experience is both caused to occur by and realized in the visual system's activity of visual perceiving (cf. Searle's, 1980, statement that mental states are both produced by and realized in the brain).

Engaging in visual perceiving of the environment or themselves in the environment, people will often give little attention to the visual activity itself. Although they may have chosen to visually perceive a certain part of the environment at this time, they will not be concerned with the activity that they have chosen as much as with the part of the environment that they have chosen to provide them with the objects of their visual perceptual experience. The reason for this usual, uneven distribution of attention is not that there is, somehow, less to visual perceiving than to visual perceptual experience. During visual perceiving of the environment a great deal goes on that is part of the process of visual perceiving and is not visual perceptual experience. The following brief quoted description of the relevant aspects of the visual system gives a good hint of the complexity that characterizes the activity. However, to characterize the activity of visual perceiving as information pickup by means of the visual system may not be misleading, but it falls short of including a major adaptational payoff of there having evolved visual perceptual systems of the human kind (which some other species may also possess). The way visual perceiving is more than a process of stimulus-information pickup and resonance to information gives to the process additional biological importance (see later). Although there are further goals for visual perceiving, the latter is done, as it were, for its own sake, because it makes the perceiver aware, in its very occurrence, of a part of the environment or perceiver.

The organs of the visual system, for example, from lower to higher are roughly as follows. First, the lens, pupil, chamber, and retina comprise an organ. Second the eye with its muscles in the orbit comprise an organ that is both stabilized and mobile. Third, the two eyes in the head comprise a binocular organ. Fourth, the eyes in a mobile head that can turn comprise an organ for the pickup of ambient information. Fifth, the eyes in a head on a body constitute a superordinate organ for information pickup over paths of locomotion. The adjustments of accommodation, intensity modulation, and dark adaptation go with the first level. The movements of compensation, fixation, and scanning go with the second level. The movements of vergence and the pickup of disparity go with the third level. The movements of the head, and of the body as a whole, go with the fourth and fifth levels. All of them serve the pickup of information. (Gibson, 1979, p. 245)

Comparison of this description of the visual system with later comments concerning less complex activities of the system than visual perceiving adds further relevance to the description's inclusion here.

Among many things, this description implies that the brain is a component of the visual system. Moreover, the brain is "the highest of several centers of the nervous system governing the perceptual systems" (Gibson, 1966, p. 267). By governing the visual perceptual system, the brain is involved in the activity of visual perceiving: "The perceptual systems, including the nerve centers at various levels up to the brain, are ways of seeking and extracting information about the environment from the flowing array of ambient energy" (Gibson, 1966, p. 5). The involvement of brain processes in visual perceiving is not only a governing of the visual system, but also the brain processes are themselves affected by the activity of the visual system: "We may suppose that the orienting of the organs of perception is governed by the brain so that the whole system of input and output resonates to the external information" (Gibson, 1966, p. 5). In the activity of visual perceiving, there are "internal loops" as well as "external loops," so that "the centers of the nervous system, including the brain, resonate to information [in the stimulus flux at the visual receptors]" (Gibson, 1966, p. 267).

And there is more to visual perceiving than has been stated or implied in this description. The following quoted statement does not give as complete a picture of the activity of visual perceiving as just quoted, but it makes quite explicit the crucial distinction between visual perceiving and visual perceptual experience, and the statement construes the latter as the "end product" of the respective process of perceiving. That is, visual perceptual experience is not a mere byproduct or offshoot, as some psychologists hold (see later), but a product for which the function of the visual system was "designed" by the evolution of the species.

The term perception itself has two meanings in ordinary usage. Which of the two is intended is usually clear from the context, but when necessary I distinguish *perceiving*, as the process of arriving at a "perception," from a *percept*, the end product, the brain process that is the cognition or awareness of the object perceived. Except with very familiar objects, perceiving is not a one-stage, single-shot affair. It usually involves (a) a sensory event; (b) a motor output, the adjustment of eye, head, or hand to see, hear, or feel better; (c) the resulting feedback; (d) further motor output, further feedback, and so on. As we will see later, this is not a trivial point but must affect our understanding both of percept and of image. (Hebb, 1968, p. 468)

An "aspect" of the activity of visual perceiving is a stream of visual perceptual experience. The intimate relation between this "aspect" and the activity to which it belongs is suggested by the following statement. "Consciousness undergoes change throughout the course of life because we learn to pick up new sorts of information in new ways" (Neisser, 1976, p. 104). Engagement in visual perceiving has as its proximate goal the *having* of visual perceptual experience (in that special sense of *having* discussed in the preceding section). And this *having* by a subject, the perceiver, is not a matter of there coming

into play an "independently definable mechanism" (Neisser, 1976, p. 104); it is a part, rather, of the very process itself of perceiving.

What does the perceiver "achieve" (Gibson, 1979, p. 239) by engaging in visual perceiving? The achievement of visual perceiving is more than getting his or her visual system to resonate to stimulus information. It is more than the selective extraction of information from light depending on the perceiver's purposes. It is more than what a meter might do: "When the pencil comes into view, the perceptual system resonates to the information—which is to say, the affordance is detected" (Michaels and Carello, 1981, p. 65). Visual perceiving is not a purely bodily activity that is like, for example, a digestive process except for a difference in biological function, namely, the visual system's becoming in some ways and at a level of abstraction transiently like the particular stimulus flux. Visual perceiving is a "psychosomatic" activity (Gibson, 1979, p. 240). In addition to "becoming like" (i.e., the pickup of stimulus information), the visual system produces experience, namely, the living observer's experience of the surfaces, events, and so on whose properties determine the structure of the successive optic arrays along the path of observation that the living observer travels in visually perceiving the surfaces, events, and so on. The perceiver achieves visual perceptual experience of ("awareness-of": Gibson, 1979) those ecological properties that the picked-up stimulus-information is specific to. Visual perceptual experience is "awareness of something in the environment or something in the observer or both at once" (Gibson, 1979, p. 239). Visual perceptual experience consists of a flow of visual awareness of the object perceived, a flow produced directly by the particular activity of the visual system that visual perceiving (or straightforward seeing) is. To pick up, to absorb, or to resonate to stimulus information is not necessarily to experience that to which the information pertains.

If a nomic relation holds between the optic array and its environmental source, then is the array specific to its source . . . ? Surely a nomic relation is not enough to support an intentional quasi-relation such as perception. Why do we apprehend objects "through" the optic array and not the optic array? When we perceive one object nomicly related to another (e.g., two billiard balls, one launching the other) we see both objects, not "through" one to the other. If nomic relations cannot explain optical specificity, what can? (Reed, 1983, pp. 91-92)

Even assuming a nomic relation combined with a relation of similarity (see Natsoulas, 1984c, p. 238), the point holds: a visual system's resonating to stimulus information does not suffice in explanation of the visual apprehension of objects through the optic array.

Visual perceiving involves the "experiencing of things," "awareness-of," a "stream of experience" (Gibson, 1979, pp. 239 and 253). This is why perception psychologists are seldom behaviorists and often, over the last forty years,

have been concerned with Koffka's (1935) question "Why do things look as they do?" For example:

It is time now to consider briefly the first two questions. The first is a general question about process—*How* is sense made of what is projected in the optic array? The second is about the surety of perception. Both can be considered subspecies of perhaps the most important question asked about visual perception (Koffka, 1935): Why do things look as they do? The seeming simplicity of this query masks its depth. All theories of perception must address the issue of *information* in light of *phenomenology*. (Cutting, 1986, p. 241)

In the study of perception, the most basic questions pertain to the nature of appearances. Early in his monumental work, Koffka (1935) asked, "Why do things look as they do? [p. 76]" and he tried to explain their looking just that way. How things look (and why) needs to be distinguished from *the fact that things do look or appear*. Thus, a question prior to Koffka's is: What is it for things to look, sound, feel, to appear as they do? (Natsoulas, 1974, p. 613)

See also Gibson (1979, p. 1; Lombardo, 1987, p. 147: "Gibson was concerned primarily with explaining 'veridical looks' and not so much with 'looks' in general") on this matter. Things' looking as they do, in whatever way that they do, is not a case simply of their affecting the process of perceiving in a characteristic way. It is also a matter, in addition, of their being objects of visual experience. However discriminatively (see later) a perceiver responded to information contained in the stimulus flux at the visual receptors, the environment would not look to the perceiver in any way unless there was produced in the visual system a special process.

Assuming that the visual system resonates in a wholistic way to stimulus information (Gibson, 1966, 1979), different "levels" will resonate differently. Thus, they will make a distinct contribution to the activity of visual perceiving as a whole (cf. Lombardo, 1987, p. 321). The looking a certain way of environmental things proceeds at a particular level, as opposed to throughout the visual system. The stream of visual perceptual experience (or awareness) of things is a temporally continuous brain process (cf. Natsoulas, 1987-1988) that is a special kind of "resonating" to stimulus information, a kind that does not occur elsewhere in the visual system. Whereas visual perceiving can be usefully conceived of wholistically as involving a system that includes the head and body as well as the eyes and brain, visual experience proceeds entirely in the brain (cf. Gibson, 1970: "internal loops"). The following paragraph is an effort to describe in a preliminary way "the central process" that is Awareness, or the stream of consciousness, which gives to the perceiver, among other things, his or her visual apprehension of the environment or self.

This present interpretation implies some revision in traditional stimulus-response concepts of central nervous control. Any scheme, regardless of its complexity, in which sensory impulses are conceived to be routed through a central network system into a motor response becomes misleading. The present view suggests a presence of ongoing central processes specifically organized for conscious awareness around the different sensory

modalities. These central mechanisms have their own intrinsic organization and special dynamics that in large part are determined centrally and autonomously. The sensory input becomes incorporated into the central process, altering the dynamics of the system and thereby its conscious properties. The initial train of sensory inflow is largely absorbed and transformed within the higher level central mechanism, and only indirectly through its perturbation of the holistic properties of the central process does the sensory input influence awareness or the volitional motor response. The present view places greater emphasis on the central processes and their specialized organizational features that create out of neural excitation the higher order phenomena of mental experience. (Sperry, 1969, p. 535)

On the basis of the well-known research with commissurotomed people, it seems safe to conclude that visual perceptual experience proceeds at the cerebral cortical level of brain process (for relevant discussion and references, see Natsoulas, 1987). Otherwise, it becomes most difficult to comprehend the independent perceptually based behavior that is governed, respectively, by the right and left mutually disconnected cerebral hemispheres.

Other Activities of the Visual System

No less than digestive processes, the ongoing process of visual perceptual experience must be understood relative to its causal context, as a product of the latter and in interaction with it. The causal context of visual perceptual experience includes the particular activity of the visual perceptual system that is visual perceiving, as well as the part of the world being perceived and the light by which it is perceived. The visual system should not be understood as a system only capable of one kind of activity. In addition to visual perceiving, the activities of the visual system include, among others, the following: "retinal photographic vision" (Gibson, 1979, p. 3), "visualizing" (Gibson, 1970, 1979), and "reflective seeing" (Natsoulas, 1985a, in press-b). Although the present article is largely concerned with visual perceptual experience, it helps to place it in a larger context to give some attention to visual reflective experience (due to reflective seeing) and visual nonperceptual experience (due to visualizing). But first, a brief comment on another kind of visual activity.

Retinal Photographic Vision

There is a mode of functioning of the visual system whose import is controversial among perception psychologists. This has been described as "retinal photographic vision [i.e.,] vision with a fixed eye or vision with a shutter" (Gibson, 1979, p. 3). Perception psychologists differ concerning how much can be learned from research on this kind of visual activity. For example:

Such displays come very close to not existing at all. They last for only a fragment of a second, and lack all temporal coherence with what preceded or what will follow them.

They also lack any spatial link with their surroundings, being physically as well as temporally disconnected from the rest of the world. They cannot be touched, cannot be heard, and cannot be glanced at more than once. The subject is isolated, cut off from ordinary environmental support, able to do nothing but initiate and terminate trials that run their magical course whatever he may do. Although the data obtained under such conditions can serve as the basis of much ingenious theorizing, the resulting theories may mislead us. Experimental arrangements that eliminate the continuities of the ordinary environment may provide insights into certain processing mechanisms, but the relevance of these insights to normal perceptual activity is far from clear. (Neisser, 1976, pp. 35-36)

Although the word *activity* may be challenged in those cases of retinal photographic vision in which the subject does no more than fix an eye on a mark, perception psychologists do not disagree that retinal photographic vision is an actual activity of the visual system. They disagree with regard to the generalizability of results acquired from studying retinal photographic vision, for other activities in which an individual engages by means of his or her visual system.

Retinal photographic vision occurs under conditions that prevent the visual system from functioning over time to pick up stimulus information (pertinent to the object perceived) from the stimulus flux at the visual receptors: "The [visual] system is held down to the completion of the internal loop of activity, to that component of perception confined within the central nervous system, that is, the arousal of images" (Gibson, 1970, p. 246). Rather than speaking of the arousal of images, it would be better to speak in the present context of "visual momentary experience" or the like (cf. "economic" perceiving "at a glance:" Gibson, 1966, pp. 286 and 309-310). The point, however, is clear: retinal photographic vision is a matter of an optic array at a point of observation impinging on the visual receptors and thereby evoking a visual experience. This contrasts with the stream of visual perceptual experience that is produced through a process of interaction between visual activity and the succession of optic arrays, as the visual system travels a path of observation governed by a strategy of perceiving.

Visualizing

Further comment on visual activities other than visual perceiving will be restricted, for want of space, to visualizing (here) and reflective seeing (next). Visualizing produces and includes "nonperceptual awareness" (Gibson, 1979, p. 256). Maintaining the present pattern of usage, let us call the latter "visual nonperceptual experience." Accordingly, the stream of experience produced by visualizing is no less visual than the corresponding product of visual perceiving. The same can be said about all the other kinds of visual activity; therefore, reference without qualification to "visual experience" shall be reference to

all the visual experiential products produced by the various possible activities of the visual system.

The visual experiential dimension of visualizing is nonperceptual; in contrast to visual perceptual experience, the stream of visual nonperceptual experience, which occurs during the activity of visualizing is not constrained by the stimulus flux (Gibson, 1979, p. 256; cf. Skinner, 1976, p. 91). This is not to say, of course, that stimulus-information does not help to determine subsequent visualizing. In fact, this dependency is of a sufficient magnitude to have led some psychologists to propose that only those properties of the ecological environment of which one has had visual perceptual experience can be objects of visual nonperceptual experience, that is, can be properties that one has awareness of in *having* visual nonperceptual experience. For example: "For it is the very features of the object that your perceptual system has already picked up that constitutes your ability to visualize it" (Gibson, 1979, p. 257). In visualizing, however, there does not occur the closely dependent entrainment of the stream of visual experience by a process of information pickup.

Nevertheless, visualizing is no less an activity of the visual system, and visual nonperceptual experience is no less a part and product of an activity of the visual system. Moreover, visual nonperceptual experience, like visual perceptual experience, is constituted of "awareness-of," whether or not that of which the individual seems to have awareness of during visualizing exists, has existed, or will exist. Commonly, we are correctly said to visualize fictitious scenes, objects, people, and so on. Of course, visualizing cannot be considered (except in a special sense) as a way by which people "keep-in-touch with the world" (Gibson, 1979, p. 239), which quite clearly applies to visual perceiving. We may visualize in order to remember, to hypothesize, or to anticipate, but not to inform ourselves concerning what is now taking place. Admittedly, as a result of knowledge and circumstances, one may succeed in visualizing an actual situation or event that one cannot perceive at present, but such correspondence is not being caused by the situation or event.

Actually, it is problematic to construe all visual nonperceptual experience as being an experiencing of things beyond itself (i.e., awareness of something else). Often, visual nonperceptual experience is only *as of* something. This does not imply that the individual takes his or her visual nonperceptual experience for visual perceptual experience, though this does sometimes happen. When it does happen, the individual takes his or her experience as being of something in the world that is here and now appearing to him or to her, which it is not. Accordingly, visual nonperceptual experience has a certain intrinsic structure whereby each experience possesses the property of "intentionality," though it does not necessarily possess the property of "aboutness." The latter property is an external relation of the visual experience to something

beyond it. The point is that visual nonperceptual experience always is directed beyond itself (always is intentional) but it need not have an actual target (need not succeed in being about something). That which it would be about may not exist, have existed, or come to exist.

Reflective Seeing

Still another activity of the visual system is "viewing the world" (Gibson, 1979, pp. 195-196). This has also been called "reflective seeing" (Natsoulas, in press-b) in contrast to "straightforward seeing," which is none other than the present article's activity of visual perceiving. When one engages in reflective seeing, a stream of "visual reflective experience" is therein produced. How this category of visual experience differs from visual perceptual experiences shall be explained. Also, visual reflective experience differs from the visual nonperceptual experience that is produced by visualizing, although an activity of "reflective visualizing" also no doubt occurs (cf. Cairns, 1973, p. 255). Like straightforward visualizing, reflective visualizing proceeds without the constraint of the stimulus flux, but differs from the straightforward kind of visualizing in that one is taking notice of the visual experience per se that one is having in the course of visualizing.

So, too, visual reflective experience is the awareness of or "noticing the perspectives of things" (Gibson, 1979, p. 196). It is the taking notice of "the seen-now" and "the seen-from-here" (Gibson, 1979, p. 195). These terms refer to those surfaces of the ecological environment that, at the moment, lie within the particular perceiver's field of view. Reflectively seeing these surfaces, one is in a position to distinguish those that, relative to one's point of observation, are optically uncovered (unhidden, visible). More specifically, one discriminates by becoming aware of the visual appearances that are being produced in one's visual system by some of the surfaces inside the boundary of one's field of view.

If I pass over reflectively in the first and natural manner from the straightforward object-perception to the modes of givenness [appearances], then they are perceived, noticed in their subjective existence. But the object itself also continues to be perceived and noticed, although it is not what is exclusively noticed, as when I am directed straightforwardly toward it. What I now grasp is the object as appearing in this or that *how* of its mode of appearance; or, vice-versa, the mode of appearance is preferred as the main theme, but still as mode of appearance of the object which so to speak is still in our grasp and remains in its previously posited actuality. (Husserl, 1925/1977, p. 129)

Some of the surfaces within "the solid angle of the ambient light that can be registered by [one's] ocular system" (Gibson, 1979, p. 111; i.e., within one's field of view) look to one in some way at the moment, while other surfaces

within the boundaries of the same solid angle (i.e., the occluded surfaces) do not look to one right now in any way.

Like visual perceiving and visualizing, reflective seeing is a visual activity in which the person may choose to engage. To so choose is to adopt an "attitude of introspection" (Gibson, 1979, p. 195) directed on the activity of one's visual system. In particular, one may have an interest in determining what exactly one is "literally seeing," that is, what exactly is here and now visually appearing to one. One's interest may be to judge whether the beliefs about the environment that one is currently acquiring have a literal visual basis. It has been said that to literally see something (i.e., to have visual reflective experiences of it) is to see it in the "visual field" and not only in the "visual world" (Gibson, 1966, p. 205). Actually, the visual field and the visual world are not places; they are two categories of visual experience, which result from the activities, respectively, of viewing and visually perceiving the environment.

Much more can be said about activities of the visual system that are not visual perceiving (straightforward seeing), as well as about visual experience that is not visual perceptual experience. For example:

My comparison of the visual field to a perspective painting, although guarded, now seems to me a serious mistake. No one ever saw the world as a flat patchwork of colors—no infant, no cataract patient, and not even Bishop Berkeley or Baron von Helmholtz, who believed firmly that the cues for depth were learned. The notion of a patchwork of colors comes from the art of painting, not from any unbiased description of visual experience. What one becomes aware of by holding still, closing one eye, and observing a frozen scene are not visual sensations but only *the surfaces of the world that are viewed now from here*. They are not flat or depthless but simply unhidden. One's attention is called to the fact of occlusion, not to the pseudofact of the third dimension. I notice the surfaces that face me, and what I face, and thus where I am. (Gibson, 1979, p. 286)

Accepting the main point, one would have to take issue with some of what this statement contains (see Natsoulas, 1985a). Also, some of what is said about visual perceptual experience and visual perceiving in the present article applies to other visual activities as well, but space shall not be taken here to draw comparisons and contrasts.

In the Absence of Visual Perceptual Experience

Sometimes, it is enlightening to consider what something would be like in the absence of a particular essential ingredient of it. Without visual perceptual experience, visual perceiving would still be a matter of the visual system's coming to embody the picked-up stimulus information. The flowing optic array at the visual receptors would embody this information and more, which was not picked up. In visual perceiving, less stimulus information is picked up than is available in the stimulus flux. Depending on how much less, we

may speak of a process of economic or schematic visual perceiving (Gibson, 1966, p. 309). The latter is a perceptual strategy, or a way in which the individual puts his or her visual system to use, and may be considered a further visual activity, distinct from reflective seeing, visualizing, visual perceiving, and others. In any case, insofar as a visual activity involves some information pickup from the light, the visual system becomes transiently like the stimulus flux at the receptors in some respects and at a level of abstraction. Since we are considering visual perceiving in the absence of visual experience, whether conscious or not conscious, we are assuming that it still makes sense, without visual experience, to speak of visual perceiving. In a hypothetical case of this kind, the visual system would be functioning to pick up stimulus information; the visual system would embody that information; and it would transmit the information to a point in the brain where the information might cause effects in the behavioral stream. The following description of what takes place in the brain would be apropos the hypothetical case, if one deleted the visual perceptual experience that the author located "midway" between the stimulus flux and response to it.

In the above examples, the visual perception of a triangle is assumed to be built up in the nervous system as an active operational adjustment that puts the brain in readiness to respond to the triangle. Although the general adjustment may involve actual motor changes, the core of the perceptual process in the higher centers is not itself a motor pattern. It is more premotor or better pre-premotor in nature, owing to the hierarchical plan of neural organization. This continued emphasis on the motor approach to mental activity should definitely not be taken to imply that subjective experience resides within any motor reaction or within the motor system. If obliged to localize the conscious experience, we could only suggest vaguely those brain centers midway functionally between the sensory input and motor output, where the coordinated action of the entire motor system may be governed as an integrated whole through the combined influences of most of the sensory excitations and mnemonic traces. (Sperry, 1952, p. 309)

For some psychologists, the above characterization minus all references to experience would suffice as a rough characterization of an instance of visual perceiving. Contrary to the view of the present article, these psychologists would define visual perceiving without reference to visual experience. They would treat all behavior that results directly from visual activity as a matter of discriminative responses caused to occur by stimulus information at the receptors, albeit reduced in quantity by the nervous system. That is, the information would reach a point in the brain where it determined processes of behavioral selection highly dependent on the species' or individual's history. Those previous behaviors would be automatically selected that had proved most successful in the past under stimulation of the present specific kind.

The same interpretation would be applied as well to cases in which the individual is visually perceiving without emitting any behavior except that behavior belonging to visual perceiving itself (qua "sensory action:" Skinner,

1987). The following paragraph treats of such cases from the antiexperiential radical behaviorist perspective.

The answer is to be found in the discriminative contingencies. What is differentially reinforced as one learns to see? The development of "eye-hand" coordination and of spatial relations is one example. One sees *where* a thing is by acquiring the behavior of reaching for it. One sees *what* a thing is by acquiring all the behavior under its control as a stimulus. These survive in contemplation. The man I see across the field is someone I can reach by moving in a given direction; he is someone I can or cannot speak to in a normal tone of voice; etc. Hence all these behaviors are part of seeing him. If one bit of behavior is moving out of my box in a straight line toward him, and if part of that is looking for immediate footing, then the acrophobic reaction is reasonably well accounted for. (Skinner, 1980, pp. 309-310)

In cases of visual contemplation, the stimulus information is held to evoke only incipient and covert behaviors. Covert behavior is behavior of small magnitude that is not publicly observed for that reason. Incipient behavior consists of the early central stage of behavior without its completion in the form of either overt or covert behavior. All behaviors that one acquired under the control of a particular environmental source of visual stimulation can be part of one's now seeing that source because the behaviors now occur in incipient form all at once, as they cannot occur in overt or covert form. The above statement implies, as well, that in those cases in which overt behavior does occur, seeing something consists of the evocation of numerous incipient behaviors.

In sum, visual perceiving without visual experience would consist of a stream of highly relevant, visual-stimulationally selected overt, covert, and incipient behaviors, made possible by the visual system's continuous information pickup from the stimulus flux at the visual receptors. The stimulus-informational status of the visual system would undergo change that reflected change in the environment or the observer's relation to the environment.

Not only does embodiment of information lack the implication of awareness of something, even awareness of that to which the information is specific and which caused the information to be instantiated. Also, the evocation of *responses*, by processes of the visual system embodying stimulus information, does not imply being aware of (a) the responses, or (b) the embodied information, or (c) the environmental part that gave structure to the stimulus flux from which the stimulus information was picked up. When stating that their experimental subjects "responded to" such and such, psychologists should keep strictly in mind just how much they are entitled to thereby claim. It is sometimes implicitly assumed that a certain piece of discriminative behavior from which a scientist can infer a certain cause of it, must constitute a sort of taking the cause into account. However, no matter how unique their causation may be, responses are blind. Responses are as blind as the behavior of

iron filings that respond to a magnet as such (cf. Sellars, 1980). In the above example of Skinner's incipiently responding to someone (X) on the playing field below where Skinner is sitting, it cannot be said that Skinner is the subject of visual perceiving, in the sense that Skinner, by responding in a way due to X's presence, is *having* visual experience of X. For Skinner would lack all awareness of the person perceived, assuming the radical behaviorist account of seeing.

The Causal Efficacy of Visual Perceptual Experience

In contrast, the present view holds that the "percept" or "perception," which is "the cognition or awareness of the object perceived" (Hebb, 1968) is itself a part of the "main action" (Skinner, 1976) through the nervous system and to overt behavioral activity. That is, the perceiver's behavior relative to the part of the environment that is perceived depends on his or her perceptual experience of it. Accordingly, the theoretical position that the following paragraph describes is badly mistaken, because it transforms "the behavior of seeing the rainbow" into a practically inefficacious byproduct of the process of visual perceiving. This "behavior" is probably equivalent to visual perceptual experience of the rainbow (though considerable doubt remains: see Natsoulas, 1986).

In the radical behaviorist account, as I have been piecing it together, no role has been assigned to the covert behavior of seeing the rainbow in the production of the overt behavior of describing the rainbow on the occasion of its visual stimulatory presence. The behavior of seeing the rainbow is a covert part of the total response to the rainbow, and is collateral to the main action through the nervous system leading to the overt behavior of describing the rainbow. So long as no introspective behavior occurs (e.g., a verbal reference to one's seeing the rainbow), the behavior of seeing would proceed without effect. Or, Skinner has not yet told us of a function that such covert behavior might have in the presence of the object seen. Zuriff (1979, p. 5) seemed to detect such a proposed function at one point in Skinner's (1968, p. 127) works. However, Skinner was there referring to some sort of covert looking behavior, that is, covert precurrent responses that help one better to see covertly. Skinner (1969, p. 252) has distinguished the behavior of seeing from the behavior of looking. (Natsoulas, 1985c, p. 97)

One Causal Role

The activity of visual perceiving, or straightforward seeing, may itself be affected by the visual perceptual experience that it produces. To take a very simple case, one must have one's eyes closer to an object in order to have perceptual experience of certain of its characteristics (e.g., certain details). Visual perceiving includes movements of the body, head, and eyes and, thus, is affected by the visual perceptual experience produced. It is the latter's unsatisfactoriness (e.g., incompleteness, unclarity) that motivates movements

towards the object. By consulting one's visual perceptual experience of the object, one knows that one is not adequately perceiving certain of the object's characteristics. Surely, one does not consult one's behavior and infer from how one is responding what it is that one is and is not visually perceiving. (How is "consulting one's visual perceptual experience" accomplished? Elsewhere, I argued that this requires interspersed visual reflective experiences directed on exactly the same part and aspect of the environment; Natsoulas, in press-b). Once the goal of having visual perceptual experience of the particular, desired characteristic is achieved, visual perceiving may now take a different direction in the effort to secure a different stream of visual perceptual experience. The latter can be itself consummatory, in the sense that the experience is sought for its own sake. Or it can be sought for the purpose of learning something about the world, or as an immediate basis for action.

A Second Causal Role

Without visual perceptual experience, there would be no one who was visually aware of anything when visual perceiving was going on. *And no one who could base his or her actions on what was being perceived.* This issue is raised, from a different theoretical perspective, in the following paragraph.

Vision is therefore, first and foremost, an information-processing task, but we cannot think of it just as a process. For if we are capable of knowing *what* is where in the world, our brains must somehow be capable of *representing* this information—in all its profusion of color and form, beauty, motion, and detail. The study of vision must therefore include not only the study of how to extract from images the various aspects of the world that are useful to us, but also an inquiry into the nature of the internal representations by which we capture this information and thus make it available as a basis for decisions about our thoughts and actions. This duality—the representation and the processing of information—lies at the heart of most information processing tasks and will profoundly shape our investigation of the particular problems posed by vision. (Marr, 1982, p. 3)

If visual perceiving is to provide the perceiver a basis for deciding what to do next, the activity must produce visual perceptual experience. In this regard, the above paragraph speaks clearly. It says that visual perceiving must include "representation" of the picked-up stimulus information. The nature of this representation must be such that the perceiver has visual awareness of the world "in all its properties of color and form, beauty, motion, and detail." This kind of representation evidently does not stand in for the world, in place of it; rather, it gives to the perceiver access to the world itself.

Just how to conceive of visual perceptual experience is a difficult question that perception theory must address—for the reason given in the above quotation. However, to consider visual perceptual experience as being *descriptive* of that which is perceived does not seem to capture visual experience any

better than incipient responding does (as, e.g., Skinner, 1980, seemed to suggest). When one is aware of oneself as visually experiencing something, it does not seem to one as though one is engaged in describing it. It does not seem to one as though one were representing it in the following sense. "A representation of a set of entities *S* is a formal scheme for describing them, together with rules that specify how the scheme applies to any particular one of the entities" (Marr, 1982, p. 366). One can tell when one is describing the environment in thought, and this seems very different from having visual experience of it. In fact, one can "verbalize" one's visual awareness (Gibson, 1979, p. 260), distinguishing what is visually appearing to one from one's naming it and describing it. In some instances, one will find it difficult to say what one sees, to name properties and relations. "Perceiving precedes predicating" (Gibson, 1979, p. 260).

It may be suggested that to conceive of visual perceptual experience as descriptive of the environment requires some getting used to. The suggestion implies that how we find our visual perceptual experience is illusory and subject to fundamental improvement. We can get to the point where it is quite natural to apprehend experience as descriptive. However, more is necessary from a theorist who relies on this line of argument, namely, to explain why we do not take our visual perceptual experience as the theorist claims that it is. Despite our inner access to our visual perceptual experience, we fail to discern its descriptive character, even taking it as nonconceptual. How will the perception theorist explain this systematic error?

Be that as it may, the above quoted paragraph captures the point about the individual's being in a position to consult his or her visual perceptual experiences. A visual system that merely gave rise to behavior would put the perceiver in a position of having to infer from his or her behavior what in the environment might have caused the behavior. If all perceptual systems failed to produce perceptual experience, the environment would be a black box for the perceiver, with his or her own outputs as the sole signs from which to infer the characteristics of the entities or events that he or she faced. Just think of it, being aware of one's behaviors but having to infer whatever one could tell about the rest of the world. From this behaviorist dream or nightmare, how different are the lives that we actually lead.

References

- Bogen, J.E. (1985). Split-brain syndromes. In P.J. Vinken, G.W. Bruyn, and H.L. Klawans (Eds), *Handbook of clinical neurology* (Vol. 1, pp. 99-106). Amsterdam, Netherlands: Elsevier.
- Brentano, F. (1973). *Psychology from an empirical standpoint*. London: Routledge and Kegan Paul. (Originally published in 1911)
- Brentano, F. (1981). *Sensory and noetic consciousness*. London: Routledge and Kegan Paul. (Originally published in 1929)
- Broadbent, D. (1984). Mental models. *Quarterly Journal of Experimental Psychology*, 33A, 673-681.

- Cairns, D. (1973). Perceiving, remembering, image-awareness, feigning awareness. In F. Kersten and R. Zaner (Eds.), *Phenomenology* (pp. 251-262). The Hague, Holland: Nijhoff.
- Cronin-Golomb, A. (1986). Subcortical transfer of cognitive information in subjects with complete forebrain commissurotomy. *Cortex*, 22, 499-519.
- Cutting, J.E. (1986). *Perception with an eye for motion*. Cambridge, Massachusetts: Bradford/MIT Press.
- Freud, S. (1964). Project for a scientific psychology. *Standard Edition* (Vol. 1, pp. 295-387). London: Hogarth Press. (Originally composed in 1895)
- Gazzaniga, M.S. (1985). *The social brain*. New York: Basic Books.
- Gazzaniga, M.S. (1987). Perceptual and attentional processes following callosal sections in humans. *Neuropsychologia*, 25, 119-133.
- Gibson, J.J. (1966). *The senses considered as perceptual systems*. Boston: Houghton Mifflin.
- Gibson, J.J. (1970). On the relation between hallucination and perception. *Leonardo*, 3, 425-428.
- Gibson, J.J. (1979). *The ecological approach to visual perception*. Boston: Houghton Mifflin.
- Hebb, D.O. (1968). Concerning imagery. *Psychological Review*, 75, 466-477.
- Hebb, D.O. (1980). *Essay on mind*. Hillsdale, New Jersey: Erlbaum.
- Hebb, D.O. (1981). Consider mind as a biological problem. *Neuroscience*, 6, 2419-2422.
- Husserl, E. (1977). *Phenomenological psychology*. The Hague, Holland: Nijhoff. (Lectures presented in 1925)
- James, W. (1890). *The principles of psychology*. New York: Holt.
- Koffka, K. (1935). *Principles of Gestalt psychology*. New York: Harcourt.
- LeDoux, J.E. (1985). Brain, mind and language. In D.A. Oakley (Ed.), *Brain and mind* (pp. 197-216). London, England: Methuen.
- LeDoux, J.E. (1986). The neurobiology of emotion. In J.E. LeDoux and W. Hirst (Eds.), *Mind and brain* (pp. 301-354). Cambridge, England: Cambridge University Press.
- Lombardo, T.J. (1987). *The reciprocity of perceiver and environment*. Hillsdale, New Jersey: Erlbaum.
- Luborsky, L. (1967). Momentary forgetting during psychotherapy and psychoanalysis: A theory and research method. In R.R. Holt (Ed.), *Motives and thought* (pp. 177-217). New York: International Universities Press.
- Mace, W.M. (1977). Gibson's strategy for perceiving: Ask not what's inside your head but what your head's inside of. In R. Shaw and J. Bransford (Eds.), *Perceiving, acting, and knowing* (pp. 43-65). Hillsdale, New Jersey: Erlbaum.
- Marr, D. (1982). *Vision*. San Francisco: Freeman.
- Michaels, C.F., and Carello, C. (1981). *Direct perception*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Myers, G.E. (1986). *William James*. New Haven, Connecticut: Yale University Press.
- Natsoulas, T. (1974). The subjective, experiential element in perception. *Psychological Bulletin*, 81, 611-631.
- Natsoulas, T. (1977). On perceptual aboutness. *Behaviorism*, 5, 75-97.
- Natsoulas, T. (1978). Consciousness. *American Psychologist*, 33, 906-914.
- Natsoulas, T. (1981). Basic problems of consciousness. *Journal of Personality and Social Psychology*, 41, 132-178.
- Natsoulas, T. (1982). Conscious perception and the paradox of "blind-sight." In G. Underwood (Ed.), *Aspects of consciousness* (Vol. 3, pp. 79-109). London: Academic Press.
- Natsoulas, T. (1983a). Concepts of consciousness. *The Journal of Mind and Behavior*, 4, 13-59.
- Natsoulas, T. (1983b). The experience of a conscious self. *The Journal of Mind and Behavior*, 4, 451-478.
- Natsoulas, T. (1984a). Freud and consciousness: I. Intrinsic consciousness. *Psychoanalysis and Contemporary Thought*, 7, 195-232.
- Natsoulas, T. (1984b). On the causal self-referentiality of perceptual experiences and the problem of concrete perceptual reference. *Behaviorism*, 12(2), 61-80.
- Natsoulas, T. (1984c). Towards the improvement of Gibsonian perception theory. *Journal for the Theory of Social Behaviour*, 14, 321-258.
- Natsoulas, T. (1985a). An introduction to the perceptual kind of conception of direct (reflective) consciousness. *The Journal of Mind and Behavior*, 6, 333-356.
- Natsoulas, T. (1985b). Freud and consciousness: II. Derived consciousness. *Psychoanalysis and Contemporary Thought*, 8, 183-220.

- Natsoulas, T. (1985c). The treatment of conscious content: Disorder at the heart of radical behaviorism. *Methodology and Science*, 18, 81-103.
- Natsoulas, T. (1985-1986). Concerning the unity of consciousness: Part II. William James on personal conscious unity. *Imagination, Cognition and Personality*, 5, 21-30.
- Natsoulas, T. (1986). On the radical behaviorist conception of consciousness. *The Journal of Mind and Behavior*, 7, 87-116.
- Natsoulas, T. (1986-1987). The six basic concepts of consciousness and William James's stream of thought. *Imagination, Cognition and Personality*, 6, 289-319.
- Natsoulas, T. (1987). Consciousness and commissurotomy: I. Spheres and streams of consciousness. *The Journal of Mind and Behavior*, 8, 435-468.
- Natsoulas, T. (1987-1988). Gibson, James, and the temporal continuity of experience. *Imagination, Cognition and Personality*, 7, 351-376.
- Natsoulas, T. (in press-a). Freud and consciousness: III. The importance of tertiary consciousness. *Psychoanalysis and Contemporary Thought*.
- Natsoulas, T. (in press-b). Reflective seeing: An exploration in the company of Edmund Husserl and James J. Gibson. *Journal of Phenomenological Psychology*.
- Neisser, U. (1976). *Cognition and reality*. San Francisco: Freeman.
- Pope, K.S., and Singer, J.L. (1980). The waking stream of consciousness. In J.M. Davidson and R.J. Davidson (Eds.), *The psychobiology of consciousness* (pp. 169-191). New York: Plenum.
- Popper, K.R., and Eccles, J.C. (1977). *The self and its brain*. Berlin: Springer-Verlag.
- Reed, E. (1983). Two theories of the intentionality of perceiving. *Synthese*, 54, 85-94.
- Reed, E., and Jones, R. (1982). (Eds.). *Reasons for realism*. Hillsdale, New Jersey: Erlbaum.
- Rosenberg, J.F. (1986). *The thinking self*. Philadelphia, Pennsylvania: Temple University Press.
- Ryle, G. (1949). *The concept of mind*. London: Hutchinson.
- Searle, J.R. (1980). Author's response: Intrinsic intentionality. *Behavioral and Brain Sciences*, 3, 450-457.
- Searle, J.R. (1983). *Intentionality*. Cambridge, England: Cambridge University Press.
- Sellars, W. (1980). Behaviorism, language, and meaning. *Pacific Philosophical Quarterly*, 61, 3-25.
- Skinner, B.F. (1968). *The technology of teaching*. New York: Appleton-Century-Crofts.
- Skinner, B.F. (1969). *Contingencies of reinforcement*. New York: Appleton-Century-Crofts.
- Skinner, B.F. (1976). *About behaviorism*. New York: Knopf.
- Skinner, B.F. (1980). *Notebooks*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Skinner, B.F. (1987). Outlining a science of feeling. *Times Literary Supplement*, No. 4388, 490, 501-502.
- Sperry, R.W. (1952). Neurology and the mind-brain problem. *American Scientist*, 40, 291-312.
- Sperry, R.W. (1969). A modified concept of consciousness. *Psychological Review*, 76, 532-536.
- Sperry, R.W. (1976). Mental phenomena as causal determinants in brain function. In G.G. Globus, G. Maxwell, and I. Savodnik (Eds.), *Consciousness and the brain* (pp. 163-177). New York: Plenum.
- Sperry, R.W. (1982). Some effects of disconnecting the cerebral hemispheres. *Science*, 217, 1223-1226.
- Sperry, R.W. (1985). *Science and moral priority*. New York: Praeger.
- Sperry, R.W. (1987). Structure and significance of the consciousness revolution. *The Journal of Mind and Behavior*, 8, 37-66.
- Sperry, R.W., Gazzaniga, M.S., and Bogen, J.E. (1969). Interhemispheric relationships: The neocortical commissures; syndromes of hemisphere disconnection. In P.J. Vinken and G.W. Bruyn (Eds.), *Handbook of clinical neurology* (Vol. 4, pp. 273-290). Amsterdam, Netherlands: Elsevier.
- Weiskrantz, L. (1986). *Blindsight*. Oxford, England: Clarendon Press.
- Wild, J. (1969). *The radical empiricism of William James*. New York: Doubleday.
- Zuriff, G.E. (1979). Ten inner causes. *Behaviorism*, 7, 1-8.