

## Consciousness and Commissurotomy: III. Toward the Improvement of Alternative Conceptions

Thomas Natsoulas

*University of California, Davis*

This is the third in a series of articles that address what is known or knowledgeably held about the consciousness of fully commissurotomed people. This installment discusses three alternative conceptions with which the present author does not agree. They are Eccles's dualist-interactionist conception, Gillett's linguistic conception, and Rey's eliminative conception. With regard to the first two of these, issues are raised with the intention of helping the respective proponent to improve his conception. In the case of the third, it is urged that the view not be promoted, for moral reasons, unless very strong evidence sometime becomes available in its favor.

The present article is the third in a series addressing what is known or knowledgeably held about the consciousness of fully commissurotomed people. These are people who, because of their intractable epilepsy, have submitted themselves to the surgery of complete forebrain commissurotomy. See the *Handbook of Clinical Neurology* for details on the resulting "split-brain syndrome" (Bogen, 1985, Sperry, Gazzaniga, and Bogen, 1969).

The kind of understanding I favor of the consciousness of fully commissurotomed people was obvious in the first two articles of the present series (Natsoulas, 1987a, 1988). Like Sperry (e.g., 1977, 1977/1985), I favor the hypothesis of a doubling of consciousness. There is good evidence supporting this hypothesis, but I cannot say that I know it to be true. More specifically, I believe each fully commissurotomed person possesses two streams of consciousness; a stream of consciousness "flows" in each of his or her cerebral hemispheres, in my view.

My concept of a stream of consciousness is very similar to James's (1890, 1892/1984) familiar concept, provided that one subtracts from his concept the mind-body dualism that characterized James's psychology at the time of the

*Principles* (Natsoulas, 1987–1988). My concept of the *duality* of consciousness might also be called the “*duplicity*” of consciousness in order to contrast with the alternative “*unicity*” of consciousness as Puccetti (1981) defined the latter.

Puccetti (1981) distinguished *conscious unity* and *conscious unicity*. He was arguing that the consciousness of intact people is characterized by *duplicity* as much as the consciousness of commissurotomized people. Both groups have a center of consciousness located in each cerebral hemisphere, even when the cerebral commissures of the intact people are functioning perfectly (Puccetti, 1973, 1975, 1976, 1977). Puccetti (1981) stated, “One can separate the question of whether consciousness must be *unified* from the question whether there can be only one conscious center per organism. And once one does make this distinction, it is clear that *conscious unity* is compatible with *duality* as well as with *unicity*” (p. 95, italics added).

Using this conceptual perspective, one can say that the consciousness of commissurotomized people is no more *disunified* than the consciousness of intact people, although the consciousness of commissurotomized people, in contrast to intact people (Puccetti would not make the contrast), is characterized by *duplicity* rather than *unicity*. Thus, I favor the hypothesis that the consciousness of the fully commissurotomized person is dual in the sense that he or she possesses two unified streams of consciousness.

In an article published before the present series, I discussed, following Puccetti (1981) the concepts of *conscious unity (disunity)* and *conscious unicity (multiplicity)* (Natsoulas, 1983–1984). I shall not go over that ground again here except to say that I found it useful to distinguish two kinds of *conscious unity (disunity)*. These were (a) “*experiential conscious unity (disunity)*,” which is the *intrinsic* unity (disunity) of a single experience or state of consciousness, of what James (1890) called an integral pulse of consciousness or section of the stream, and (b) “*personal conscious unity (disunity)*,” which is the *subjective* unity (disunity) of the stream of consciousness from the present to the far past (or less, depending on how poor the person’s personal memory is for his or her past sections of the stream; Natsoulas, 1979, 1984b, 1985–1986). Each of the two streams of consciousness that, *ex hypothesi*, belongs to the commissurotomized person may exemplify both kinds of conscious unity.

It is also evident from the first two articles of the present series that my understanding of the consciousness of the commissurotomized person is not agreed to by all knowledgeable scholars and scientists who have written on the topic. As I have described, even Sperry (e.g., 1977/1985; Trevarthan and Sperry, 1973) puts to use sometimes, when he is discussing laboratory observations of commissurotomized people, the concept of a more or less disunified single sphere of consciousness, instead of the concept of two distinct streams of consciousness with more or less similar contents (Natsoulas, 1987a, pp. 442–458). A sphere of consciousness can be more or less unified from moment

to moment depending on stimulatory conditions. Other authors have explicitly opposed the hypothesis that the commissurotomed person's right hemisphere is the locus of a stream of consciousness (e.g., Eccles, 1970; Gillett, 1986; Marks, 1981; Rey, 1983b). For example, Gazzaniga (1985) stated, "Consciousness in my scheme of brain events becomes the output of the left brain's interpreter and those products are reported and refined by the human language system. The interpreter calls upon an untold number of separate and relatively independent modules for its information" (p. 135; Gazzaniga, 1988, p. 235).

The area of scientific investigation that I am discussing in this series of articles, as well as other such areas, will benefit from the presence on stage of cogent alternative accounts of the relevant phenomena. The latter is my basic methodological assumption. A rich development of alternative accounts will help to bring out what is different about the account that one advocates with respect to the same phenomena. Subtle differences, previously difficult to notice, will emerge distinctly. Particularly desirable is clarity concerning what the different accounts expect the relevant phenomena to be like. Moreover, the contrast effect, as it were, between well worked out alternative accounts will make it unnecessary for theorists to exaggerate the claims of their position or to move their position to an extreme in order to make it distinctive.

As I see it, alternative accounts do not function to detract from each other except with regard to their owners' acquisition of worldly goods. Also, the proliferation of alternative accounts may depress certain colleagues who prefer a more simple science, a science closely unified around methods, concepts, problems, and academic departments. I acknowledge, as well, that alternative accounts may anger the scientific dogmatist, and frustrate those in our field (and courses) who want a quick scientific fix. However, I hope the reader will agree with me that none of these reactions to the development of alternative accounts corresponds to a scientific virtue.

### Three Alternative Conceptions

In the first article of the present series (Natsoulas, 1987a), I called the reader's attention to knowledgeable authors who had raised doubts concerning whether a stream of consciousness proceeds in the right hemisphere of commissurotomed people. Simply to inform, I called passing attention to such authors, or I devoted substantial discussion to them in an effort to show that their view was not as compelling as the two-streams view. In the present article, I return to three of these authors, to their respective understanding of the relation between consciousness and commissurotomy.

The first of the three authors whom I shall consider in the present article

is Eccles (1970), who once held that the commissurotomed person's mute hemisphere is a kind of computer. Referring to the first group of commissurotomed patients that Sperry (1964, 1966) had studied, Eccles (1970) stated,

All the evidence produced by these nine cases is explicable by the postulate that, when bereft of commissural linkages with the dominant hemisphere, the minor hemisphere behaves as a computer with inbuilt skills of movement, with recognition of the form and function of objects, and with the ability to learn; nevertheless, the dominant hemisphere with its ability of linguistic expression remains oblivious of all this performance. . . . We can summarize this by stating that the goings-on in the minor hemisphere, which we may refer to as the computer, never come into the conscious experience of the subject. (pp. 77-78)

By calling the minor hemisphere a computer, Eccles meant that its relation to consciousness is in a certain significant way different from how the dominant hemisphere is related to consciousness. Though, according to Eccles, there is no stream of consciousness flowing in either hemisphere. (Cf. MacKay, 1965, p. 313: "I don't think that either hemisphere is conscious. I don't think that it makes sense to attribute consciousness to cerebral hemispheres.") The left cerebral hemisphere, only, is in "liaison," that is, in intimate causal interaction, with the self-conscious mind: an immaterial entity to which belong all of the person's states of consciousness.

Eccles was a dualist interactionist with regard to the relation of the mental and the physical (Popper and Eccles, 1977). He could not countenance such a view as mine, or Sperry's (e.g., 1980, 1987), or Gazzaniga's (e.g., 1985, 1988), and so on, that holds consciousness to be a kind of brain process or property thereof. Concerning such physical monist views, see my discussions of (a) Sperry's monist interactionism (Natsoulas, 1987b), (b) Gazzaniga and LeDoux's verbal consciousness system (Natsoulas, 1988, pp. 519-521; 526-536), and (c) Sperry's commissural-intergrative understanding of the stream of consciousness (Natsoulas, 1988, pp. 524-526; 537-544). Here is how I characterized the latter: "The single stream of consciousness of the normal person is identical to a single ongoing brain process that, so to speak, straddles the two cerebral hemispheres and includes activity, all along the way, in the cerebral commissures as well as in certain locations of the two cerebral hemispheres" (Natsoulas, 1988, p. 525). In contrast, although Eccles (1970) held that the brain had to evolve to a certain point in order for conscious experiences to come into existence, the brain property that has emerged, "at the extreme level of organized complexity of the cerebral cortex," is only "the property of being associated with conscious experiences" (p. 173). Thus, conscious experiences are distinct from any property or process or part of the brain.

The second author whose account of commissurotomed consciousness I discuss in the present article is Gillett (1986), who argued that it is unreason-

able and unnecessary to explain any behavior that laboratory investigators have so far observed in commissurotomed people in terms of any consciousness belonging to the right cerebral hemisphere. Although Gillett acknowledged the impressive behavior that psychologists have shown to be produced by the right hemisphere of the commissurotomed person, Gillett nevertheless insisted that this behavior, which "would normally be considered the conscious performance of an intelligent person" (p. 225) must be explained exclusively at the neurophysiological level, that is, in terms of brain mechanisms that are describable without reference to anything mental. In other words, all of the mute hemisphere's behavior, however complex or intelligent, does not have a stream of consciousness behind it.

Having discussed Gillett's view in the first article of the present series (Natsoulas, 1987a, pp. 462-465), I shall not cover again the same ground here. Instead, I shall propose how Gillett can improve his account of commissurotomy and consciousness to meet the kind of criticism that I made previously of his account. Therefore, by looking back and forth in this series of articles, the reader will be able to contrast a negative with a positive critical approach to the same conception, and begin perhaps to develop an opinion regarding which kind of critical approach (if not both) is better for psychology.

The third author is Rey (1983b), who has taken an especially skeptical position regarding consciousness in the commissurotomed person. In reaction to Puccetti's (1981) conception that there are two streams of consciousness proceeding in the intact person, even in the person whose cerebral hemispheres are in excellent working condition and functioning now as well as they ever do, Ray (1983b) stated,

However, whatever we may conclude about the duality of [the commissurotomed person], certainly nothing follows from that alone about possible dualities in the *normal* case. Any conclusion of the latter sort depends on exactly what role the cerebral commissures play in the whole of a normal person's life. I see nothing whatsoever that forces or even permits us to regard them as merely some kind of "relay system" ([Puccetti, 1981], pp. 96, 97, 98), analogous to the television cables of the football game example ([Puccetti, 1981], p. 95). Perhaps they serve to integrate consciousness in the normal case, but when they are cut, consciousness becomes centered only in the left hemisphere; or perhaps only in the right! Or in both. Or, for all we presently know, in neither. I know of no evidence that supports one of these hypotheses to the exclusion of the others. (Rey, 1983b, p. 734)

Evidently, Rey was not impressed by the kind of evidence that led Shallice (1988) to conclude as follows from a study by Zaidel, Zaidel, and Sperry (1981) of two fully commissurotomed people, namely L.B. and N.G. Their performance on the Progressive Matrices nonverbal reasoning test demonstrated that they both had consciousness in the right as well as in the left hemisphere; unless it can be shown, which Shallice thought unlikely, that their level of

performance is achievable “unconsciously.” N.G.’s right and left hemispheres performed at the same mental-age level (eight years). L.B. did better with either hemisphere, achieving the level of an average eleven year old with his right hemisphere.

Nevertheless, in the light of this and other evidence, Rey (1983b) believed it to be a reasonable possibility that commissurotomed people possess no consciousness in either hemisphere. Rey’s grounds seem to have been that these people’s behavior (and all other human activity, including Rey’s own in writing his criticism of Puccetti, 1981) can be adequately explained with no reference to consciousness at all.

Puccetti’s (1983) reply to Rey (1983b) consisted of particular observed performances in the commissurotomed, together with argument to the effect that these performances are not explainable as having proceeded “unconsciously.” Also, Puccetti (1983) characterized Rey’s position as “mental agnosticism about just everything,” and at one point Puccetti stated, “It is of course *logically* possible that [a certain performance by the right hemisphere of the commissurotomed person] was achieved unconsciously, but then it is equally logically possible for elephants to fly by flapping their ears” (p. 737).

Whereas Rey’s (1983b) position is, so to speak, anti-consciousness, it is not antimentalistic. He referred to the existence of “substantial evidence” supporting the views on “unconscious mentation” of “Freud, Piaget, Chomsky and the whole industry of cognitive psychology.” Therefore, I take it that Rey (1983b) would want to account for the performances of commissurotomed people, their behaviors of the right or of the left hemisphere, in terms of unconscious mental processes.

The latter step will seem surprising from an author who denies consciousness. Perhaps it would have been less surprising had Rey taken the neurophysiological exit, as Gillett (1986) did for just the right hemisphere. It would have been less surprising because we theoretically introduce unconscious mental processes by analogy to conscious mental processes. If Rey is skeptical about conscious mental processes, should he not be equally skeptical, at least, about unconscious mental processes?

However, Rey’s move to unconscious mental processes is not entirely surprising given a currently prevailing conceptual framework in psychology and certain allied sciences. Typically, workers in cognitive science seek to explain performances without reference to consciousness. Searle (1989) described their maneuver in this regard as follows:

In order to account for mind without consciousness, one must postulate some other sorts of phenomena. The most obvious solution is to postulate *unconscious* mental processes to do the jobs that traditional philosophy, psychology, and common sense ascribed to conscious mental processes. This maneuver takes different forms, but the general tendency in cognitive science has been to drive a wedge between, on the one hand, conscious,

subjective mental processes, which are not regarded as a proper subject of scientific investigation; and, on the other hand, those which are regarded as the genuine subject matter of cognitive science, and which, therefore, must be objective. (p. 194)

### A Dualist-Interactionist Conception

In his target article for *The Behavioral and Brain Sciences*, Puccetti (1981) briefly mentioned Eccles's conception of the commissurotomed person's right cerebral hemisphere, and attributed to Eccles (Popper and Eccles, 1977) the view that this hemisphere does not have any mental states and is a kind of automaton. However, in this regard, Eccles's view had already begun to change as a result of laboratory tests on commissurotomed people (e.g., Sperry, 1974). Already, prior to Puccetti's (1981) comment, Eccles stated that we cannot know whether the mute hemisphere has associated with it mental occurrences and consciousness (we are perforce "agnostic" about this) because the only way we could determine such facts is through a rich linguistic ability which the mute hemisphere lacks.

An implication of our being "agnostic" about the consciousness of the right cerebral hemisphere is that the available evidence does not rule out such a consciousness. Therefore, Eccles was no longer contending that the right hemisphere is an automaton or a computer (Eccles, 1970). Rather, the disconnected minor hemisphere may be "in liaison with a mind" – to which Eccles immediately added, "But this is quite different from the self-conscious mind of the dominant hemisphere – so different that a grave risk of confusion results from the common use of the words 'mind' and 'consciousness' for both activities" (Popper and Eccles, 1977, p. 329). That is, the evidence rules out the left hemispheric kind of consciousness for the disconnected right hemisphere, and does not rule out that a kind of consciousness is associated with the latter.

Shortly thereafter, in his commentary on Puccetti's (1981) target article and in a series of lectures, Eccles (1980, 1981) made it clear that he had become convinced otherwise; especially by the results of the Sperry, Zaidel, and Zaidel (1979) study. This study of fully commissurotomed people showed that their right cerebral hemisphere possesses the ability to self-recognize and to be self-aware (i.e., of the person of whom it is a part). On this and other evidence, Sperry, Zaidel, and Zaidel (1979) were willing to grant a stream of consciousness to the disconnected right hemisphere. And Eccles (1980), despite his dualist-interactionist perspective, found it necessary to describe the Sperry, Zaidel, and Zaidel (1979) results as "remarkable evidence in favour of a limited self-consciousness in the right hemisphere" (p. 12).

Eccles (1980) seems to have come around to a two-streams view; albeit with qualifications that clearly distinguish his from Sperry's two-streams view, and any other physical monist conception of the mind-brain relation. Here are

Eccles's (1980) qualifying remarks, followed by a statement by another author whom Eccles quoted to express what Eccles held to be the case:

These tests for the existence of mind and of self-conscious mind [Sperry, Zaidel, and Zaidel, 1979] are at a relatively simple pictorial and emotional level. We can still doubt if the right hemisphere has a full self-conscious existence. For example, does it plan and worry about the future, does it make decisions and judgments based on a value system? These are essential qualifications for personhood as ordinarily understood. (Eccles, 1980, p. 13)

Both minor and major hemispheres are conscious in that they both, no doubt, have the basic phenomenal awareness of perceptions, sensations, etc. And they both have minds . . . in that they exhibit elaborated, organised systems of response hierarchies, i.e., intentional behaviour. But in addition I would conjecture that only the major hemisphere has a self; only the language utilising brain is capable of the abstract cognising necessary in order to be aware of itself as a unique being. In a word, only the major hemisphere is aware of itself *as a self*. (DeWitt, 1975, p. 44)

I believe that it would improve Eccles's position if he came closer to grips with the empirical facts of the specific kind observed by Sperry, Zaidel, and Zaidel (1979). Upon suggesting as he has, that this evidence falls short of what is required to ascribe "personhood" to the disconnected right hemisphere, Eccles needs to become more explicit about this evidence. Eccles is obviously not ignoring evidence; the evidence has led him to change in a major way his conception of the disconnected right hemisphere. However, he needs to work out what exactly is wrong with the best evidence that other scientists propose for *full* consciousness in the disconnected right hemisphere – and, also, what minimal kinds of tests would decide the question, as far as he is concerned.

A scientist of Eccles's high standing in the profession can certainly convince other scientists having the necessary access to fully commissurotomed people to test these people in specific ways that bear on Eccles's account of the functioning of the right cerebral hemisphere. Sperry, Zaidel, and Zaidel's (1979) study empirically brought the issue between Sperry and Eccles on the disconnected right hemisphere to a certain advanced point. They, or others, should be able to take the issue further, to help Eccles decide just "how much" consciousness he must assign to the disconnected right hemisphere.

In the first article of the present series (Natsoulas, 1987a, p. 437), I mentioned what Zaidel (1983) concluded from having tested and questioned the disconnected right hemisphere in a number of studies for extended periods of time. Zaidel stated that if a Martian had come to earth and performed as Zaidel had observed the human right hemisphere to perform, the Martian would have overwhelmed Zaidel with its closely humanlike character, its familiar scope of cognition and value, and its sense of the past and the future. Eccles needs to address Zaidel's grounds for this conclusion much more than Eccles has, since Eccles does not agree with Zaidel's conclusion and Eccles's



conception of consciousness and commissurotomy contradicts Zaidel's conclusion. If Eccles believes that Zaidel's conclusion is not well founded, then Eccles should, as I have suggested, seek further evidence of the right kind that would decide the issue or, at least, he should seek evidence that would bring us closer to resolution of the issue.

The results of Sperry, Zaidel, and Zaidel (1979) led Eccles (1980) to revise a diagram titled "Communications to and from the Brain and within the Brain" (p. 7). He had used this diagram in a book three years before (Popper and Eccles, 1977, p. 327); and now he added to the diagram two further causal arrows. One of these arrows runs from the minor hemisphere to "the self-conscious mind," and the other from "the self-conscious mind" to the minor hemisphere (Fig. 1-2). Therefore, it is held that each causes something to take place in the other. Referring to this diagram, Eccles (1980) stated (a) that the right hemisphere of the commissurotomed person displays "conscious responses at a level superior to those exhibited by any non-human primates" and (b) "consciousness in the right hemisphere is indubitable, as is diagrammed in Fig. 1-2" (p. 11).

However, let me say at once, the diagram shows the disconnected right hemisphere to be causally connected with the one and only self-conscious mind, which is also causally connected to the left hemisphere. This is not what Eccles actually held, as will be seen.

Eccles described these causal links between the immaterial entity and the material entity as "interaction in both directions, which can be conceived as a flow of information, not of energy" (Eccles and Robinson, 1984, p. 35). He went on to explain, following Karl Popper, that such causality does not conflict with the laws of physical nature, because the flow of information from the immaterial entity to the material entity "could be effected by a balanced increase and decrease of energy at different but adjacent micro-sites, so that there is no net energy change in the brain" (Eccles and Robinson, 1984, p. 8; see also Eccles, 1980, p. 21). As Popper had expressed this understanding of the relevant causation, the law of the conservation of energy might be valid only statistically (Popper and Eccles, 1977, p. 541).

Subsequently, Eccles (1987) found support for his view in a book by the physicist Margenau (1984), who conceived of the mind as an immaterial field (containing neither matter or energy) yet which can causally interact with the brain. Eccles quoted the following paragraph from Margenau (1984):

In very complicated physical systems such as the brain, the neurons, and sense organs, whose constituents are small enough to be governed by probabilistic quantum laws, the physical organ is always poised for a multitude of possible changes, each with a definite probability; if one change takes place that requires energy, or more or less energy than another, the intricate organism furnishes it automatically. Hence, even if the mind has anything to do with the change, that is, if there is mind-body interaction, the mind would not be called on to furnish energy. (p. 96)

The relevance of our understanding of nature at the quantum level to Eccles's dualistic-interactionist conception of the mind-brain relation is a difficult question to address in a small space (or in a large space). At some length, Honderich (1988) has recently discussed the relevance of physical quantum theory to theories of the mind including the theory set forth by Popper and Eccles (1977). Although Honderich is skeptical concerning any such relevance, he admits to a relative lack of confidence when discussing this specific topic. Of course, Eccles should address Honderich's well thought out reservations. Here, I shall only mention a difficulty that bears on the matter of mental causality at the quantum (or any) level and how, in effect, Eccles has treated of the difficulty.

Is not everything that the self-conscious mind does or experiences conscious? Are any of its passions or actions unconscious? If the self-conscious mind affects the brain at the quantum level, must not the mental occurrences that have such effects be conscious mental occurrences? Must not the self-conscious mind be consciously aware of the parts of the brain that it affects at the quantum level? Whatever functions Eccles ascribes to the self-conscious mind, should we not all have, in our own case, firsthand evidence of all these functions? Should we not have awareness of the self-conscious mind's interactions with the brain at some level, if not at the quantum level?

Eccles (1980) considered the self-conscious mind to function in part unconsciously; for example, the self-conscious mind "is continually scanning or probing the spatio-temporal patterns of the modular activities of the cerebral cortex. . . in accord with its interests and attention" (p. 69). If this goes on continually and unconsciously, then there is a part of the self-conscious mind that is not self-conscious since we have no awareness of these activities in which it is engaged. That is, even when we have consciousness of our mental activities the scanning and probing of the cerebral cortex by the self-conscious mind is supposed to go on unconsciously. Therefore, must there not be a second part of the self-conscious mind whose activities the first part of the self-conscious mind does not have access to? The self-conscious mind is like the human being; that is, the human being has processes proceeding in his or her body and brain of which he or she has no awareness. The hidden part of the self-conscious mind is an important part of it that requires an account, as does the whole idea of different parts of the self-conscious mind that function differently from each other, analogously to different parts of the brain. It may be suggested that the self-conscious mind has no spatial dimension, but then what can it mean for a part of it to get split off?

Unconsciously, the self-conscious mind or part of it not only reads out information from a multitude of modules belonging to the left cerebral cortex but also the self-conscious mind integrates the information that it reads out. By this process, the self-conscious mind produces its own stream of con-

consciousness, which flows in the self-conscious mind. The effects of the physical world, the body, and the brain on the stream of consciousness are all of them causally mediated by the unconscious portion of the self-conscious mind.

The question that I want to raise here is how Eccles distinguishes those activities of the self-conscious mind that have consciousness associated with them and those that do not. That is, in addition to their being respectively conscious and not conscious, what distinguishes the sets of activities? What makes it possible for one set to be conscious and the other set unconscious? Note that the two parts of the mind are not causally closed relative to each other; each of the two parts is affected by the other. But this interaction does not render the unconscious part of the self-conscious mind any more conscious than the unconscious part's interaction with the open brain modules of the left cerebral cortex renders conscious the processes that take place in these modules. However, might causal interactions between the conscious and unconscious parts of the self-conscious mind have different consequences than what occurs across the mental-physical boundary?

Obviously, Eccles needs to pursue the structure and function of the self-conscious mind to answer these and related questions. A great many of the questions that psychological neuroscientists ask about the brain must be asked, on the assumption that Eccles's dualist-interactionist hypothesis is on the right track, about the self-conscious mind, since it does many of the things that other scientists hold that the brain does. The self-conscious mind cannot be merely invoked for explanatory purposes without its own properties being theoretically developed, if Eccles's conception of the mental is to emerge as a strong alternative.

I mentioned above the two causal arrows that Eccles (1980) added to his diagram, in both directions between the self-conscious mind and the disconnected right hemisphere. I believe that these arrows symbolize a crucial part of Eccles's account of commissurotomized consciousness that requires clarification and development. In the diagram, there are six solid arrows in each direction between the dominant hemisphere and the self-conscious mind. In contrast, the two causal arrows between the self-conscious mind and the minor hemisphere consist of dashes. Evidently, therefore, as a result of commissurotomy, the self-conscious mind stands to different parts of the brain in different actual direct causal relations (omitting the cases of indirect effects in either direction). Of course, one wants to know what direct causal relations exist between the self-conscious mind and the disconnected right hemisphere.

The following passage from Eccles (1980) gives further help in trying to fill out the picture of Eccles's dualist-interactionist conception of the consciousness of commissurotomized people:

I think that, in the light of Sperry [Zaidel, and Zaidel's] (1979) recent investigations, there is some self-consciousness in the right hemisphere, but it is of a limited kind and would

not qualify the right hemisphere to have personhood on the criteria mentioned above. Thus the commissurotomy has split a fragment off from the self-conscious mind, but the person remains apparently unscathed with mental unity intact in its now exclusive left hemisphere association. However, it would be agreed that emotional reactions stemming from the right hemisphere can involve the left hemisphere via the partly unsplit limbic system. . . . So the person remains emotionally attached also to the right hemisphere. (p. 14)

According to Eccles, commissurotomy breaks into two parts the self-conscious mind; also, commissurotomy opens up the right cerebral cortex to mind-brain interaction. If Eccles's diagram pictured the mind and brain of intact people, the diagram would presumably omit the two added causal arrows.

Did Eccles literally mean that commissurotomy has split a fragment off from the self-conscious mind? (a) In his reply to Puccetti (1981), Eccles (1981) quoted from the above passage the sentence that begins with *thus*. (b) And in the earlier published lecture, he recurred to the same idea of the "existence of a fragment of the self-conscious mind associated with the isolated right hemisphere" (Eccles, 1980, p. 15). (c) He also mentioned that certain movements are out of the control of the self-conscious mind; these movements are a consequence of "the splitting of the conscious mind," and they "emanate from the activity of the right hemisphere with its associated mind" (Eccles, 1980, p. 15).

I found this view of Eccles's surprising. I had assumed that only information (from the brain) affects the self-conscious mind, and that the effects of information are transient. Of course, I realized that the self-conscious mind changes more permanently in its properties, but these changes are the result of the self-conscious mind's own actions and experiences. The world indirectly contributes to these changes through the information that the self-conscious mind reads out from the cerebral cortex. But the idea that a piece of the self-conscious mind can break off and attach itself to the right cerebral cortex would not have occurred to me, based on what I understood concerning the self-conscious mind. Nor had it occurred to William McDougall, I gather, since he believed that if his cerebral commissures were severed (assuming he was fatally ill and submitted himself to complete forebrain commissurotomy), he would possess still only a single consciousness — that is, if it was true that the mental and the physical were, as he held, two and not one.

Eccles (1980, p. 15) himself acknowledged the difficulties that this hypothesis raises for his conception of consciousness and the brain. But Eccles expressed optimism that these difficulties could be overcome, contrary to Nagel's (1971) pessimism in the face of the findings with commissurotomized people. At this point, rather than treat of the difficulties that arise with the new notion of a split-off mind, Eccles (1980, p. 15) emphasized that the interactions between the self-conscious mind and the brain are spread out over the whole cerebral cortex; there are an enormous number of sites in the cerebral cortex ("over

a million:" p. 19) where information flows both ways between the material entity and the immaterial entity. However, Eccles (1980) soon added that these sites are restricted "by definition . . . to the modules of the liaison brain" (p. 45). But the summary at the end of his chapter states that the interactional sites are "largely in the dominant cerebral hemisphere" (pp. 49-50). Did Eccles mean that there are interactional sites as well in the minor cerebral hemisphere, where the self-conscious mind, not the split-off fragment, can interact directly with the minor hemisphere? Would the existence of such sites help to explain the splitting of the self-conscious mind by commissurotomy?

Elsewhere, Eccles (Popper and Eccles, 1977, p. 508) stated that the self-conscious mind "plays and interplays over" *both* cortexes; it "scans everywhere," finding some sites from which it can read and some sites that it can affect, and others that are causally closed to it in any direct way. When it plays over possible interactional sites of the right cerebral cortex, it finds them all inert relative to it. Someone may want to suggest that commissurotomy does not chip off a fragment of the self-conscious mind but opens up some of the right hemisphere's modules to it. The problem with this suggestion is, however, that the two cerebral hemispheres of the commissurotomized person do not have associated with them one and the same consciousness, as would be the case if both hemispheres were in liaison with the self-conscious mind.

Not having faced the difficulties connected with the hypothesis of a split-off part of the self-conscious mind, Eccles (1980) acknowledged new difficulties concerning how the self-conscious mind could interact with so many complex brain processes, as he had stated that it does. He explained this part of what takes place by the notion of the self-conscious mind's learning to extract the meaning contained in all of the information that it reads out of the cerebral cortex (which it selects, in the first place, according to its interests).

Here, too, there is something that requires clarification or explanation. Eccles (1980) explained cognitive learning in terms of the hypertrophy of certain synapses of the brain. Later in the same book, in a lengthy discussion of cognitive learning (pp. 176-188), Eccles did not make reference to the self-conscious mind with an exception at one point only. As a result of the self-conscious mind's engaging in deliberate recall, which involves the mind's probing the left cerebral cortex for information, the mind has memory experiences.

Evidently, the self-conscious mind, too, can learn. It can improve its performance and so on. In conversation with Eccles, Popper stated, "In a way the self-conscious mind has a personality, something like an ethos or a moral character and . . . this personality is itself partly the product of actions done in the past" (Popper and Eccles, 1977, p. 472). The self-conscious mind changes, not only in the sense that a changing stream of consciousness flows therein, but also in the sense that it comes to function differently. But the question

is how the self-conscious mind learns. The hypertrophy of synapses will result in its having different memory experiences than it had before those particular synapses grew. Is not the change in function of the self-conscious mind more than just a matter of remembering or the acquisitions of skills in the use of the body? How does the self-conscious mind change if it does? What is it made of?

Popper called the idea of a changing personality for the self-conscious mind a very difficult idea, an idea which might be rendered more comprehensible by conceiving of the self-conscious mind as partially determining, by means of its "free actions," the memory dimension of the brain, including not only what is needed to evoke memory experiences in the self-conscious mind but also the changes due to learning that allow the person to execute performances, such as playing the piano.

Honderich (1988) referred to this part of Popper and Eccles's dualist interactionism, and he suggested that, since the self-conscious mind is being conceived of as a person within a person, Popper and Eccles's view will almost certainly develop in such a way that a further person will be necessary, within the person within a person, in order for the person within the person to play its role in the account. Of course, Honderich did not know this to be true. We must wait to see whether a further self-conscious mind must be added to make it possible for the first one to do all that is expected of it.

Eccles (1980) wrote of the changes that the self-conscious mind undergoes in terms of the commonsense notion of "learning to use one's brain" (p. 48). The brain is something that the self-conscious mind uses to achieve its ends. However, its ends change as the person lives and develops and grows, and so it must use the brain differently. But using the brain differently to achieve new ends must mean that the self-conscious mind has changed. How does this happen?

### A Linguistic Conception

Gillett (1986, 1987b, 1988) argued that the commissurotomized person retains a "unitary standpoint:"

Even after a brain bisection, a person tries to perform the tasks he is assigned; he makes mistakes and is conscious of so doing. The person, "he," and "his" here point to the real identity or unity which remains intact in this situation, despite disrupted brain function or disorders in the "complexities of the human control system." (Gillett, 1987b, p. 78)

How and why did Gillett deny consciousness to the disconnected right cerebral hemisphere? In his view, *do all nonlinguistic creatures*, however close genetically, anatomically, and physiologically to healthy adult human beings, *lack a stream of consciousness*? Do people who have suffered massive damage to their

left cerebral hemispheres, or have had removed their left hemisphere in its entirety, no longer possess a stream of consciousness! For they do not have speech by which they can show that they still have propositional thoughts.

Before I begin the main discussion of this section, let me examine in a preliminary way the following statement from one of Gillett's articles. In this statement, Gillett (1986) acknowledged certain facts about the separate behavior of each disconnected hemisphere. This factual statement may lead readers to expect from Gillett a different view than he actually held. Gillett (1986) accurately stated,

The right hemisphere almost exclusively controls the left hand and the left hemisphere the right hand. The left hand cannot respond adequately to information delivered to the left hemisphere as the interhemispheric connections, or most of them, have been severed. This means that each hand can be used to respond in a way opposite to the other in certain simple tasks. There is no question that each hemisphere "performs" tasks which show a degree of information complexity. The behaviour produced would normally be considered the conscious performances of an intelligent person. There is also no question that each hemisphere is unable to use some of the information given to the person involved. (p. 225)

I begin by listing and commenting on some of the facts Gillett's above paragraph expresses. I agree that all are "true facts"; I do not take issue with Gillett about them as such, except that I would want to state the third one differently, removing the quotation marks around the word *performs*. My purpose in making the following list, and briefly commenting on it to begin with, is to call readers' attention to certain presently relevant points.

1. *Each disconnected hemisphere adequately controls the opposite hand and does not control the ipsilateral hand except very inadequately.* It would seem to follow, therefore, that not all behavior produced by either disconnected hemisphere can be categorized as a mistake. If the right (left) cerebral hemisphere receives, in a laboratory situation, different information than the left (right) cerebral hemisphere and consequently produces different behavior, the behavior of the right (left) hemisphere may or may not be mistaken, depending on the task set by the investigator for the right (left) hemisphere. Indeed, the right hemisphere *controls* the left hand, and this is often a very adequate performance, both in the psychological laboratory and in every-day life. Gillett used a concept of mistake to characterize the commissurotomed person. This concept needs explication and development, since (a) when the disconnected left hemisphere does not have the necessary information to behave correctly, this hardly can be considered a mistake for anyone, and (b) when the disconnected right hemisphere does have adequate information and behaves correctly, this hardly can be counted a mistake for the person or for the left hemisphere.

2. *Each hand can be used to respond in a way opposite to the other hand.* I, too, would apply the word *used* in stating the latter fact, just as Gillett does.

It would seem to follow, therefore, that we can and should ask *who* it is who uses each hand to respond. As will be seen, this is also Gillett's own key question. At one point, Gillett (1986) seemed to suggest it is the commissurotomed person who uses *either* hand to respond in a way opposite to the other hand: "The data we have available on patients who have had such operations indicate that, under certain conditions, they can be induced to make disparate responses to information which is delivered separately to each cerebral hemisphere" (p. 224). However, if the right (left) hemisphere controls the behavior of the left (right) hand and no one else controls the right (left) hemisphere, it would seem to follow that the right (left) hemisphere is the one who uses the left (right) hand to respond in a way opposite to the right (left) hand. Here is a place where Gillett needs to clarify his position: Does he wish to argue that (a) in the commissurotomed person no one controls the left or the right hemisphere, or (b) both hemispheres are controlled by the "person," or (c) the left hemisphere controls the right hemisphere?

3. *Each disconnected hemisphere "performs" tasks.* Does not each disconnected hemisphere also perform tasks, without quotation marks? If the right (left) hemisphere controls the left (right) hand and uses the left (right) hand to respond in particular ways, would this not amount to performance of a task? Must the word *performance*, in the latter sentence, be placed in quotation marks to make this statement true for one or the other hemisphere? Consider a case on which Gillett (1986) focused:

Take the situation where, after a visual "message" which gives the names of different shapes to each hemisphere, the left hand picks out a square object and the right hand picks out a round object. . . . [The agent] can select a square object [with his left hand] but not say that what he has selected is square. He can select a round object [with his right hand] and say that it is round. (p. 226)

Is there a single "agent" who controls both disconnected hemispheres, according to Gillett? Who is this controlling agent and why is he unable to name the objects he picks out with his left hand? We know he can speak and name since he tells us about his choices with his right hand. Gillett needs to help us on this one. We may have an answer to why quotation marks are placed by Gillett around *performs* in the above statement of the fact I am considering. Perhaps, in Gillett's view, an agent distinct from the two hemispheres accomplishes the task; the hemispheres, like the hands, are this agent's means. But who is this agent? I shall return to this question, a very difficult one to answer and maintain Gillett's present conception of the commissurotomed person.

4. *The behavior produced would normally be considered the conscious performances of an intelligent person.* This statement would seem to refer to the behavior produced in certain informationally complex laboratory tasks by



either disconnected hemisphere. In the first article of the present series (Natsoulas, 1987a), I interpreted Gillett's position to be that the case of the right disconnected hemisphere is not "normal"; that is, Gillett would not consider the right hemisphere's behavior as the conscious performance of an intelligent person, because of *other facts* that we know about the right hemisphere. Although, in a personal letter to me, Gillett speaks of my previous discussion (Natsoulas, 1987a) as fair to his view, I am now wondering whether Gillett's claim that one and the same agent uses both disconnected hemispheres to perform tasks does not mean the behaviors produced by either disconnected hemisphere, behaviors that would normally be considered conscious performances of an intelligent person, are after all considered by Gillett conscious performances of an intelligent person. Referring to behavior produced by the disconnected right hemisphere, Gillett (1986) stated, "The patients with brain bisection can do a number of things with objects, try to draw them, mime their use, and so on, but often only with one hand. By the very nature of the lesions they are precluded from saying what they are doing" (pp. 226-227). Again, it is the *patients* (not hemispheres) that are performing these tasks. Are the behaviors not, therefore, the conscious performances of an intelligent person? Is not the same agent who performs with the left hemisphere and right hand also performing with right hemisphere and left hand? In the latter case, is this agent performing unconsciously? Can the agent do all that the right hemisphere produces in the laboratory unconsciously?

5. *Each disconnected cerebral hemisphere is unable to use some of the information given to the person involved.* Who is "the person involved"? Is "the person involved" the commissurotomized person, the human being whom we can see before us, or something else? For Gillett the above fact seems to be that information given exclusively to the left (right) disconnected hemisphere cannot be used by the right (left) disconnected hemisphere. But, in his view, it is *the person* who controls both hemispheres and, therefore, who uses the information provided to him or to her to guide the behavior of both hemispheres. If it is the person who is given the information, the problem requiring attention from Gillett is the person's inability to use some of this information, since the person receives the information and controls the right hemisphere. One explanation that Gillett should consider is that the person to whom Gillett keeps referring is none other than the disconnected left hemisphere! The disconnected left hemisphere has a unitary standpoint and is the subject of experience whom Gillett invokes. The commissurotomized person does not have a unitary standpoint because (a) the disconnected left hemisphere does not control the behavior of the other hemisphere, and therefore cannot use some of the information that it itself receives for this purpose and (b) the information received by the commissurotomized person in the laboratory is not all of it received by the left hemisphere, some is received by the

right hemisphere, and some of this information is used by the right hemisphere in choosing suitable behaviors.

After the above preliminary comments, let me turn to Gillett's grounds against consciousness in the disconnected right hemisphere. Gillett cannot accept a stream of consciousness for the disconnected right hemisphere without abandoning his position on "standpoint." In effect, I have just asked him to treat of the question whether the commissurotomed person does or does not have a unitary standpoint. In Gillett's view, the evidence for consciousness in the right hemisphere is not adequate; all evidence that anyone has proposed as supporting a center or stream of consciousness in the disconnected right hemisphere does not suffice to show this hemisphere possesses consciousness. For Gillett, the evidence makes two consciousnesses per commissurotomed person *far less reasonable* than a single sphere or stream of consciousness that each of these people possesses, in just the same sense that intact people possess only a single consciousness. Thus, the issue seems to be one of evidence. What is the more reasonable conception of the commissurotomed person and his or her consciousness in light of the evidence?

According to Gillett (1986, pp. 225–226), a two-streams view is an unreasonable "leap into an hypothesis," a theoretical jump that ignores overwhelming evidence of the commissurotomed person's everyday functioning in a remarkably integrated way; which should lead us away from whether the commissurotomed person possesses one or two streams of consciousness, and to the key question of who is actually performing the tasks in the laboratory when one hand "is used" to respond in a way opposite to the other hand. That is, the performances of commissurotomed people in the laboratory must be understood not narrowly, that is, not simply in terms of an individual performance or set of performances in the laboratory, but in terms of the commissurotomed person's total pattern of functioning, inside and outside the laboratory.

Gillett wants us to raise the right questions about the commissurotomed person's consciousness, and not to predetermine our understanding of this consciousness by the questions we raise. Given the integrated performance of the commissurotomed person throughout the vast majority of moments of his or her life, the reasonable question upon disparate responding of the two hands (to information delivered separately in the laboratory to each cerebral hemisphere) is to ask whether the immediate situation (together with cerebral disconnection) has brought into existence momentarily or more permanently a second "subject of experience" (Gillett, 1986, p. 226). Besides the commissurotomed person himself or herself, is there *someone else* who is producing the behavior of the disconnected right hemisphere? The question almost answers itself: *so big an assumption for so relatively little to explain.*

However, Gillett does not address whether the laboratory arrangements

have made it possible to discover something heretofore hidden: the existence of a second "who." Do we really know, already, the full psychological consequences of commissurotomy? As Gillett (1986) stated about other kinds of brain damage, "There is no blithe continuation of personal life with largely intact psychological function here" (p. 228). Recall that prior to Sperry's research, commissurotomy was thought to produce hardly any psychological effects. In a sense, the everyday behavior of commissurotomed people as well as their behavior in earlier testing "fooled" the scientists. Only later did we learn how different are commissurotomed people from intact people. Do we not have a great deal more to learn about the psychological effects of commissurotomy? Should not Gillett get himself into a better epistemic position regarding commissurotomed people's daily lives before he confidently pronounces that they have "a unitary standpoint"? In support of what I am suggesting, I can cite his own wise statement during a discussion: "We are supposed to know what it is like to be a 'person' with a single cerebral hemisphere. Having met patients with much less serious brain defects, I do not find such situations at all clearly imaginable or intelligible" (Gillett, 1987a, p. 54). Could it be that in the daily life of the commissurotomed people much goes on that scientists have not yet managed to observe? Puccetti (1981), especially, emphasized that a hemisphere with a distinct consciousness could be led along by its dominant mate and produce little distinctive behavior. Also, much behavioral integration may occur, as Gazzaniga (1985) emphasized, after behaviors are produced; that is, the disconnected left hemisphere may be constantly making very good sense of behavior that the disconnected right hemisphere is producing. In my opinion, Gillett could strengthen his account by *pursuing the question of integration*, rather than assuming an answer to it. As I stressed in the first article of the present series, following Puccetti (1981), functional integration does not require unicity of consciousness (Natsoulas, 1987a).

To the question of who is producing the behavior of the disconnected cerebral hemisphere, Gillett (1987b) gave the following "reasonable" answer: "This is the model I would favor, that of a person attempting to overcome the effects of damage to a part of his body, rather than a complex of conscious entities that can come apart." (p. 77). What are the effects of this damage? And who is attempting to overcome them? The commissurotomed person is a single subject of experience, according to Gillett, with some of the behavior produced by his or her body occurring outside of the commissurotomed person's direct control. This is what Gillett seems to mean by referring to the behaviors of the right hemisphere as "mistakes." The commissurotomed person can be aware of the latter behavior and can recognize it as not being what he or she has done or would have done. Gillett (1986) stated,

The fact is that the person realizes that he has made a mistake, not that someone, perhaps contingently related to him, has made a mistake which he has the knowledge to correct. As far as he is concerned, the person in error and the person who is not are he, himself, one person and one mind, but he is not functioning properly. (p. 226)

Thus, Gillett emphasized the perspective of the one subject of experience who converses with the researcher and others. From this subject's perspective, the behavior produced by the right hemisphere may indeed be viewed as a mistake. However, *there are other perspectives*. From the informational perspective of the right hemisphere, behavior that the "person" himself or herself produces may be considered a mistake. Gillett may not agree with the latter statement, but then what will he make of laboratory reports that the disconnected right hemisphere has behaved in such a way as to help the left hemisphere to improve its performance (e.g., J. Levy, as described by Pucetti, 1983). Of course influenced by my two-streams view, I have expressed the latter observed fact in a way that Gillett would reject. However, the job remains for Gillett to describe such behavior of the disconnected right hemisphere in a way consistent with his main hypothesis. The problem is that, as I believe Gillett would agree, the functioning of the disconnected right hemisphere is not under the person's direct control.

Who performs the apparently intelligent behaviors that emanate from his or her body and are not chosen by the commissurotomed person? *Nobody*, according to Gillett; when the left hand correctly picks out a square object, this can be explained in terms of *brain function* but not in terms of consciousness. As I stated, at the very end of the first article of the present series, Gillett needs to improve his account at this point (Natsoulas, 1987a, p. 465). Which will be difficult to do. However, the very idea of the right disconnected hemisphere's helping behavior, self-recognitive behavior, and evaluative behavior proceeding caused by processes none of which involves consciousness needs to be addressed. Gillett (1986) himself seemed to suggest a partially mental explanation of such behavior, when he wrote that the commissurotomed person "may form two different intentions, which could be contradictory" (p. 226; cf. Gillett, 1987b, p. 77). But only a few sentences later, Gillett stated that the behavior of the right disconnected hemisphere can be explained neurophysiologically, by which I understand, without reference to anything mental.

I hope to be understood as being positively rather than negatively critical when I say that Gillett's discussion seems to me to follow a double standard. On the one hand, those who would explain right hemispheric behavior in terms of consciousness must deliver evidence of an "austere set of information processing abilities" in the right hemisphere (Gillett, 1986, p. 227; see below). On the other hand, Gillett and others who would explain the brightest and the best behavior of the disconnected right hemisphere in terms that do

not include reference to consciousness *are granted* that they can actually pull this trick off. I do not believe it is a negative criticism for me to ask Gillett to be more persuasive about the latter. How does he know, why does he think, that such a scientific feat is possible? Consider the behavior already referred to here and demonstrated by Sperry, Zaidel, and Zaidel (1979). Can Gillett reasonably hold that this evidence for self-awareness and self-recognition by the right disconnected hemisphere can be given an explanation in terms of ordinary neurophysiological concepts, that is, not in terms of the kinds of concepts of mentality and consciousness that Sperry (1977/1985) thought necessary? If Gillett does think it can be done, let him develop and display his reasons. The result could be a much greater cogency for his position.

From Gillett's perspective, if the observed facts concerning the commissurotomed person are best explained in terms of a single subject of experience, a single one who is performing the experimental tasks and leading a life, then there will be no need to introduce into our explanations a second stream of consciousness to account for any of the commissurotomed person's behavior. This is why Gillett urges that the question as to *who* is performing the tasks is the prior question. As Gillett (1988) stated about his earlier discussions of the problem,

Parfit, by contrast, claims that one can have a stream of conscious activity in one's mind to which one has no verbal access at all. He claims that brain bisection cases suggest that there can be two conscious streams in the one subject. I have argued elsewhere that this does not do justice to an adequate notion of the subject of experience [Gillett, 1987b]. Even on the basis of the present study it is clear that wide access to an indefinite number of conceptual abilities so that a range of judgments can potentially be made about any given experience is a characteristic of conscious thought and an important, perhaps even central, subset of these abilities are verbal. Consciousness involves an ability to *integrate* divers experiences so as to enable the subject to build a coherent picture of the world. Such a picture allows the subject to connect and exploit the possibilities of all the situations faced. (p. 339)

Why does a two-stream view not do justice to an adequate notion of the subject of experience? Once armed with an adequate notion of the latter, we will no longer be tempted by the two-streams view. *How does an adequate notion of the subject of experience protect us from adopting a two-streams view?* It is at this point that Gillett's conception of the commissurotomed person requires the closest attention if his conception is to play an important role on the main stage of cogent alternative conceptions. I proceed by isolating several points that require further work.

1. Gillett (1986) stated, "In the absence of language certain detailed propositional attitudes and consequently certain thoughts cannot be justifiably ascribed" (p. 227). Does this mean that because the disconnected right hemisphere has limited linguistic ability therefore it has no stream of consciousness? Or does this mean that, if it has a stream of consciousness, then

this stream of consciousness must be different in character from the left hemisphere's stream of consciousness, specifically in lacking certain kinds of linguistic thoughts?

2. However, Gillett did not stop with "certain thoughts." If these thoughts are not justifiably ascribable to the disconnected right hemisphere, it seems to count, in Gillett's book, *against* the proposition that "the mute hemisphere is fully conscious of the objects [that it draws, mimics their use, and so on, with the right hand] and is merely unable to use language" (Gillett, 1986, p. 227). In these circumstances, much can be done with the word *fully*, but can Gillett move to a denial of consciousness in the disconnected right hemisphere?

3. Gillett (1986) did not explain how it is that nonlinguistic behavior cannot be the basis for ascribing "certain" detailed propositional attitudes and "certain" thoughts. Instead, he simply gave this example:

Consider, for instance, the patient whose two hands evinced different reactions to his wife. It would be implausible, on a moment's reflection, to claim that one of his hemispheres loved his wife and the other one hated her. We would want to know about beliefs, intentions, commitments, expectations, and a great number of "propositional attitudes" held by any candidate for these ascriptions. (p. 227)

Are we to conclude that the disconnected right hemisphere, deficient as it is in linguistic abilities, cannot experience love or hate (which counts against this hemisphere's having a stream of consciousness)? Gillett is suggesting that, in the case of the disconnected right hemisphere, we cannot know about the necessary constituent propositional attitudes — though he does not say why we cannot know. Suppose one had a larger sample of the right hemisphere's behavior; might one not become progressively more convinced about its feelings and emotions, just as one does in the case of the "person?" In both cases, the process would seem to be one of weighing the evidence.

4. Elsewhere, Gillett (1987) stated, "Where there is no language for its expression and elaboration, we cannot ascribe a full human range of thoughts with propositional content" (p. 78). Suppose for a moment that a "full human range" of thoughts cannot be ascribed to the disconnected right hemisphere. Does it follow that the right hemisphere does not possess a stream of consciousness? How? Is a double standard operative here as well? Suppose that, in keeping with the commissural-integrative view of the intact person's consciousness, commissurotomy changes the person's stream of consciousness. That is, a stream of consciousness that now flows only in the left hemisphere and no longer "straddles" both hemispheres must be a different stream of consciousness. (Cf. Bogen, 1969, on people with right cerebral hemispherectomy; Cook, 1986, on the right hemisphere's contributions to the "contextual and connotative implications of language;" and Natsoulas's, 1988, pp. 543–544, last comments on the commissural-integrative view of the unity of conscious ex-

perience in intact individuals.) Would Gillett deny that the deconnected left hemisphere possessed a stream of consciousness if it were shown that it could not have certain experiences that the person used to have? Would it, too, have to have the "full human range" in order to have a stream?

### An Eliminative Approach

When I introduced Rey's (1983a) conception of the commissurotomized people's consciousness earlier in the present article, I pointed out that Rey's conception is of a piece with his conception of his own consciousness. More specifically, Rey has arrived at the position that all animals, including all people, including Rey himself, are none of them ever conscious. It is inconclusive as regards Rey's having consciousness that Rey thinks a great deal in subtle and sophisticated ways about his not being conscious, that Rey discusses often about his purported condition, and that Rey dreams of himself as proceeding through his daily life unconsciously and tells about his dream in the morning.

As far as Rey is concerned, all of this, and everything else that one may truly say about Rey, can be explained without reference to Rey's having a conscious mental life. All of this proceeds unconsciously. My own conviction that close study of commissurotomized people will help us better to understand consciousness is, from Rey's perspective, erroneous. I should concern myself instead with how the deconnected right and left hemispheres are different in their unconscious psychological functioning. Neither hemisphere has consciousness, nor do the people who read these words.

The general reason for Rey's doubts concerning the existence of consciousness is: "We cannot find a place for [consciousness] in any reasonable theory of the world" (Rey, 1988a, p. 6). This implies that all theories that include a place for consciousness are, to this point, not reasonable theories. In a moment, I will raise a question about this large claim of Rey's. Before I do so, let me point out that, having made this claim, Rey's thoughts did not turn, evidently, to our educational system and how we might modify this system so that humanity will have a better chance of solving the mystery of consciousness. Nor did he say anything at all along the lines of how to improve our abilities to function intellectually and scientifically, so that we might find a place for consciousness in a theory of the world that Rey would consider reasonable. Rey did not mention the fact that so many of our scientists are employed in one way or another by the military, and that this may be leading us more and more deeply into the blind alleys of machine analogies.

Also, before throwing in the towel for all of us, a frustrated thinker about consciousness might want to devote another ten years to the topic, especially since others are also intensively working on the problems involved. Rey seems

to show unseemly haste to declare the nonexistence of consciousness. After all, he has stated, "The appropriate evidence, much less the appropriate theory, is not yet available in psychology for conclusive claims about much of anything" (Rey, 1983a, p. 7). And, "There really aren't any fully developed psychological laws available" (Rey, 1988a, p. 8). Then, why the rush to conceive of human beings as lacking consciousness?

In a chapter published in 1983, Rey used the word *fetal* to characterize the contemporary state of psychology as a science. In a chapter published only five years later, Rey's (1988a) word for the state of psychological science was *adolescent*. From fetal to adolescent in five years is extraordinary progress for a science, and should cause Rey to feel optimism concerning the next ten years. Here is excellent reason for him not to declare consciousness nonexistent on the basis of the current state of the science, especially in view of the likely moral consequences, which Rey (1988b) virtually admitted, of his present conception of people as lacking consciousness (see below).

In part, Rey would answer as follows the question of why the rush to conceive of human beings as lacking consciousness: "The most plausible theoretical accounts of human mentation presently available appear not to need, nor to support, many of the central claims about consciousness that we ordinarily maintain" (Rey, 1988a, p. 6). Thus, those theorists who invoke consciousness for their explanatory purposes do not, any of them, put forward "reasonable" theories. And those who provide us with the most "plausible" psychological accounts do so without the help of any reference to consciousness.

For example, Sigmund Freud's conception of the psychical apparatus, which includes a perception-consciousness system in which conscious psychical processes literally proceed, is not a reasonable account in Rey's view. I have discussed the consciousness aspect of Freud's conception at some length and I have found it illuminating (Natsoulas, 1984a, 1985, 1989a, 1989b, 1991). In contrast to Freud's theory, certain "theories about the nature of human mentation that are available in recent psychology, psychobiology, and artificial intelligence" (Rey, 1988a, p. 5) are not only "reasonable"; they are the most "plausible" theoretical accounts available to us. According to Rey, these theories lead to his own stupendous conclusion: "In all theoretically significant ways we seem to be indistinguishable from 'mere machines' from which we nevertheless insist upon distinguishing ourselves" (Rey, 1988a, p. 23). Modest throughout, Rey does not exclude himself or the process by which he arrived at this conclusion.

However, Rey did not wait to see how the "plausible" theories would develop, whether they will last as long as behaviorist theories did, whether they will come eventually to include concepts of consciousness, as they attempt to explain a greater range of phenomena. Again, even more recently, Rey (1988b) stated without equivocation, "I conclude in my own work that there is no



such thing as consciousness" (p. 6). The latter statement may remind you of James's (1904) denial of the existence of consciousness. But James made very clear that he was denying only that consciousness is any kind of entity. Rey was making a larger claim, that there is not even a kind of consciousness that James called a "function." That is, according to Rey, there is no conscious mental life, no stream of consciousness.

Perhaps Rey would say that certain theorists who include consciousness in their theories (e.g., James, Freud, Sperry, Puccetti, Popper, Eccles, Gazzaniga, LeDoux, and Gillett) are showing, in doing so, a loss or lapse in their usual outstanding reasonableness, much as some scientists lose their normal reasonableness when they seek to compare people of different races. Rey's (1988b) remarks on Jaynes's (1976) conception of consciousness explicitly brought in a reference to racism:

Should someone propose . . . that only people of a certain race are genuinely conscious, it is reasonable to object that the moral consequences would be so bizarre that we would need a very strong argument indeed to force us to accept them. Jaynes' (1976, 1986) proposals strike me as very nearly so bizarre. [Later in the same remarks, Rey stated that Jaynes's view has "morally odious consequences."] He claims that consciousness consists of a metaphorically created internal space, and an "analog I" that is constantly filling out a temporal narrative. . . . [Jaynes claims] that consciousness is actually *created* and *constituted* by this conception [which the "analog I" is constantly filling out]. And he cheerfully endorses the consequence that people lacking this conception – if his historical research is to be believed, the whole of humanity prior to 600 BC and apparently many schizophrenics today – are therefore not conscious! As in the case of the racist proposal, the moral consequences of such a view should at least give one pause. Would what we might do to the people of the "unconscious race" matter as little as what a doctor might do to an anesthetized patient? Could we treat them as indifferently as we treat a "mere automaton," a presumably unconscious computer? (p. 2)

If Jaynes's conception of consciousness can be used to justify treating certain people as though they were computers or mere automata, which is why Rey considered Jaynes's view morally odious, is not Rey's own account also morally odious for the same reason? According to Rey, all children lack consciousness. According to Rey, all old people lack consciousness. According to Rey, all disabled people lack consciousness. According to Rey, all poor people lack consciousness. According to Rey, all people who are in prison lack consciousness. According to Rey, all inmates of mental hospitals lack consciousness. And that's not the end of it.

Rey (1988b) acknowledged that his own conclusion about consciousness "may seem more appalling than that advanced by Jaynes" (p. 6). He was probably thinking that his conclusion, in contrast to Jaynes's, can be used to justify our treating *whomever we please* as though he or she is a computer or a mere automaton. Whereas Jaynes's morally abhorrent conception excludes only some schizophrenics from being conscious and perhaps other small groups of people whose minds do not function as Jaynes requires for consciousness,

Rey's morally abhorrent conception of people is a conception of all people. And it especially places at risk all those people who are relatively weak.

Rey (1988b) did not think that his conclusion about consciousness was as bad as Jaynes's. About his claim that consciousness has no place in the world, Rey (1988b) stated,

This conclusion may seem even more appalling than that advanced by Jaynes. But it has this advantage over Jaynes', that we are not misled [by Rey's conclusion] into adopting some criterion of consciousness that would lead us into misconceptions of ourselves and bizarre distortions of our moral lives. Rather, we are led, as I think we ought for many other reasons to be led, to re-examine our conceptions of ourselves and of what matters in our moral worth. (p. 6)

I believe that Rey is mistaken here (and elsewhere). No less than Jaynes's conception of consciousness, Rey's conception of people misleads us into adopting a certain criterion of consciousness; a criterion of consciousness that, according to Rey, no one meets. Not long ago, according to Jaynes, no one met Jaynes's criterion of consciousness. A totalitarian administration declares that new hats will be issued to those, only, who have the corresponding head circumference, which no one in fact has. Rey's misleading criterion of consciousness is no less a criterion of consciousness whether or not anyone meets it. According to him, all people fail to qualify for being conscious; that is, no human being possesses a property of consciousness that some existing computer cannot be programmed to possess.

As for "bizarre distortions of our moral lives," I do not see how Rey's misleading criterion of consciousness is less likely to lead to such distortions than Jaynes's misleading criterion. Of course, Rey feels that vigorous promotion of his conception of people is worth the risks (which will fall mainly on the weak). It is to humanity's great advantage to know Rey's truth about itself. Whereas Jaynes's conception, being untrue, misleads us, Rey's truth will lead us away from erroneous conceptions of ourselves and to the re-examination of our morality in the light of scientific fact as opposed to superstition. Rather than "bizarre distortions of our moral lives," if we follow Rey, we will come to value ourselves and each other for something unrelated to consciousness, for something very real. (What might that be? Predictability? Controllability? Docility? Usefulness? Samelson, 1985, conjectured that the denial of consciousness may have the function of rendering the populace more orderly and cooperative. Accepting that they are not conscious, they will no longer conceive of themselves as culture makers but simply as products of their biology and society. Samelson, 1985, p. 44, stated, "Keeping this force under control is best accomplished by having a politically neutral and objective science certify that there is no consciousness, or at least that it is powerless.") If Rey's conception of people is false, which is likely given the very large pro-

portion of false theories in psychology and science, Rey's conception of people has no redeeming value to compensate us for the great harm that it may do in the meantime if more and more people become convinced that they are in no theoretically significant way distinguishable from computers.

The reader would misunderstand me if he or she thought that I am opposing or would oppose people's re-examining their conceptions of themselves and their moral principles in the light of all that we know and have yet to learn about ourselves. At the same time, I strongly disapprove of the premature promotion of those conceptions that have morally odious consequences. I mean premature in relation to what we know about ourselves. I believe that conceptions with morally odious consequences should be held to an extremely high standard; by both those who are tempted to promote them and by the rest of us when those who are tempted succumb. Note that Rey (1988b) himself demanded from Jaynes "a very strong argument indeed" before Rey would accept his morally bizarre conception of consciousness.

In my introduction to Rey's eliminative approach in an earlier section of the present article, I pointed out that Rey had no similar doubts about unconscious mental processes, as he had about conscious mental processes. Rey held that human beings and other animals possess a mental life, though this did not consist of any conscious occurrences. On what grounds did Rey hold that people have unconscious mental lives — which then led him to conclude that they have no conscious mental lives? How well founded are his fundamental theses from which he proceeds to his morally abhorrent conclusion? In this case, one should not be charitable, accepting premises for the sake of argument or to let Rey get his case off the ground. Keep in mind that Rey wants us to believe something about people that may well be untrue and could have terrible consequences, worse than those that have already transpired in the darkness of the twentieth century.

Rey (1988a) begins as follows:

One of the soundest reasons for taking a particular description of an object seriously is that the object obeys laws in which the description figures. Amoebas, for example, can be regarded as literally alive, since they obey many of the laws of living things. Similarly, an object can be regarded as literally possessing a mental life insofar (and perhaps only insofar) as it obeys psychological laws. Now, to be sure, given the still adolescent state of psychology as a science, there really aren't any fully developed psychological laws available. (pp. 7-8)

Rey has better grounds for believing that amoebas are alive than that he has a mental life. Rey cannot regard any "object," including himself and all other people, as literally possessing a mental life because no fully developed psychological laws exist. The absence of psychological laws does not lead Rey to deny the existence of all mental life, as he would, I take it, if he believed that no such laws were ever forthcoming.

What, according to Rey, is the relation between mental life and fully developed psychological laws? How would one get from the laws (which we don't have yet) to the postulation of a mental life, presumably to explain the laws? I believe that Rey, when speaking of psychological laws, has in mind observable lawful relations in which the dependent variable is a kind of behavior or characteristic thereof. What leads Rey from behavioral laws to mental lives? And how does he move on to unconscious mental lives as distinct from conscious mental lives?

On the faith that fully developed psychological laws are forthcoming, what are the alternative postulations that would explain them? Why do not psychological laws lead Rey to explanations strictly in terms of brain function? Since mental life, according to Rey, is all of it unconscious, his mental concepts cannot derive from our own case; they must have their ultimate source in observations of behavior and of its observable conditions. But how? How does human or animal or computer behavior give us the hint that a mental life proceeds "behind" it? By introducing a mental life at all, is Rey performing a very large and unsteady theoretical leap, since he knows from biological science what kinds of structures and happenings proceed behind the eyes and between the ears?

Let me put it this way: In the absence of any direct access to one's mental life that amounts to anything more than a computer's printing out certain marks on paper when the computer is in a certain internal state (cf. an oven's continuous "reporting" of its internal temperature), how does one choose an unconscious mental life to explain psychological laws?

Recall Puccetti's comment to the effect that cognitivism, which Rey represents, has allowed itself to run wild. Puccetti (1983) stated,

Rey [1983b] may find it "quaintly preposterous" that we raise questions about consciousness in the split brain now that the "whole industry" of cognitive psychology allows imputing consciousness to computer programs, ghosts, nonexistent Martians, indeed anything that is organized in the right way (functionalism). His attitude seems to be that if a concept is applied widely enough it will, like a bad odor, become benign. But it is not at all clear to me that with cognitivism we have not passed from the sterile abyss of behaviorism to an equally sterile attitude of rank superstition. (p. 737)

Puccetti thus understands Rey and other cognitivists not to be denying consciousness, but to be ascribing consciousness freely to whatever "object" conforms to certain law sketches. Puccetti's basic criticism seems to be the same one that I have raised: How does Rey move justifiably from an object's observed regularities to ascribing no less than a mental life to it?

Important to emphasize: Rey's case against consciousness in human beings depends on his ascribing a mental life to computers. If we accept the latter ascription, we are subject to Rey's challenge as to how people's purported consciousness makes them different from computers. If we grant to Rey that

existing computers can have a mental life, we must next face Rey's cognitivist license to claim that existing computers can possess a mental life that is not different in any theoretically significant way from a human being's mental life. And, of course, everyone agrees computers are not conscious.

Here is how Rey (1988a) continued at the fundamental level to make his case against consciousness:

Among [the psychological law sketches], few seem to be more central and basic than those that attempt to capture what might be called the "Rational Regularities:" these are the regularities among a creature's states whereby [these states] instantiate the steps of inductive, deductive, and practical reasoning. So far, the best explanation of such remarkable capacities seems to be one that postulates mental processes in the animals whereby they are able to perform at least elementary inductions and deductions, and are able to base their behavior upon some one or other form of practical reasoning: e.g. they generally act in ways that they believe will best secure what they most prefer. (p. 8)

Among other things, Rey had in mind here spatial learning in animals (see Rey, 1983a, p. 7). Ascribing a mental life is, he says, the best way "so far" to explain the observed regularities. He does not mention any alternative account besides the behaviorist one. He does not, for example, make reference to neurophysiological explanation. He does not, for example, contrast explanations that do and do not include reference to conscious mental processes. Are there distinct kinds of explanation?

How is Rey's favored kind of explanation an explanation in terms of unconscious mental processes? If the animals are indeed "basing" their behavior upon some one or other form of practical reasoning, does this not imply consciousness? I take it that when animals do this kind of "basing," they choose suitable behavior depending on what they are aware of themselves as desiring and knowing or believing about the circumstances. Is not Rey himself intimately familiar with this conscious mental process ("basing"), and has he not taken the cognitivist opportunity to ascribe the same to animals and others as in his own case?

At this point on his way to deny consciousness, Rey adds that the kind of explanation that he is discussing is a central part of "Verstehen" or "empathic" explanation. Moreover, he states that this kind of explanation is not yet fully understood, "much less all the behavior of the explicanda" (Rey, 1988a, p. 8). The implicit reference here to consciousness and to our ignorance does not deter Rey from promoting a position that he has just about admitted is a position that it is morally reckless to promote.

Again and again, as Rey proceeds toward his goal, he admits to shakiness, uncertainty, tentativeness. He repeats that what he is proposing is possible, is plausible. In other words, he asks for our patience as he develops his position gradually over the years. His efforts are to be appreciated for what they are: early attempts at a conception of people.

We will soon have a chance to study a much more complete statement of Rey's cognitivist doctrine. MIT/Bradford is now preparing to publish Rey's book, which bears the title *Mind without Consciousness: A Discrepancy between Explanatory and Moral Psychology*. Because there is so much at stake, I urge close attention to the foundations of Rey's conception of people, where I expect that the unanswered questions will be discovered.

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