Sperry contends that we can legitimately hold that science can address the realm of the subjective. And since cognitive values are an important subset of ideas formed by the complex interaction of the environment and our innate and learned cognitive structures, scientists can study, on the one hand, the developmental and environmental origins and maintenance of values, and, on the other, their role in effecting behaviors.

But Sperry's undoing of the fallacy only partially bridges the gap between fact and value. The alleged gap between fact and value may be conceived in various ways. One type of gap is explanatory. Science can explain facts but not values. This is the gap that Sperry's mentalism, if correct, removes. Insofar as values are ideas which cause us to do what we do and insofar as science proves itself able to understand and explain our behaviors in terms of values, the explanatory gap can be bridged. Such explanations, however, belong to a geneaology of morals and ethical behavior.

But that is not sufficient. For one could grant to Sperry that the behavioral sciences can give a causal account of how values of either the non-cognitive or cognitive sort bring about human behaviors while maintaining that these sciences are unable to give any rationale for why they do so. In other words, one may grant that a scientific explanation could show how ideas cause behaviors without showing why values motivate behaviors. Sperry needs to bridge the motivational as well as the explanatory gap.

In order to build a bridge over the motivational divide, it will be helpful to look in more detail at the explanatory patterns involved in Wilson's and Skinner's proposals for their respective sciences of values. There are good reasons to hold that both the evolutionary and operant patterns of explanation upon which these sociobiological and behavioral theories are built are teleological rather than causal in character (Rottschaefer, 1980a, 1980b, 1982a, 1982b). I take causal explanations to be aimed at finding the necessary and/or sufficient *antecedent* conditions of a behavior given certain background assumptions. Teleological explanations, on the other hand, are in terms of the *consequences* of the phenomenon to be explained (Ringen, 1976; Wright, 1976). Such explanations have been called by some *teleonomic* to distinguish them from teleological explanations in terms of conscious purposes (Mayr, 1974). In the case of evolutionary explanations, traits and behaviors are explained by means of their contributions to the fitness of an organism (Brandan, 1981; Mayr, 1974). In the case of operant explanations, behaviors are explained in terms of the reinforcing effects of behaviors (Ringen, 1976). And Skinner (1971, 1974) makes it clear that operant effects are themselves ultimately grounded in the genetic makeup of the organism (Smith, 1983). Such explanations of behavior are accounts of why an organism does what it does, not how, because they refer to consequences rather than antecedents as explanatory. As a result, they can be invoked to explain the motivational capacity of what Sperry calls

non-cognitive values. Moreover, there is a natural extension of this explanatory pattern from non-cognitive values to cognitive values. Cognitive behavioral theorists as well as cognitive psychologists generally offer explanations in terms of the cognitively held goals of agents and not merely in terms of the causal antecedents, cognitive or otherwise, of behaviors (Bandura, 1986; Dennett, 1981; Rottschaefer, 1982a, 1982b). For it is the anticipated consequences of one behavior rather than another that can lead to the choice and execution of one of several proposed behaviors by a cognitive agent. Thus, if we supplement Sperry's causal account of the role of values in bringing about behaviors with a teleological account, it seems that, in principle at least, the behavioral sciences can explain not only how values cause behavior but why they motivate them.

But this bridge does not seem to take us far enough either. For even if we grant that the behavioral sciences can explain not only how ideas influence behaviors but why, the gap Sperry needs to span concerns moral agency. We are still left with the task of accounting for the prescriptive and justificatory role of values. Sperry needs to bridge the prescriptive-justificatory gap.

This task leads us naturally to Sperry's second suggestion for understanding and dissolving the problematic character of the fact/value dichotomy. Sperry (1983, p. 22.; p. 50; p. 73ff) believes that this thesis on the hierarchic character of values and the role of first ethical principles in determining subordinate principles in the value hierarchy allows us to do this. He claims that the prime value determinants of our behaviors are the basic values embodied in our first ethical principles, principles that deal with the ultimate meaning of life, thus, with human nature and its relationships with cosmic forces, living and non-living. In Sperry's view, the most adequate source for such principles is our best current scientific knowledge rather than religious authority, intuition or mysticism. Consequently, the values that prescribe and justify what we do are to be drawn from such scientifically based principles. Sperry is not particularly concerned with the justification of particular ethical norms, for instance, prohibitions against murder or cheating. Nor does he attempt to support in any but a cursory fashion the several versions of a first ethical principle that he proposes. He usually argues in support of such principles by claiming that they represent best current scientific knowledge.

How does the adaption of such scientifically based principles help us to overcome the prescriptive-justificatory gap? Sperry's discussion of the causal role of cognitively grasped values does not, I believe, answer this question. For the bridging of the prescriptive-justificatory gap requires more than accounts of how values influence behavior and why they motivate. It demands an explanation of how values make a behavior morally requisite and an understanding of why a behavior is what it ought to be. One way to fulfill

these requirements that accords with Sperry's intent is to introduce a naturalistic principle that bridges the prescriptive-justificatory gap. If we conceive of the goal of ethical practices to be individual and social human fulfillment, then we can argue that knowledge of what counts for such fulfillment depends on a knowledge of human capacities and that the latter knowledge is best found in what Sperry has called the behavioral sciences. Sperry's various formulations of first ethical principles fit this suggestion that values are things that fulfill human potentialities. Reference to whether or not actions and practices fulfill these potentialities can serve both to give prescriptive and justificatory force to ethical norms and principles.

Since my intent is the limited one of fitting Sperry's proposal about values into a larger naturalistic project for ethics, I shall not here attempt to examine the justification for the introduction of such a principle nor its merits relative to other approaches to metaethical justification (Edel, 1980; Hudson, 1970; Richards, 1986a, 1986b; Ruse, 1986). However, it should be noted that the sources for the justification of the principle need not be exclusively scientific nor non-scientific. Put more positively, the sources of such a principle can be found in ordinary knowledge, scientific theory, and philosophical reflection (Edel, 1980; Held, 1984). Moreover, the naturalistic principle I have proposed for bridging the prescriptive-justificatory gap is formal in the sense that neither human potentialities nor their fulfillment have been specified. How are we to identify these potentialities and their fulfillment so that particular behaviors and more general moral principles may be prescribed and or justified to the degree that they allow for the actualization of these potentialities? Following Sperry's proposal for a science of values, such knowledge will come in its best form from the sciences, from biology, psychology and the social sciences (Flanagan, 1984; Held, 1984). This is not to say, I believe, that other cognitive sources are entirely excluded. It seems entirely consonant with Sperry's program that ordinary experiential knowledge plays an intrinsic role in the acquisition of knowledge about human capacities and their actualization. Moreover, Sperry believes that religious traditions, shorn of supernaturalistic beliefs, are also a valuable source of ethical wisdom. But even if we grant that Sperry's proposals for the metaethical justification of scientifically based value claims require the sort of naturalistic principle that I have proposed, much remains to be done both in elaborating a scientifically based naturalistic ethical system and examining its merits relative to other systems, both naturalistic and not.

Conclusion

Roger Sperry's proposal for a science of values, based as it is on his thesis of mental emergentism, overcomes the criticisms leveled against similar reduc-

tionistic sociobiologically and behaviorally based proposals for making ethics scientific. It does so because it recognizes from the perspective of the neurosciences the crucial role of the mental in any account of the genealogy and justification of values. Supplemented by non-reductionistic sociobiological and behavioral accounts of values, as well as contributions from the social sciences, it opens up the possibility of an account of the origin, development and maintenance of values ranging from the genetic to the socio-cultural. With the assumption of the naturalistic principle that human values are to be identified with what fulfills human capacities, Sperry's proposal allows us to argue that the behavioral sciences, broadly interpreted, provide us with the most adequate knowledge of these capacities and how they can best be fulfilled. I have not here attempted to defend such a principle. My concern rather has been to show how Sperry's proposal for a science of values fits within and contributes to a more general project for a scientifically based naturalistic ethics.

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