ficient because many of them never have had the opportunity of understanding the real meaning of a lab experiment with animals.

Even if humans are not rats, and rats are not humans, to work with animals is very useful for the psychology student. In the same way in which frogs are not humans, and the medical student must work with frogs, the future psychologist will profit from this type of training. In spite of Lockard's attacks, I am sure that comparative psychology is here to stay.

REFERENCES

ARDILA, R. *Historia de la psicología comparada.* Lima: Universidad de San Marcos, 1968.

LOCKARD, R. B. Reflections on the fall of comparative psychology: Is there a message for us all? *American Psychologist,* 1971, **26**, 168–179.

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More on Heritability: Addendum to the Hebb and Jensen Interchange

The recent comments by Hebb (1970, 1971a) and Jensen (1970), as well as those of others who joined the argument (Einhorn, 1970; Gordon, 1970), illustrate once more the fact that several different questions may be asked about the role of heredity and environment in behavior development. When one person's answer is attached to another's question, the resulting juxtaposition may make little sense. Many of the confusions and controversies regarding heredity and environment arise from the failure to differentiate among these diverse questions.

Hebb (1970) argued that the concept of heritability (or amount of population variance attributable to heredity) "cannot show how important heredity (or environment) is in determining an aspect of behavior [p. 568]." To dramatize this point, he cited Mark Twain's humorous proposal that boys be raised in barrels to the age of 12. While the heritability ratio of IQ computed within such a population of boys would be close to 1.00, because of the negligible environmental variance among them, environment would obviously account for the major intellectual retardation displayed by these boys. Jensen (1970) correctly replied that, in order to assess the contribution of heredity and environment to such retardation, it would be necessary to compute a new heritability ratio in a population comprising both barrel-reared and normally reared boys. (Essentially the same point was made by Gordon, 1970.) In his one-paragraph reply, Hebb (1971a) put his finger on the crux of the difficulty. Because there is so much confusion and misunderstanding in this area, however, it may not be amiss to risk some redundancy and spell out the points more fully.[1]

In his analysis of heritability in the original article, Jensen (1969, pp. 33–46) gave a lucid and thorough explanation of this concept, together with its limitations (see especially pp. 42–46). Three of these limitations have particular relevance to the present controversy. First, heritability refers only to population variance in a trait and is inapplicable to individuals. For example, in identifying the etiology of severe mental retardation in a child with PKU or in one of Mark Twain's barrel-reared boys, data on the heritability of intelligence would be of no use whatever.

Second, a heritability ratio pertains to a specified population under existing conditions. It is not generalizable to other populations nor to the same population under altered conditions of heredity or environment. Heritability ratios are not characteristic of traits but are descriptive of a particular population. As Jensen (1969) correctly stated,

> All the major heritability studies reported in the literature are based on samples of white European and North American populations, and our knowledge of the heritability of intelligence in different racial and cultural groups within these populations is nil. For example, no adequate heritability studies have been based on samples of the Negro population of the United States [pp. 64–65].

Thus, available heritability ratios tell us no more about Negro–white differences in intelligence than a heritability ratio computed on Hebb's barrel-reared boys would tell us about the differences between these boys and a normative sample. To be sure, in a later section of his article dealing with race differences, Jensen (1969, pp. 78–88) made no direct reference to heritability ratios (although there is a vague, indirect allusion to "a large genetic component of intelligence [p. 82]"). Nevertheless, the inclusion of the sections on heritability and race differences within the same article may account for some of the misconceptions and non sequiturs characterizing popular citations of the article.

Third, heritability does not indicate the degree of modifiability of a trait. As Jensen (1969) put it: "High heritability by itself does not necessarily imply that the characteristic is immutable [p. 45]." The same point was made more explicit by the population geneticist, Crow (1969), in his comments on the original Jensen article, when he wrote, "High heritability of intelligence does not mean that a program

[1] A further comment by Hebb (1971b), in direct response to Jensen's (1970) reply, appeared after the present note had been accepted for publication. In it Hebb explains more fully the point made in his earlier reply to Gordon (Hebb, 1971a).

of compensatory education is destined to fail [p. 307]." The fact that Jensen drew just the reverse conclusion in his article again compounds the confusion about the concept of heritability.

In summary, available heritability data do not provide a proper answer to such questions as the etiology of an individual's handicaps, the origin of ethnic differences in test performance, or the anticipated benefits of compensatory education or other programs of environmental intervention. The question they *are* designed to answer is much more limited in scope, namely, What is the proportional contribution of heredity to the variance of a specified trait in a given population under existing conditions?

REFERENCES

CROW, J. F. Genetic theories and influences: Comments on the value of diversity. *Harvard Educational Review,* 1969, **39**, 301–309.

EINHORN, H. J. On Hebb's criticism of Jensen. *American Psychologist,* 1970, **25**, 1173–1174.

GORDON, R. A. Concerning Hebb's criticism of Jensen and the heredity-environment argument. *American Psychologist,* 1970, **25**, 1172–1173.

HEBB, D. O. A return to Jensen and his social science critics. *American Psychologist,* 1970, **25**, 568.

HEBB, D. O. Response to Gordon by Hebb. *American Psychologist,* 1971, **26**, 665. (a)

HEBB, D. O. Whose confusion? *American Psychologist,* 1971, **26**, 736. (b)

JENSEN, A. R. How much can we boost IQ and scholastic achievement? *Harvard Educational Review,* 1969, **39**, 1–123.

JENSEN, A. R. Hebb's confusion about heritability. *American Psychologist,* 1970, **25**, 568.

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Toward a Reorganization of the Psychology Curriculum

MacLeod's (1971) article on the teaching of psychology came as a bright light for those of us who have the responsibility of teaching introductory psychology and also for those of us who teach in departments of such a size that it is possible to see the psychology program as a structural whole. Concerning the latter, I would propose that the approach to teaching outlined by MacLeod provides an excellent orientation not only to an introductory psychology course but for a complete undergraduate program as well.

The newly organized undergraduate psychology program at the University of Dallas can perhaps serve as an illustration of how MacLeod's approach is transformed from the "should" and the "ought" to the actual, as well as illustrating the implementation of his thought into a complete program. I will describe this program in the context of the questions MacLeod asks of teachers of psychology.

1. What Is Your Purpose in Teaching Psychology?

The aim of the Psychology Department at the University of Dallas is to develop and to articulate the meaningful study of the psychological dimensions of human living. An explicit commitment to the inexhaustible richness of human life underlies our approach to psychology. Man is thus thought of as an inexhaustible mystery taken in the sense expounded by Gabriel Marcel—man as a certain plenitude—rather than a void to be filled. We conceive of our task as the description of this plenitude, relying on the insights of various psychological perspectives. We look on man with wonder, then, rather than on him in the context of problems to be solved. We presuppose that the meaningful study of psychology must be grounded in philosophical questions concerning man in relation to the world and that this philosophical context must be articulated as clearly as possible and constantly dialogued with our developing psychology.

2. What Kind of Psychology Are You Teaching? 3. To Whom Are You Teaching Psychology?

We agree wholeheartedly with MacLeod that the psychology teacher must become comfortable with the paradox of taking a stand toward the meaning of psychology while at the same time considering alternative points of view in an understanding manner. The purpose in teaching psychology as articulated in the first question becomes embodied in the introductory psychology course. This course is oriented toward awakening the student to the psychological dimensions of human living and moves him to bring his thought to a level of speaking by introducing him to a style of language that is adequate to the task of remaining true to the reality that he is seeking to describe. Typically, introductory courses attempt to survey the various areas of psychology in terms of the current facts, definitions, research, and theories of psychology. This course does not emphasize abstract thinking about man's behavior, but rather focuses on the development of a concrete descriptive presence to lived experience and behavior, and the movement from this presence to the articulation of meaning and the development of the empirical methods to assist in the descriptive effort.

The sympathetic concern for alternative points of view is carried out within the context of historical concern. Psychology majors take a three-semester sequence focusing on the writings of important contributors to psychology from Greek to contemporary times. In the first course of the sequence, readings