printing. In these and in many other instances, the narrative of his ingenious experiments is impressive in its detail and lucidity. This factor itself makes the book essential reading for any investigator who wants to pursue the topic of imprinting.

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Educability and Group Differences

By Arthur R. Jensen. New York: Harper & Row, 1973. Pp. 407. $10.00.

Heroes are made, not born, and something similar can be said also of martyrs and other assorted defenders of a faith. Closed-minded rabble-rousers have made a martyr, of sorts, out of Arthur Jensen. He has responded, as one might expect a martyr to respond, with a rather pained, detached, and controlled expression of righteousness. The result has been that those who most oppose his views but love liberty and justice have come to the defense of his right to express his position. This kind of passion play and audience reaction is dramatically enacted in the now well-known introduction to Jensen's earlier book, *Genetics and Education* (1972), and the equally well-known "Resolution on Scientific Freedom Regarding Human Behavior and Heredity" (*American Psychologist,* 1972, 27: 600–661), which was signed by some of the most highly respected scientists in the world. Yet the liberal thinkers who have argued that we need to hear the science of Jensen, if he wishes to speak science, have not failed to recognize that expressions of Jensen's position often are akin to screams of "fire" in a crowded theater, particularly so when in popular restatements the positions are stripped of the provisos with which Jensen is usually careful to clothe them.

There has developed, then, over the years since the publication in 1969 of Jensen's "How Much Can We Boost I.Q. and Scholastic Achievement?" (*Harvard Educational Review* 39:1–123), a sustained intellectual interest in what Jensen has come to represent. And underlying this have been those historically more persistent interests which in their basest expressions are racism and in their most rarefied forms are curiosities about human differences and the varieties of all living things. Jensen has not failed to react to these many manifestations of interest in him, his work, and all he has come to stand for. From his earlier creative efforts to find interactions between human attributes and programs that would make schools more diversified and development more salubrious for all children, he has more and more since 1969 developed into a writer of papers and a maker of talks which, in effect, are defenses of what he acknowledges were, to differential psychologists, commonplace ideas about heredity and ethnic differences when he mentioned them, almost casually, in his 1969 article. Now, in *Educability and Group Differences,* he has brought these defenses together to try to focus all relevant results and lines of argument to support the thesis that egalitarian environmentalism is not enough — that "a largely genetic explanation of the evidence on racial and social group differences in educational performance is in a stronger position scientifically than those explanations which postulate the absence of any genetic differences in mental traits" (p. 4).

The book is an advancement in several notable respects over Jensen's previous efforts to develop this thesis. It is an advancement partly because it provides,

under one cover, most of the evidence and argument on this theme that he has developed elsewhere, often in more discursive form, in papers scattered through a great variety of journals and books, some of which are difficult to obtain. In particular, it is an advancement over the earlier book, *Genetics and Education,* which, in the main, is a republication of the 1969 paper. No doubt his thinking has advanced since he wrote the present volume, but I would venture that when he completed it, it contained most of the major ideas and facts he believed to clearly support his position, including his ideas about the ethical and epistemological soundness of his study in this area. The book is, therefore, a 'must' for those who really want to understand Jensenism, as his argument has come to be called, and have not read most of his other writings on the matter.

The book is directed at supporting two major hypotheses: that differences of social class in a free society reflect genetic differences of intelligence, and that differences between whites and blacks in the United States are indicative of sampling from different gene pools for the determiners of intelligence. Although the first issue is bothersome to many, as the public reaction to Herrnstein's "I.Q." (*Atlantic,* 1971, 228:43–64) demonstrates, still, in the abstract and devoid of racial implications, it is just barely controversial. It is the hypothesis about racial differences that is of most concern, and it is for information and discussion about this issue that Jensen's book is of principal interest and value.

As noted, the book is, to a considerable extent, a collection of reactions to the criticisms leveled against Jensen since his 1969 paper appeared. There has been a heavy barrage of them, launched from almost every conceivable point on the compass of academic disciplines and directed, it would seem, at almost every possible weakness in Jensen's position. Jensen puts up a valiant defense, in many cases successfully disarming, neutralizing, or destroying the objections to his argument.

In the early chapters, Jensen deals with definitional matters and ethical issues, defining concepts such as heritability and arguing that the study of racial differences in intelligence is not simply an expression of vulgar curiosity that encourages racism. He then takes up the case for the hypothesis that a substantial proportion of the obtained variability in intelligence is genetically determined. Along the way, he deals effectively with some of the arguments that failure to take account of gene-environment interactions invalidates most of the evidence of the heritability of intelligence (but see Layzer, *Science,* 1974, 183:1259–1266). He considers the evidence for a relationship between intelligence and academic achievement and the hypothesis that part of the variation in this latter is genetically determined. Similarly, he develops defenses against the view that the gap between the average intellectual achievements of blacks and whites increases with age from infancy to adulthood. When measured in standard-deviation units, the gap remains fairly constant throughout childhood. This, Jensen contends, "means that (a) the educational process is *not* treating children of the two races differently and (b) Negro and White children *per se* are *not* responding differently to the educational treatment" (p. 101). The evidence for these claims deserves to be considered carefully.

It is disappointing that Jensen makes little attempt to counter the argument that what is measured by most omnibus intelligence tests is psychometrically indistinguishable from what is measured by general academic achievement tests.

This is important, because elsewhere Jensen contends that heritability for measures of intelligence is larger than (i.e., definitely different from) heritability for measures of academic achievement. This is part of a larger problem, namely, that Jensen's operational definition of intelligence changes somewhat as he moves from one batch of evidence to another and thus is rather different in different parts of his total thesis. This larger problem, too, is one that Jensen never really acknowledges or attempts to solve.

Chapters 5 through 7 contain the main arguments, that differences of social class and race do indeed exist in intelligence and are genetically determined. Jensen readily acknowledges that there are genuine differences with social class and racial-ethnic group in the opportunities and encouragements that help to produce intelligence. But he contends that the evidence does not support the view that these latter differences are large enough to account for the obtained differences in intelligence between racial-ethnic groups and social classes.

Chapters 8 through 19 are short. Each is a focused attempt to discount a particular criticism and/or state the case for a particular viewpoint. Chapter 17, for example, counters the "claim that intelligence tests are biased in favor of white middle-class children and, therefore, are invalid when applied to minority children (or to lower-class white children)" (p. 291).

The book ends with a "Recapitulation," an appendix on heritability, a list of roughly 350 references cited, an author index, and a subject index. Jensen concludes that, "In view of all of the most relevant evidence which I have examined, the most tenable hypothesis... is that genetic, as well as environmental, differences are involved in the average disparity between American Negroes and Whites in intelligence and educability, as here defined: All the major facts would seem to be comprehended quite well by the hypothesis that something between one-half and three-fourths of the average IQ difference between American Negroes and Whites is attributable to genetic factors" (p. 363). "The public schools... must move beyond narrow conceptions of scholastic achievement to find a much greater diversity of ways for children over the entire range of abilities to benefit from schooling.... Radical efforts will probably be called for to modify public education in ways whereby it can more effectively benefit large numbers of children who have limited aptitudes for traditional academic achievement" (p. 365).

Before launching the next section of this review, I would like to thank Jack Block, James Crow, John De Fries, Harry Gollob, Irving Gottesman, Lloyd Humphreys, Arthur Jensen, and Steven Vanderberg for their helpful responses to an earlier draft of the review.

Now, since the major ideas of heritability and the measurement of intelligence are developed in terms of mathematical and statistical representations, and since these are the ideas with which Jensen is concerned, it is inevitable that his book is in some measure technical and demands an ability to deal with mathematical abstractions. For those who believe that any idea worth expressing can be satisfactorily stated in the vernacular, the book will be too much to bother with. Indeed, perhaps a major difficulty of the book is that to read it with the kind of critical acumen needed to discern both its sense and its nonsense, one needs to be at least as knowledgeable about analysis of variance and correlational methods as Jensen is, and that is no mean talent! However, I think the book

is not so highly technical that it cannot be critically evaluated by undergraduate college students who are aided in their analysis by an instructor skilled in statistics. In any case, those who wish to defend or oppose the scientific aspects of Jensenism must understand the mathematical-statistical grounds for Jensen's arguments and so must make this effort to understand.

The treatment is a bit polemical in spots. Some potential readers will be turned away by the debate style in which Jensen often presents his ideas. Others will find this distasteful even as they persevere in their reading. Personally, I find this more to my liking (as Jensen does it, anyhow) than the dry, uninvolved writing that we are told is the ideal in scientific reporting. I can only warn against Jensen's vigorous style and say that in my view he presents a reasonable, if spirited and partisan, argument for the positions he favors.

It is trite to note that Jensen is not always entirely objective in his selection and interpretation of evidence; no one is, particularly on topics that are as emotionally arousing as those considered in this book. But although the book can be faulted on grounds of lack of objectivity, as I shall suggest more specifically below, the fault should be seen to be on an absolute scale relative to a top measure of perfect objectivity; compared to recent books against Jensenism (e.g., Senna's *The Fallacy of I.Q.,* 1973; Richardson and Spears' *Race and Intelligence,* 1972), Jensen's is objective.

It seems to me that after all the dust has settled from the various scuffles over the rightness and wrongness of this and that particular argument about heritability and racial differences in intelligence, we are left finally with the question of how much genes and environments do indeed covary in the simulated experimental designs in which estimates of heritability and between-group differences have been obtained. The experimental design is only simulated, and yet implicit throughout Jensen's arguments is the assumption that all influences are controlled except the genes producing intelligence. Estimates of heritability are so confounded with environmental variance that genetic and environmental influences on the development of intelligence are correlated. No amount of sophisticated statistical analysis can undo this confounding. Similarly, because the environments of persons of different races vary unavoidably with genetic differences, the two kinds of influences are inextricably confounded in all analyses of differences between racial-ethnic groups. And as we move away from this kind of purism and attempt to deal with the results of less-than-perfect experimental designs, we face the obdurate question of estimating the extent to which evidence on within-group heritability of intelligence may be relevant to an understanding of the differences between the means for phenotypic intelligence of whites and blacks (and other ethnic groups) in the United States.

These issues were raised in some of the first cogent reactions to Jensen's 1969 paper (see Crow's article in the *Harvard Educational Review,* 1969, 39:153–161, Lewontin's in the *Bulletin of the Atomic Scientists,* 1970, 26:2–8). They are still the core issues. Yet of all the questions Jensen addresses in 375 pages of his book, these seem to be the most neglected, the questions he seems most reluctant to confront head on and attempt to wrestle to the ground. Perhaps this is because the questions simply cannot be properly addressed until we have much more reliable information than we now have about the extent of genotypic similarity (in intelligence) among individuals within racial groups or,

alternatively, more direct information about genotypic variation between racial groups, as such. Or perhaps, contrary to Herrnstein's effusively sanguine view, these are questions which when properly stated have no answer — are the kinds of problems that mathematicians prove unsolvable. In any case, it is in respect to these issues, more than others, that Jensen is less than candid and complete.

Near the end of a chapter titled "Between-Groups Heritability," Jensen cites De Fries' (*Genetics, Environment, and Behavior,* 1972, ed. E. Caspari, ch. 2) refinement of the argument that within-group heritability can be 1.0 and yet between-group differences can be due entirely to environmental influences. Most of this chapter is devoted to developing what might be called the plausibility of the argument that environmental differences between blacks and others in the United States are not so large or so consistently bad as many have believed and that it is reasonable to suppose that the obtained mean differences in intelligence are due largely to heredity. But this misses the scientific point. I don't think scientists seriously question the view that the genetic hypothesis is plausible. Nor do they seriously question the view that scattered evidence fits together *as if* the hypothesis represented reality. Scattered evidence also fits together *as if* it were true that racial differences are due almost entirely to environmental variations. There is no dearth of plausibility for either position. This is the reason, partly, why there is so much debate and difference of opinion on the issues. What is needed is more directly convincing evidence and this is what De Fries' paper was an attempt to provide.

De Fries developed mathematics to show that if one knew or could make a reasonable estimate of the intraclass correlation among *genotypes within* racial groups, r, then one could estimate the heritability of group averages, h^2_f, namely, the extent to which group differences are due to heredity, from estimates of heritability (narrow sense) within groups, h^2_w, and the intraclass correlation for the phenotypic (obtained) measures of the trait. De Fries noted that a difficulty with this formulation is that "no valid estimate of r is available" for measures of intelligence. But he noted also that for "low levels of inbreeding, r is approximately twice the coefficient of inbreeding" and that in "genetic analysis of morbidity data obtained from major racial groups of Hawaii, Morton, Chung and Mi (1967) estimated that inbreeding coefficient was .0009 for major races; ... thus, for morbidity data, r may be as low as .002" (p. 10). De Fries concluded that "if r were as low as .002 and if h^2_w were about .6, h^2_f would be approximately equal to .005. If this were the case, of the reported 15-point IQ difference between Afro-Americans and Caucasians, less than .1 IQ would be heritable.... Since no valid estimate of r exists for IQ data, it is impossible to choose a particular value of h^2_f at this time. Nevertheless it is abundantly clear... that high within-racial heritability by no means implies a highly heritable racial difference" (p. 11). De Fries tried out a number of possible values for r. Only when this indicant of inbreeding approached a value similar to that expected for propagating second cousins did the h^2_f become comparable to the $h^2_w = .80$ that tends to be interpreted as indicating heritability.

As noted, Jensen does refer to De Fries' work. Indeed, he devotes a page and a graph to this issue! In the graph he plots values for h^2_f against various possible values of h^2_w for values of r ranging from .05 to .50! The latter is about the degree of inbreeding that would occur if the Oedipus story represented our normal breeding behavior. Jensen uses the graph based on De Fries' work mainly

to support his argument that there is a monotonic increasing relationship between heritability within and heritability between groups, so that if h^2_w is large, then h^2_f must be large and the observed differences in intelligence between races largely hereditary. At no point does Jensen restate De Fries' argument (as I have restated it above), note the very low values for r that De Fries considered, and then proceed to show why De Fries' argument and estimates of r are not a good way to approach the evidence on racial differences in intelligence. Instead, he states that "since we do not know r, the formula is not presently of practical use in determining the heritability of mean group differences" (p. 146).

This reluctance to carry the issue forward by trying to make a reasonable estimate of r is striking partly because Jensen shows no such reluctance to use scattered, inconclusive evidence to make estimates elsewhere. For example, after considering the range (.40–.90) of h^2_w (broad and narrow) reported in the literature, he is quite willing to use an estimate of .8 in most of his arguments. This is what I mean when I say Jensen is sometimes less than ideally objective in his selection of evidence and arguments. Frankly, I don't know enough about genetics to know whether or not De Fries' estimates of r are reasonable, but my point is not that De Fries is right and Jensen is wrong. It is simply that Jensen fails to deal adequately with what appears to be a major piece of evidence damaging to his fundamental thesis.

Such items may seem like quibbles, and perhaps they are. Yet the central point remains that whether or not racial differences in intelligence are mainly genetic is still very much an open question. On this point, therefore, one should read Jensen's book rather as one would listen to the evidence in a jury trial for murder in which the corpse (h^2_f, alias r) has not been found. Of course, if you have read about the case in the newspapers, you may need no further evidence to bring in a verdict. If you are inclined to be skeptical about what you read in the newspapers, however, you should find Jensen's case for the prosecution generally well argued, to the point, and well designed to provoke better detective work or better law from the defense. I recommend the book to serious students on this basis.

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Communication, Language, and Meaning: Psychological Perspectives

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A new approach to the study of language and language behavior emerged after the publication of Chomsky's *Syntactic Structures* almost 15 years ago. Within the framework Chomsky provided, a renewed attack was made on traditional problems such as the structure of language, the relationship of language to thought, and the effect of language on society. The sudden growth of interest in language and its subsequent relationship to other areas in the social and biological sciences has created a whole set of new subdisciplines, such as 'generative grammar,' 'psycholinguistics,' 'neurolinguistics,' and 'sociolinguistics.' Today, many a student, social scientist, and interested layman feels he should know more about these new approaches to the study of language and communication, both because of the rapid growth of these areas and because of their