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COMMENTARIES

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I agree with Humphreys's analysis of the meaning of phenotypic intelligence. I do, however, disagree with him on two issues. First, I think that it is important to distinguish between genotypic and phenotypic intelligence. Second, I do not agree with his analysis of the costs and benefits of affirmative action programs.

Phenotype and Genotype

Humphreys fails to consider the complex relations between genotypes and phenotypes for intelligence. I use the term *genotype* in this context in both commonly accepted definitions—as a latent characteristic of a person and as the biological genotype determined for an individual at the moment of conception. If genotypes for intelligence exist that are independent of the level of intelligence expressed in the phenotype of an individual, it may be necessary to consider both the phenotypic and the genotypic level of intelligence of a person in order to understand changes in intelligence and the design of appropriate interventions to change the impact of the genotype on the phenotype.

There are both conceptual and empirical reasons to distinguish between phenotypic and genotypic levels of intelligence. There are manifestations of genotypes present in the first year of life that are predictively related to measures of childhood intelligence obtained as late as 8 years. Measures of habituation and response recovery obtained in the first 6 months of life correlate with childhood IQ scores in excess of .4, uncorrected for attenuation (Bornstein, 1989). These data imply that the development of phenotypic levels of intelligence is predictable from a measure of information processing before the development of a sufficiently large repertoire of phenotypic intelligence that would permit one to derive an appropriate index of intelligence by sampling from the repertoire. These data may not be compatible with the assumption that the correlation for tests over occasions forms a quasi-simplex matrix.

Studies of twins reared together and apart and adoption studies provide evidence for a changing relation between phenotypes and genotypes for intelligence over the life span. The heritability of intelligence is a monotonically increasing function of age. Correlations of IQ scores for biologically unrelated siblings reared together and between the IQs of adoptive parents and the IQs of their adopted children decline to near-zero values as the adopted children grow older (Brody, 1992, chap. 5; Loehlin, Horn, & Willerman, 1989). Correlations between the IQs of biological parents and their adopted children exhibit little or no decline over time. Behavior genetic analyses of these data imply that the heritability of IQ increases with age and that the influence of the shared environment declines. IQ correlations for monozygotic twins increase in childhood and appear to remain constant over the life span. IQ correlations for dizygotic twins, by contrast, decline over the life span (Brody, 1992; McGue, Bouchard, Iacono, & Lykken, in press). If the heritability of IQ is a monotonically increasing function of age, then changes in IQ over the life span may be construed as changes in phenotypes that increase the similarity between a phenotypic score and a biological genotype present for each person at the moment of conception.

The analysis of the relation between changes in phenotypic intelligence and genotypic dispositions may have implications for the design of intervention programs. Modifications in the environment provided early in life may be of diminishing importance as the effects of the early environment fade and as genotypic dispositions increasingly determine the growth and development of intelligence. We know that early interventions have diminishing influences on intelligence over time (Brody, 1992, chap. 6; Consortium for Longitudinal Studies, 1983). Comprehensive interventions that start shortly after birth and continue for the first 5 years of life lead to changes in intelligence that fade over time. The Abecedarian Project, for example, has reported gains in intelligence of approximately one third of a standard deviation at age 12 (Ramey, 1993). Even adoption effects for older adoptees are weak—with estimated effect sizes that may be between .00 and .5 *SD*. Turkheimer (1991) analyzed French adoption studies and derived a regression equation for the relation between the educational background of the adop-

tive parent and the IQ of the adopted child at age 14. His analysis indicates that the child's IQ increases 1 point for every 2 years of difference in the number of years of education completed by the adoptive parent. Other adoption studies report declining influences of the adopted family as children grow older (Loehlin et al., 1989; Weinberg, Scarr, & Waldman, 1992).

The relatively weak effects of adoption and intensive early interventions suggest that we will need to think in new ways about interventions to increase intelligence. If IQs are influenced by genotypes, then we shall have to consider approaches to the modification of genotypes in addition to modifications in phenotypes. Because the effects of early interventions are marginal, it might be appropriate to concentrate on interventions that occur after children enter the public schools. And, if we are unable to modify intelligence by planned interventions, we might wish to concentrate on educational innovations that will reduce the importance of individual differences in intelligence as a ubiquitous influence on academic achievement.

Humphreys's analysis of change in intelligence and intervention may be criticized for a failure to consider the difference between genotypes and phenotypes. This criticism is primarily conceptual, and the view presented here suggests that conceptual issues do relate in complex ways to an understanding of recommendations for interventions to increase intelligence.

Affirmative Action

Humphreys's discussion of affirmative action may be criticized for a failure to indicate the respects in which his recommendations may derive from assumptions and values that are not made explicit. His analysis begins with the unsubstantiated assertion that the "strong" form of affirmative action contributes to racial tension and discontent among African Americans. These opinions are offered without supporting data. Humphreys's critique of affirmative action is based on the implicit assumption that social harmony and optimal social functioning will derive from an attempt to select individuals irrespective of their group identity in such a way that the selection will maximize scores on a narrowly conceived criterion—in the case of selection for college, grades and academic performance. This represents a constricted view of the benefits of affirmative action programs. The opportunity to live and work in an interracial setting may be educational and is valued by some members of the academic community. Racial changes in the composition of university faculties and student bodies have been instrumental in promoting new scholarship about African Americans. Humphreys may not be interested in these changes, but a full evaluation of the benefits of affirmative action programs should, in my opinion, consider multiple criteria, including claims of social justice deriving from the systematic exclusion of African Americans from many positions in our society in the recent past. I do not object to Humphreys's values. And, I do not object to his assertions that the "strong" form of affirmative action programs will decrease performance on a criterion that is correlated with IQ scores. I do, however, object to the attempt to derive recommendations about social policy based on values that are not necessarily universally shared. The science and psychometrics may be sound—but the policy implications do not follow from the science.

Note

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References

Bornstein, M. H. (1989). Stability in early mental development: From attention and information processing in infancy to language and cognition in childhood. In M. H. Bornstein & L. Krasnegor (Eds.), *Stability and continuity in mental development* (pp. 147–170). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Brody, N. (1992). *Intelligence* (2nd ed.). San Diego: Academic.

Consortium for Longitudinal Studies. (Ed.). (1983). *As the twig is bent ... Lasting effects of preschool programs.* Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Loehlin, J. C., Horn, J. M., & Willerman, L. (1989). Modeling IQ change: Evidence from the Texas Adoption Project. *Child Development, 60,* 993–1004.

McGue, M., Bouchard, T. J., Iacono, W. G., & Lykken, D. T. (in press). Behavioral genetics of cognitive ability: A life-span perspective. In R. Plomin & G. E. McLearn (Eds.), *Nature, nurture, and psychology.* Washington, DC: American Psychological Association.

Ramey, C. T. (1993). A rejoinder to Spitz's critique of the Abecedarian Project. *Intelligence, 17,* 31–36.

Turkheimer, E. (1991). Individual and group differences in adoption studies of IQ. *Psychological Bulletin, 110,* 392–405.

Weinberg, R. A., Scarr, S., & Waldman, I. D. (1992). The Minnesota Transracial Adoption Study: A follow-up of IQ test performance at adolescence. *Intelligence, 16,* 117–135.