Letters

Santa Cruz: Another Dimension

Luther Carter's article on the University of California, Santa Cruz (15 Jan., p. 153), was a refreshing presentation of what we are trying to do and of the almost idyllic physical conditions under which we are doing it. Although he avoided much of the false emphasis which has characterized many other writings on the same subject, Carter did miss one important aspect of Santa Cruz, namely, the modest but growing program of graduate work and the research atmosphere, particularly in the sciences. To complete the picture, therefore, these notes should be added.

Even in the first year of Santa Cruz's activity, graduate work was begun in biology and astronomy—biology because there were a number of senior faculty, some of whom brought graduate students along with them, and astronomy because the whole staff of Lick Observatory transferred to Santa Cruz and decided to commence teaching at both graduate and undergraduate levels. In the same year a broad graduate program was begun in psychology, philosophy, and history called "History of Consciousness." Chemistry followed the very next year. Graduate work now is being offered in six sciences, with a seventh imminent, in two fields of humanities (history and literature), and in psychology in the social sciences. Several doctorates have been awarded—the first as early as 1967. Many graduate students are affiliated with the colleges, some as residents, some to be in contact with their sponsoring professors, some merely by preference. Plans for closer interrelations between graduate students and the colleges are being developed.

The research activities of the faculty are substantial and serious and have attracted considerable support. Sloan fellowships for research have been awarded to Professors Ruby, Gaspari, Scott, and Dorfan in physics, to Coe in geophysics, and to Bernasconi and McMurry in chemistry. Seven faculty members are fellows of the National Academy of Sciences, and 74 have research grants amounting in aggregate to more than $3.25 million. The organization of Santa Cruz by broad divisions rather than by departments facilitates interdisciplinary work. Two journals, *Accounts of Chemical Research* and *Revue d'Histoire de la Guerre Mondiale*, are edited at Santa Cruz by Joseph Bunnett and George Baer, respectively. At present six postdoctoral fellows are in residence in biology, seven in chemistry, and nine in other fields. Lick Observatory astronomers, of course, have a long-established research program and many visiting associates. The university library already has more than 250,000 books, and, with a daily interlibrary loan exchange with Berkeley, is now a well-organized research facility in both scientific and nonscientific fields.

In addition to its collegiate program of undergraduate education, therefore, Santa Cruz is rapidly taking its place as an active research institution.

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Children of Interracial Matings

In "Intellectual development of children from interracial matings" (18 Dec., p. 1329), Willerman, Naylor, and Myrianthopoulos suggest that environmental factors depress the intellectual performance of Negro children because they claim to have found that interracial children with white mothers scored higher on the Stanford-Binet IQ test than interracial children with Negro mothers. However, their statistical analysis does not warrant this inference.

Instead of testing the independent effect of maternal race, they combined it with the effects of sex of the child and the mother's marital status and tested the three effects collectively on measured intelligence in a nonorthogonal three-way analysis of variance. Since others have found significant effects of the child's sex and the mother's marital status on IQ (*1*, *2*), it is not surprising that when these effects are combined with the effect of the mother's race, there is an overall significant effect of the three factors. However, whether or not the mother's race has a significant independent effect cannot be established in this kind of analysis.

In addition, they report two further misleading analyses. The simple regression slope cannot be interpreted for the three effects since each effect is confounded with the other two effects. And, since the first analysis revealed additive main effects, that is, no interactions, it is clear that the two-way interactions involving maternal race they found upon further analysis (leaving out sex in one and marital status in the other) can be attributed to confounding of the effects of the factor left out with maternal race.

Willerman *et al.* cautiously state: "Interpretation of the race effect should be tentative since the number of interracial subjects is small." Actually statistical significance tests take sample size into account (*3*). The problem is that their analysis does not warrant this interpretation at all.

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References

1. M. Deutsch and B. Brown, *J. Soc. Issues* **20**, 24 (1964).
2. J. E. Singer, M. Westphal, K. R. Niswander, *Child Devel.* **39**, 103 (1968).
3. D. Bakan, *On Method: Toward a Reconstruction of Psychological Investigation* (Jossey-Bass, San Francisco, 1967).

Willerman *et al.* focus on an environmental explanation while ignoring a possible source of genetic bias in their data involving paternal influence.

Table 1 of their report suggests that the highest educational level among the four types of parents in interracial matings is found among Negro fathers. While they average one-half year more education than the remaining groups (not statistically significant), the fact that 12 years is for practical purposes the upper limit of free public education suggests a ceiling effect may be influencing these data.

Perhaps more significant is the fact that this highest educational attainment level occurred in the group that, because of several factors, generally attains the lowest educational level of the four parent groups used in the study. Table 1 presents the median education level attained by Negroes and whites over 25 years of age found nationally (excluding the South, since the two southernmost hospitals in Willerman's study provided no cases), and in metropolitan areas, obtained from the 1969 census report on educational attainment (*1*).

Table 1. Comparison of years of school completed by race, sex, and regions in the United States obtained from census data (*1*) and from Willerman *et al.*

Region	Males	Females
White		
National excluding South (median)	12.2	12.2
Metropolitan areas (median)	12.2	12.1
Willerman *et al.* (mean)	11.0	10.9
Negro		
National excluding South (median)	10.7	11.1
Metropolitan areas (median)	10.3	10.7
Willerman *et al.* (mean)	11.5	11.0

Median educational attainment on either geographic sample is substantially lower for Negro males than the mean reported by Willerman, while the reverse is true for the three remaining parental groups. This educational "overachievement" of Negro fathers in the interracial matings studied suggests that on the average this group may have been more intellectually gifted than the remaining parents. Because of this possibility and because of the generally high estimates of heritability reported for intelligence test measures (*2*), data on the intelligence levels of both the Negro and white fathers in this study would be useful. One could then estimate how much of the 7-point difference in IQ scores of offspring from the two types of interracial matings examined can be attributed to the maternal environmental effect and how much to paternal genetic differences.

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References

1. U. S. Department of Commerce Bureau of the Census Current Population Reports, *Educational Attainment Series P-20 No. 194* (1970).
2. L. Erlenmeyer-Kimling and L. F. Jarvik, *Science* **142**, 1477 (1963).

The difference in IQ between the two groups of children suggests that the mean IQ of the Negro father–white mother couples is greater than that of the white father–Negro mother couples. The investigators have, however, preferred to "assume (in the absence of data) that the mean intelligence of the parents does not differ with either maternal or paternal combinations."

Relevant data are not, in fact, entirely absent. A study (*1*) of Boston intermarriages (1914–1938) showed that Negro grooms were occupationally well above the Negro Boston male in the gainfully employed population (36 percent in skilled or higher jobs as compared with 20 percent), whereas white grooms were occupationally far below the white Boston male in the gainfully employed population (35 percent in skilled or higher jobs as compared with 59 percent). Both Negro and white brides were well below the occupational status of the Negro and white women in the employed Boston population.

It seems likely that the relative occupational superiority of the Negro grooms in the Negro population and the inferiority of the white grooms in the white population parallel a similar ingroup superiority and inferiority in IQ as well. This very likely means an absolute superiority in IQ of the Negro grooms over the white grooms.

There is no strong reason for supposing that the mixed couples studied by Willerman *et al.* differed in this respect from the Boston couples. The educational data of their study indicate the same superiority of the Negro fathers found in the Boston data. It is likely then that the observed difference in IQ is, at least in part, the result of different means in the IQ's of the couples in these two types of racial mixing.

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Reference

1. L. Wirth and H. Goldhamer, in *Characteristics of the American Negro*, O. Klineberg, Ed. (Harper, New York, 1944), p. 290.

Willerman, Naylor, and Myrianthopoulos argue that "environmental factors play an important role in the lower intellectual performance of Negro children" since the "interracial offspring of white mothers obtained significantly higher IQ scores . . . than interracial offspring of Negro mothers." Although I am sympathetic to the idea that early interpersonal experience possesses some role in the development of intelligence and general adaptation (*1*), I am not convinced that Willerman *et al.* provide any evidence consistent with this position.

In a study of interracial mating, self-selection factors may grossly confound comparisons. Intellectual as well as motivational differences may distinguish Negro from white males who father interracial children (*2*). Such differences may operate to produce exactly those differences between interracial children reared to white and Negro females; that is, the observed difference between groups may derive from uncontrolled but systematic genetic variation (*3*). The same difficulty also applies to partitioning of groups into "single" and "married" females. Self-selection may operate here, too, confounded with self-selection of interracial mates (*4*).

Self-selection, however, cannot readily explain the significant interaction that "among Negro mothers, it is male children who have the low IQ's." Willerman *et al.* do not discuss this result directly, but rather elaborate a "physiological" argument for the general occurrence of sex differences in intelligence. The puzzling result, however, is the maternal race by sex interaction. This interaction might imply some race-related, sex-linked control of developmental processes related to intelligence (*5*). Regrettably, the assumption made by Willerman *et al.* in their introductory paragraph that additive genetic factors are not sex-linked seems to prejudge this possibility although when an environmental explanation appears inadequate, sex-linkage is embraced later in the text as a sufficient condition for sex difference. If sex-linkage is sufficient to explain sex difference, then race-related sex-linkage is sufficient to explain race-related sex difference. What's sauce for the goose is sauce for the gander.

These comments do not exhaust the various genetic rationales which may be applied to Willerman *et al.*'s results. For example, systematic racial variations of maternal buffering in utero might provide an alternative and economic explanation of intellectual differences between and within groups (*6*, *7*). In summary, environmental interpretations of race effects and interactions should not be premature. Genetic explanations may provide equally interesting heuristic formulations for future investigation.

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References and Notes

1. L. Van den Daele, *J. Negro Educ.* **34**, 296 (1970).
2. J. Lester, *Evergreen Rev.* **13**, No. 70, **21** (1969).
3. Willerman *et al.'s* primary criterion of group comparability was parental education. However, the available literature suggests no correlation among Negroes between either education or parental education and intelligence. E. E. Baughman and W. G. Dahlstrom, *Negro and White Children: A Psychological Study in the Rural South* (Academic Press, New York, 1968); W. A. Kennedy, V. Van De Riet, J. C. White, Jr., *Monogr. Soc. Res. Child Develop.* **28** (6) (1963); W. A. Kennedy, *ibid.*, **34** (2) (1969).
4. L. Young, *Out of Wedlock: A Study of the Un-*

married Mother and Her Child (McGraw-Hill, New York, 1954).

5. Interracial male children obtain a Y chromosome from their white or Negro father and an X chromosome from their white or Negro mother. With appropriate controls, this consequence allows an estimate of racial variation attributable to differences of sex chromosome inheritance. In the Willerman *et al.* study, sex chromosome differences are completely confounded with child-rearing differences.
6. J. C. DeFries, *J. Hered.* **55**, 289 (1964); J. C. DeFries, J. P. Hegmann, M. W. Weir, *Science* **154**, 1577 (1966).
7. Either differential sex chromosome inheritance or differential buffering or both might clarify the unexpected sex ratio in the Willerman *et al.* sample (76 males to 100 females) provided this ratio is, in fact, representative of interracial matings.

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With respect to Walberg's comments, we believe that our multivariate analysis of these data is correct and illuminating. Furthermore, our original table 2 allows one to control for sex of child and marital status while testing maternal race effect. In male children t has a probability less than 0.001 for married mothers and just less than 0.05 for unmarried mothers. The t's for female children are not significant, but race-of-mother effect appears definitely to be absent only for female children of married mothers.

By pooling educational attainment over all age groups Henderson conceals what was made explicit in his original source, namely, that education is confounded with age. For example, Negro males aged 25 to 44 living in the Northeast have a median education of 12.1 years, those aged 45 to 64 average 9.4 years, and those 65 and over average 7.1 years. Parallel age trends are found for every geographical region for both races and sexes in that source.

Table 1 gives median education from the same survey (*1*), but includes only those between the ages of 25 and 44 (representing the bulk of our cases). These data are contrary to Henderson's assertions. In our sample it is the white mothers who have the lowest education. His point about a 12-year education ceiling effect is likewise not substantiated.

Goldhamer's comparison of our intermarriage data to his (*2*) which were collected almost 30 years earlier is not entirely appropriate. Nevertheless, Goldhamer's data do not support his claim since they show that 77 percent of intermarrying Negro brides as against 61 percent of Negro brides in general were employed in unskilled jobs while 64 percent of intermarrying white brides as against only 16 percent of white brides overall were similarly employed. Thus it appears from his data, as well as ours (Table 1), that the intermarrying Negro bride is less disadvantaged with respect to her nonintermarrying counterpart than is the intermarrying white bride. His findings do not indicate that the average intelligence for white female–Negro male matings is superior to the reverse mating type.

Table 1. Median years of school completed by race, sex, and regions for individuals aged 25 to 44 obtained from census data and from Willerman *et al.*

Region	Males	Females
White		
National excluding South	12.6	12.7
Metropolitan areas	12.7	12.5
Willerman *et al.*	12.0	11.0
Negro		
National excluding South	12.1	12.1
Metropolitan areas	12.0	12.0
Willerman *et al.*	12.0	12.0

That there may be motivational differences distinguishing intermarrying Negro from white males, as Van den Daele suggests, seems reasonable. The crucial question is whether these differences are heritably reflected in IQ and not counterbalanced by similar differences among intermarrying females.

If our data had a genetic explanation, it would have to be sex-linkage. But we regard it as unreasonable to think that loci affecting a quantitative character are all on one of the 23 haploid chromosomes. We are also erroneously cited as "embracing" sex-linkage to explain the observed sex-difference. X chromosome loss, as in Turner's syndrome, is not to be identified with sex-linkage.

If by "buffering in utero" Van den Daele refers to a less hospitable uterine environment for children of Negro mothers, this is not reflected in birth weight, length at birth, or gestational age in our data.

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1. U. S. Department of Commerce Bureau of the Census Current Population Reports. *Educational Attainment Series P-20 No. 194* (1970).
2. L. Wirth and H. Goldhamer, in *Characteristics of the American Negro*, O. Klineberg, Ed. (Harper, New York, 1944), p. 290.