

causes of such differences and the importance of the fact that group distributions overlap, so that stress on the differences of mean is unfair to individuals. This is true whatever the genetic component. Of course it is called scientific racism to have an open mind on the nature-nurture controversy, but I would repeat (see *J. Biol. Educ.* 6, 323; 1972) that there are grave dangers in basing policies such as affirmative action on the assumption that all differences arise from environmental causes and all individuals are of identical potential.

Amongst the matters unaffected by rejecting Burt's data remains the evidence that IQ and social mobility are correlated. Given significant heritability of IQ this implies that part of class differences in mean must become genetic if they are not already so. It is not reasonable to ignore such evidence, whatever one's ideology. I have also pointed out (*J. Biosoc. Sci. Suppl.* 1, 3; 1969) that when group differences involve a morphological marker, as with skin colour, it is at present formally impossible to determine whether any difference of mean distinguishing the groups is all environmental, all genetic or anything in between. But group mean differences would hardly matter if we treated individuals as such, except if correlations between fertility and IQ differed between groups which, as Jensen pointed out, might occur. If so, heritability within the group becomes important as the predictor of future change, and of future mean differences.

(3) *Do IQ tests measure something whose variation matters?*

Some (see, for example, *Rose Symp. Inst. Biol.* 22, 191; 1975) do not think that IQ tests measure anything.

However, these tests rank individuals on a scale just as stature measures do, and differ from stature measures in only three ways: the measurement error may be larger, IQ scales have no zero, and stature measures can be applied equally accurately, or inaccurately, to doors and trousers. But errors in both measurements can be assessed, and the zero point is irrelevant to biometrical analyses since these are solely concerned with deviations from means. The real difference concerns measuring doors and this is what leads many to think IQ tests only measure ability to do IQ tests. But, though we cannot measure educational doors with such tests, there is significant though incomplete correlation with future educational performance, and various other aspects of "success" in life as Terman's investigations first demonstrated. If, therefore, we consider that the attributes of which IQ tests are partial predictors matter, either to the individual or society, then they do measure something that matters. There might be better measures, complementary measures might make more powerful combined predictors. But they do seem to work, and assessment of this is not affected

by the deletion of Burt's data. I therefore tend to disagree with Blackman, a contributor to the pamphlet, whose suggested investigations concerning individual development seem to ignore that the essential issues concern the nature and causes of between-individual variance.

(4) *Should IQ tests, complemented or not, be used in any way?*

This, of course, is the ideologically loaded question and it is not to be answered by a scientist as scientist but only as citizen. Whether they should be used for investigative purposes depends on your belief in knowledge; whether for selective purposes perhaps upon your ideology.

But I would point out that there is an element of fashion in ideology. Dr Gillie says here that "a generation or more of children may have suffered" as a result partly of Burt's efforts. I can only assure him that the editor of this pamphlet is right about the different view that was taken of the 1944 British Education Act in its early days. Many of my generation when young

regarded it as a great socially progressive enactment!

I conclude that Burt's exposure makes very little difference to our knowledge of IQ and its heritability and agree with Anne Clarke when she says in her essay that "I believe that now that Burt's embarrassing results have been disposed of, we can get on with building a solid science of human differences".

In the short run self-criticism is the best insurance against error. Mutual criticism leading to repeat investigation will expose error in the long run, but in an area where conclusions may affect political action, the long run can be too long. In such areas it is particularly important to avoid antagonizing opponents, but to write as carefully and objectively as possible and, if there are data to present, to present them as they are so that others can test them critically. □

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Solar puzzles for radio astronomers

David Layzer

Radio Physics of the Sun. Edited by M.R. Kundu and T.E. Gergely. Pp.475. ISBN hbk 90-277-1120-8; ISBN pbk 90-277-1121-6. (Reidel: 1980.) Hbk Dfl.115, \$60.50; pbk Dfl.55, \$28.95.

THESE well-edited proceedings of an international conference held in August 1979 and sponsored by the International Astronomical Union contain several excellent short reviews, over 50 brief research reports and an edited transcript of the discussion following each communication. Most of the reviews and reports deal with observations of solar radio emission and with the underlying emission mechanisms; a few discuss the radio observations in a broader observational and theoretical context.

In recent years much new information about the quiet Sun, active regions and solar bursts has come from high-resolution microwave observations with large arrays and from observations at metre wavelength with the Culgoora imaging radio telescope in Australia. High-resolution microwave measurements of circular polarization now delineate small-scale magnetic fields in the lower corona. Heliograms at metre wavelengths show the hole (open field-line) and arch (closed field-line) structure so conspicuous in soft X-ray pictures. Sequences of metre-wavelength heliograms have enabled radio astronomers to track moving Type IV solar bursts and measure their polarization, and have shown that the physics of these transients is not as well understood as had been supposed.

Theories of Type III bursts are the subject of a review paper and several brief reports. Certain aspects of the disturbances responsible for these bursts — in particular, how they maintain their identity for so long (tens of seconds) and over such long path lengths (millions of kilometres) — have puzzled theoreticians for nearly 20 years. At this conference, two distinct and mutually inconsistent approaches to these problems are described, one based on quasilinear theory, the other on strong-turbulence theory. Unfortunately, the two approaches are not given an adequate opportunity to confront each other in the recorded discussion.

This volume (and presumably the conference itself) would have been greatly improved by the inclusion of a few introductory and summary reports of sufficient breadth and depth to provide context and continuity. The invited reviews that open each session are excellent, but too short and too limited in scope; and there are no summaries at all. The volume is dedicated to Stefan Smerd. One misses the breadth and depth of the two classic reviews of solar radio astronomy, both published in *Annual Review of Astronomy and Astrophysics*, that he wrote in collaboration with Paul Wild and A.A. Weiss ("Solar Bursts" by J.P. Wild, S.F. Smerd and A.A. Weiss 1, 291-366, 1963; "Radio Bursts from the Solar Corona" by J.P. Wild and S.F. Smerd 10, 159-196, 1972). □

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