Letters

History as Social-Scientific Data

The suggestion by Deitsch ("Social change and social science," Letters, 19 June, p. 1407) that generalizations be attempted only after careful investigation of the history of a question is an excellent one. It is unfortunate that he did not follow it in his own letter.

His suggestion that social science depends upon historical evidence now has history against it. Economics, political science, anthropology, and finally sociology have learned the hard way that historical facts are not scientific data. Their situation is not at all the same as that of the geologist in Deitsch's analogy. Historical accounts are in no sense empirical data. One might just as well argue that the journalistic accounts of impending annihilation from pesticides or from atomic fallout constitute empirical data. Furthermore, the comprehensive history of all aspects of any given period has yet to be written.

History has various meanings. In one sense it means only a general background in which time relations may be telescoped without serious loss of understanding. It also means the actual succession of events. The third, and for the scholar the most important, meaning is that of a synoptic interpretation, which is later accepted, willy-nilly out of the welter of such accounts, as a reasonable facsimile of reality. This is the history being pressed upon the social sciences as empirical data. Social scientists have struggled with the problem of historiography, and the Social Science Research Council has issued numerous publications about it.

Deitsch cites the work of Muzafer Sherif as a demonstration of the historical method. I see no dependence at all upon historical evidence in Sherif's work. I should say, rather, that he investigates the background of his subject (as all scientists should) in formulating hypotheses or designing tests. The tests he has carried out are highly refined, applied to limited ranges of behavior in limited situations, and done with extensive facilities and often with expensive equipment. If his work were to be expanded to test generalizations about social change, the costs would run into tens of millions of dollars. And that is precisley the point made in the editorial (6 Mar., p. 999) to which Deitsch took exception.

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New Biology Curriculum: Questions

From the tone of the letters submitted by teachers (10 Apr., p. 136; 15 May, pp. 796, 797), I get the distinct impression that the BSCS program is supposed to be immune to criticism.

I am a high school biology teacher who, unlike the previous writers, was not on the team that wrote the BSCS texts. I have studied the Green and Yellow Versions. I now have some questions or comments to make concerning the BSCS and its use.

First of all, the "feedback" used to revise the texts could have been "conditioned" by the enthusiasm of the teacher using the experimental version. Any good researcher will admit that sometimes it is rather difficult to avoid seeing what he wants to see.

Secondly, what standardized tests were used to evaluate the achievement of the students who were exposed to BSCS? As far as I know, the latest on the market is the Nelson, published in 1951! Needless to say, this test would measure poorly a BSCS program containing concepts never even heard of in 1951.

Thirdly, even assuming that much of the text is not too difficult for the average 15-year-old, how does a teacher cover adequately so much material in 9 or 10 months' time? Furthermore, if there happens to be only one biology teacher in the school (as in mine), where does he get the time to prepare the tremendous amount of lab equipment, demonstrations, and so forth? Maybe some student help is the answer, but I wonder (from previous experience) how long that would last.

I must admit that I am a conservative 26-year-old. If, after another 3 or 4 years of talking with *both* teachers and students who have had the BSCS, I find that such a course would be actually useful to the *average* 15-year-old, I will then adopt it myself. In the meantime, I must wait to see what time, the best judge of all, says.

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BSCS is definitely not above criticism and welcomes every constructive comment. In fact, if it differs significantly from previous efforts to prepare textbooks, laboratory programs, and adjunct materials to modernize the teaching of science in the secondary schools, it does so chiefly because of the vast effort made, over a period of three years, to improve the materials on the basis of the widest possible experimental trials and collection of suggestions and criticism, before any attempt was made to prepare editions for commercial distribution. No such program of repeated trials and revisions has ever been possible before, simply because of the expense. Only through the support of the National Science Foundation has a method for the improvement of scientific curricula through scientific procedures become feasible.

As for the standard tests used in evaluation of the BSCS programs, that matter was explained in some detail and quite accurately by Hulda Grobman in a report in *Science* (17 Jan., p. 265). It may be desirable to add two comments. The BSCS quarterly tests for each version and the comprehensive examination for all three groups at the end of the year have been fully standardized according to accepted procedures carried out by Educational Testing Service, Inc., and by the Psychological Corporation. The examinations, like the other BSCS materials, have gone through three rounds of preparation, field trial, analysis, and revision. No one should delude himself, however, about the ultimate subjective character of all examinations! The questions asked in the BSCS examinations are objective in type, and norms have been established, but the content, factual and conceptual, to which the examinations relate has been *subjectively* determined by

the BSCS teams of research biologists and teachers. The understanding of the nature of scientific investigation is so different a purpose from the memorization of scientific facts that it is inevitable for the BSCS exams, which emphasize the former, to differ very greatly from most, if not all, standardized biology tests.

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Grants: Nothing for the Neediest

In a recent editorial ("Forty first-rate universities," 19 June, p. 1413) the writer speaks favorably of the new Science Development Program of the National Science Foundation. Whenever I see such a write-up I feel that, as a faculty member in one of the "have-not" universities, I should attempt to present another side of the story.

A favorable view of the NSF program requires that one accept the assumption that it is of more value to the country for a second-rate institution to pass to a first-rate status than for a third-rate institution to become second-rate. I do not believe that there are sufficient facts available to warrant making such an assumption, attractive though it may be to NSF officials and others. In giving money to those who have it and withholding it from those who do not, we follow an age-old pattern but not necessarily a good one. The situation is very similar to that in our scholarship programs. We give scholarship money to those who least need it and who are most capable of acquiring their own funds—the A and B students. The C students who most need the help cannot get it but must consume badly needed time in earning money. Top students can much better afford working time and furthermore can probably borrow money more easily. So the question arises, is it better to give money to A students or to C students? I do not think that there is an obvious answer to this question, but as long as scholarship funds can be used to attract students I am sure they will continue to go to the top students.

I believe that it can be said with some assurance that it is easier for a top school to get more funds than for a mediocre school. Only those who have worked in the "have-not" institutions can appreciate the monumental tasks involved in bringing about even minor improvements. It is far from obvious to me that the NSF program will place the money where it will do the most good.

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"Cultural Divide" in Japan

In L. Campbell's fine article "Science in Japan" (21 Feb., p. 776) appears the statement: "The visitors [17 Japanese scientists attending the AAAS meeting in Cleveland in December] disclaimed any Japanese split into 'two cultures' such as C. P. Snow finds in the West." May I say that I do not share this opinion with the other visitors. I should be extremely happy if I could disclaim such a split, but the real situation in Japan seems to me to be that the separation between scientists and nonscientists is hardly bridgeable.

The situation may be represented by the accompanying figures. The two curves in Fig. 1 are supposed to represent the difference between U.S. and Japanese scientists in intensity and diversification of knowledge. These curves were suggested by Yuzuru Ooshika, Department of Physics, Kanseigakuin University. Ooshika's view is as follows:

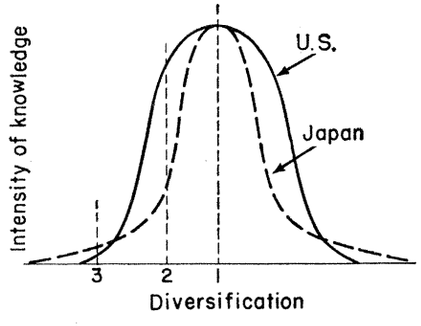

Fig. 1. The curves represent an impression of a characteristic difference between Japanese and American scientists as regards breadth (diversification) and depth (intensity) of knowledge. *1*, the specialty of each man considered; *2* and *3*, subjects outside the specialty.

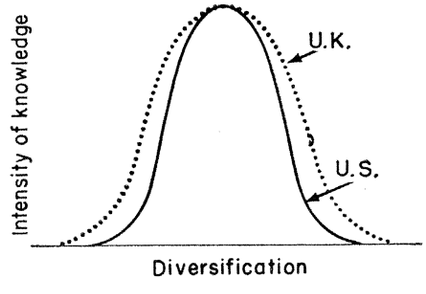

Fig. 2. American scientists and British scientists (particularly Oxford and Cambridge graduates) compared.

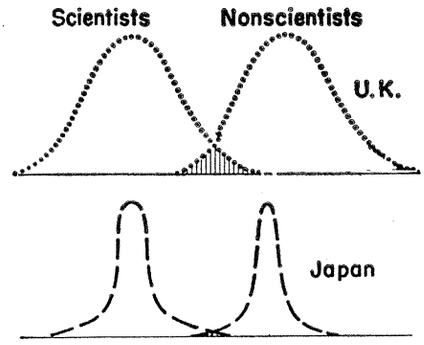

Fig. 3. An impression of the "cultural divide" between scientists and nonscientists as it appears in Britain and in Japan. The coordinates are the same as in Figs. 1 and 2. The areas of overlapping knowledge are shaded.

Compared with U.S. colleagues, Japanese scientists are equally knowledgeable within the very narrow area of their own specialties. But they are ignorant in matters outside this area, even in those closely associated with their special subjects (as represented on the scale of diversification by point 2), although in such minor subjects (point 3) as color-photography our scientists, especially of the younger generation, are less ignorant.

I have been told that Oxford and Cambridge have been able to produce balanced, well-rounded intellectual men. If this is true, one might make a further comparison as in Fig. 2, in which U.S. scientists and British scientists, particularly Cambridge and Oxford graduates, are represented.

If the foregoing comparisons make sense, then comparison of scientists and nonscientists in Japan and the United Kingdom may be represented by Fig. 3. The gap between the two peaks is much greater in Japan and the area of overlap much smaller. I agree with Snow that the "cultural divide is not just an English phenomenon; it exists all over the world." I would add that it seems to be at its sharpest not in England but rather in Japan.

Increasing specialization in Japan is unavoidable because of the isolation of the Japanese language from world languages and is necessary in order for Japan to survive in economic competition with the West.

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