LETTERS

Problem-Oriented Research

In his editorial (12 Mar.), Long has omitted an important issue—the relationship of applied research to the application of research. The application of research is not a simple process, but rather an interdisciplinary activity of great complexity. It takes place at the interface between knowledge and action. At that interface there are differences of language, psychology, and values.

The experience of industry, and of such mission-oriented agencies as National Aeronautics and Space Administration and the Department of Defense, has shown that successful application of applied research is very difficult if there is not a close and continuous interaction between those who are doing the research and those who are expected to use the results of research. The possible consequences of such interactions and their effect on the freedom and independence of the university and its programs should be carefully considered by those who would like to see more applied research for the public good done in universities.

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Male Bias and Women's Fate

In a letter (12 Feb.) Demorest Davenport defends the widespread discrimination against women in science on the grounds that women are (for a variety of reasons kindly supplied by M. B. Jensen in a following letter) too irresolute to be trusted to succeed in the opportunities that might be offered to them. The paucity of good openings for female scientists, and the substandard character of those that are available, is proof that the male scientists who run the establishment are largely in agreement with Davenport's views.

Yet the argument is one that could be made in better conscience by a physicist or a geologist than by a biologist. The physical scientists keep their female graduate students down to a tiny minority, and thus avoid the paradox of training those whom they would not employ. Biologists, however, have not been so fastidious. Beguiled by lavish federal funds for graduate student training, the men who run our graduate biology departments have played a shameless numbers game, eagerly enticing women students to swell departmental rolls and bring in the money. The inconvenient fact that winning a Ph.D. would be unlikely to entitle a girl to more than second-class citizenship in the scientific world has, of course, gone unmentioned. The acceptance of this situation is to many men merely a matter of being realistic, though some are honest enough to admit that "cynical" would be a better word. The best word for it would be stronger.

During the 1960's, the percentage of Ph.D.'s in biology awarded to women ranged from 16 percent in the 11 most prestigious institutions to more than 30 percent in numerous others. I should like to ask Davenport who was a department chairman during that decade: How many members of my unreliable sex has his department admitted in recent years? How many have been awarded doctorates? Why?

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In their attempts to justify lower salaries for women scientists, both Davenport and Jensen assume that there are "no data" on the relative scientific productivity of men and women and that such comparisons are only "theoretically possible." As readers of *Science*, they should not have to rely on what they "have heard" or would be "willing to bet" on what they "think the results would be," since a recent article on this subject noted the *higher* productivity of women in science (*1*). Or do they feel that an obligation to consider all available evidence only applies in the laboratory, and may conveniently be discarded when one is dealing with trivial matters like human aspirations?

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Reference

1. M. S. White, *Science* **170**, 413 (1970).

By resorting to hearsay in the absence of data, Jensen has himself already refuted at least one prejudice against women which assigns gossip to the female domain.

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Davenport and Jensen have alluded to a situation which is present in many fields . . . if the expectation of less job mobility in males is considered an important asset, over and above the current performance for which pay is ostensibly given, an easy solution is possible. At present, what happens if the male, paid at a preferred rate because of statistical expectation of longer employment, leaves for another job after a couple of years? Well, for one thing, he gets to keep the extra money.

If there is going to be a differential in rate of pay, it should be based on an *enforceable* expectation. That is, a bonus rate should be paid to anyone, male or female, who is willing to sign a long-term contract binding him or her to remain with the employer for a period of years, barring involuntary physical disability (this wouldn't include pregnancy), with a penalty clause providing that the extra pay over and above that of persons not signing such a contract, must be repaid to the employer if he defaults.

Some persons might be reluctant to sign such a contract, feeling that they were selling themselves into slavery. But at least it would mean that the person who claims a right to preferential pay on the basis of hypothetically greater job stability would have to either deliver or forfeit the extra proceeds.

The principle which Davenport and Jensen appear to accept is reminiscent of the man who gave his three sons a good whipping every day after breakfast, on the grounds that they were sure to do something to deserve it before the day was over. If we are going to punish occupational infidelity, it would be better to adopt the more generally accepted corrective principle of exacting the penalty after rather than before the crime is committed.

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Some hypothesis might be tested to the satisfaction of all participants. Assume the validity of the following statements: (i) women receive lower salaries than men, all things but gender being equal; (ii) such a situation would be rational if, in fact, the "job mortality" would be higher for women than for men (due to sex-specific factors). Both of these statements should receive grudging agreement from all parties. Further, assume that past and present behavior is the best predictor available for future behavior (most behavioral scientists would accept this); specifically, it should be possible to stipulate a period of employment (N years, say, where $N = 4$ or 5?) which would indicate that a specific woman had a "job mortality" factor at least as low as that of a typical man in the same position.

If the above assumptions are accepted, then an employer should be willing to give parity to prospective or current women employees (in terms of hiring preference or salary) if such employees had completed N years of continued performance as a professional. Do the employers who write to *Science* have salary parity for women who have been employed N years? Are they as likely to hire women with N years of employment as men with equivalent experience? If the answer is "yes," then the employers are behaving rationally, and women must argue the tenability of the "job mortality" assumption. If the answer is "no," then the employers are merely rationalizing irrational behavior in their letters to *Science,* and are hoist by their own petards (in the Middle French meaning of the term). Empirical tests can discriminate the good guys or gals from the bad.

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Amen

Several letters dealing with the properties, preparation, and use of yogurt have appeared in *Science* during the past few months (*1*). I have recently been informed of some less technical studies which the researcher has compiled and plans to publish in a modest manual entitled "60 Things You Can Do With Yogurt" (*2*). Then too, his research assistants have prepared a short follow-up paper entitled "One More Thing You Can Do With Yogurt" (*3*).

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References

1. E. F. Segal, *Science* **169**, 425 (1970); M. Kroger, *ibid.*, p. 816; J. Goodman, *ibid.* **170**, 123 (1970); B. H. Bagdikian, *ibid.*, p. 582; G. A. Garabedian, *ibid.* **171**, 847 (1971).
2. Private communication.
3. An even more private communication.