believe that there would be variations as the career in question was phrased as more or less intellectually demanding. While the attitude of today's high-school students may be said to prefigure the attitudes of the man in the street tomorrow, it is necessary also to recognize that these students have been exposed, rather more than their forebears, to articulate and concerted attempts to involve them in scientific careers, and so they may differ somewhat from their seniors today. The report is not in any sense designed to blame the high-school students but rather to focus attention on the one-sidedness of a picture of the scientific life which overemphasizes the gap between those who do and those who do not participate in it.

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### Grants Without Grind

An editorial in *Science* [125, 97 (18 Jan. 1957)] has helped to dispel ignorance among scientists about where and how to seek support for research. It has made me think of ways in which foundations, on their part, could improve their relations with research workers.

Years ago, that task would have been simple. The foundation would have endowed a university or a museum, which then would have hired a staff with tenure for life. That kind of security still works well in respect to basic research in many fields. But there is a greatly increased need today for the support of studies related to specific questions of current interest—a support that does not permit so-called "crash" programs to become "slap-dash" programs.

The amount of time and effort of research workers, and of research administrators, that is required to prepare requests for grants and fellowships has become appalling. At a recent conference of foreign medical educators, one of our European colleagues wondered why so large a proportion of the advance made in his field comes from European, rather than American, scientists, despite the greater funds available here. He hinted that this may be because "we in Europe are free from your kind of red tape." While he and his colleagues pursue their studies, we spend our time preparing requests for funds—often repeatedly, because many of them are rejected. The unsuccessful applicant as a rule does not receive the benefit of the critical appraisal which the foundation's advisers may have spent many hours in preparing. One foundation reports that the average number of references is seven; it costs the time of seven scholars to write seven thoughtful letters. (If, occasionally, such letters are written carelessly, both the

applicant's and the foundation's time may be wasted.)

Yet another matter deserves attention. In one case our school received a personally written letter asking it to apply for a fellowship, only to learn afterwards that the foundation had thus addressed a hundred times as many people as it had fellowships available. In another instance we applied for funds from one agency, and when the request was rejected, the administrator of another chided us for not having simultaneously applied to his —on another set of forms. In spite of a reputation for liberality in this respect, one national foundation refused to accept a duplicate of an application we had submitted to a federal agency and demanded 20 copies of an application in a different format.

We need a closer link, it seems to me, between foundations and research workers if the most important phase of research—the planning—is to be adequately supported. At the very least, granting agencies should pay the costs of duplication, circulation, and evaluation of applications and should accept the responsibility of telling unsuccessful applicants in detail why their projects are rejected. Removing the secrecy which now prevails in this respect admittedly would add to the foundation's job, but to the benefit of science. Moreover, when the foundation executive believes that support for a particular study might more suitably come from another agency, he would render a real service, not alone to the applicant but to scientific progress, by so informing him.

Donors of funds know in a general way what they want of science. So does the public. One of the foundation's functions is to translate such felt purpose into effective scientific research. Scientists share this objective. To achieve this common end, should not the foundation inform the applicant more often than it now does of ways in which he could make his project acceptable? Far from interfering with freedom of research, this form of friendly collaboration would actually advance it by removing one of the frustrations which so often beset the path of the scientist.

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## Invisible Words—Invisible Evidence

Your recent editorial [*Science* **126**, 681 (11 Oct. 1957)] was as usual of timely interest, but it was inaccurate in one respect. The existence of subliminal perception is not as well established as you suggest.

The crux of the problem is the meaning of *limen* or *threshold* in this context. In psychophysical research, *thresholds* are usually defined as the least intensity, size, duration, position, and so on, of a physical stimulus (absolute threshold), or least change in one physical stimulus, or difference between stimuli (difference threshold), which will elicit verbal recognition as determined by the average of a series of measurements. The question is whether it has been demonstrated that physical stimuli below one of these thresholds can influence behavior. I have recently reviewed the considerable experimental work on this question and have arrived at the seemingly obvious conclusion that the demonstrations of the phenomenon are far from conclusive [*Perceptual and Motor Skills* **7**, 29 (1957)].

Therefore it is yet to be proved that anyone could have his subconscious polluted by subliminal messages. Being a resident of the Cornhusker State, however, I'm all for it if it can be used to increase the sale of popcorn.

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