Over and Over again . . .

THE DRAWN OUT, inconclusive, and fruitless debates and controversies on the distinction, if any, between the so-called "basic" and "applied" research, hopefully forgotten by scientists, seem to reappear as a horrible specter whenever the use of the almighty dollar for research has to be decided by laymen. Among scientists the problem is usually dragged out towards the end of a prolonged bull session when other more obvious ways of entertainment and gossip have been exhausted. And then with a big sigh "Not *that* again!" everyone staggers away.

The issue is confused not by scientists or by complete laymen but as usual by—the worst of all—half-informed "experts". Well aware of this danger, two most eminently suitable men to tackle this problem, Dr. James B. Conant and Dr. Alan T. Waterman, stated their points of view in the recent first annual report of the National Science Foundation. The first uses the terms "programmatic" and "uncommitted" research, the second the more common but more easily misunderstood terms "applied" and "basic" research. The high esteem which both of these men have among scientists and the deep insight into the motivation and true value of scientific research which they have shown in the past is too well known to the readers of *Physics Today* to need repeating.

In spite of such clear statements to which undoubtedly the majority of scientists, with minor personal variations, will subscribe, there seems to be still an abyss of misunderstanding among "experts" as recent popular articles indicate. Their arguments usually boil down to the classical theme: "since there are borderline cases there is no borderline". One could equally well argue that since there are hermaphrodites there is no difference between men and women. One wonders. . . .

Besides delightful quibbles whether some specific research is "basic" or "programmatic" and the like, the enemies of describing research in terms of the two broad categories claim that since all sciences use "scientific method" there is no difference in the result. Here another philosophical ghost sends shivers down the spine of a needy scientist. The popular definition of a scientific method is roughly summarized in the well-known picture of a young man in a white lab coat, preferably with glasses (he must read a lot!) looking at a test tube or into a microscope or at a completely harmless part of a machine, and making notes. A pencil and a pad are a must! As a result of this kind of idea we have "scientific research" everywhere whether it is a cyclotron or a washing machine, a mouse trap or an atomic submarine. We have science of cooking, science of washing, science of making cigarettes, science of designing chairs, refrigerator jars and razor blades, not to mention cosmetics and deodorants!

The purpose of these comments is not to restate again the very elusive psychology of creative effort, the all-important role of the motive of research and the resulting difference between research motivated by curiosity and research motivated by a utilitarian end. Nor is this the place to point out again the striking difference in the output of new scientific ideas of the two kinds of research or the equally striking and opposite difference in the mass of scientific data, tables, graphs: i.e., in the sheer weight of reports produced by the two groups. We all agree that both are necessary and extremely important, that both should be and usually are intertwined and of great value for each other, that many a "practical" result has been obtained from originally "basic" research, that many "basic" and intriguing data have been obtained through "applied" research, etc., etc. But let us not forget that those who control the financial strings of research or investigate their use, either in industry or in government, understand much better and feel much easier approving money for "programmatic" rather than for "uncommitted" research. A research goal immediately translatable in terms of "better" guns, "better" radar, or "better" axle grease is much more digestible for taxpayers or shareholders than spin-orbit coupling or lifetime of a meson. If all research were to be put into one bag then the economizer's ax would certainly chop off the "abstract" part of it. On the other hand a distinct group of "basic" research may and does appeal even to an uninitiated mind. In fact the present situation is often such that in order to impress the authorities or to lure young scientists various laboratories wave the "basic" flag at the slightest provocation.

Why should we physicists bother about this state of affairs? First of all because this flood of misinformation about science affects directly or indirectly the often precarious position of the research programs of such important institutions as the Science Foundation, ONR, etc. Secondly, we are partly responsible for the lack of knowledge of facts among laymen. Let us do what we can to correct the overabundant misconceptions about science in general and physics in particular.

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