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The great honor of having received a Nobel Prize in Physics has suddenly changed my life in many ways. For one thing, I've been made to field many more questions via interviews, appearances, and other opportunities. In the process, I've found that conveying my thoughts so that they are accurately understood can be more challenging than doing research.

Research in my field of high-energy physics normally involves a division of labor between theorists and experimentalists. When I mention that I am a theorist, people often say, "Oh that's nice: so long as you have a pencil and paper, you don't need any funding, do you?" Well, for sure writing materials are needed and not that much research funding is required. Nevertheless, some funding is necessary. After receiving my doctorate in 1972, I was hired as a research associate in the Physics Department at Kyoto University. In those days, when one wrote a research paper, a preprint was published and mailed out to main research institutions in the subject field. This was the primary mode of disseminating research information. It was quite costly, even more so if one wrote a lot of papers. At the time, I was able to receive sufficient funding from the university to cover these costs. Therefore, the first time I availed myself of a Grant-in-Aid for Scientific Research was more than ten years after being employed at Kyoto University.

Now, the mode of information dissemination has changed to the Internet, making it no longer necessary to publish and mail out preprints. Still, maintaining an Internet environment is itself quite costly. On top of that is the need to travel to conferences both in and out of country. Concurrently, the price of journal subscriptions has gone up dramatically over recent years. These various costs impose a heavy burden on theoretical researchers. Needless to say, when such research is accompanied by experimentation, considerably larger research funding is needed to maintain the research environment.

It's been quite some time since I transferred my operational base from the university to

a research institution, so my understanding of the current university situation may not be exactly accurate. To be sure, however, there has been a considerable decrease in the amount of research funding allocated to them. I've heard of cases where universities are providing their researchers with only ¥100,000 (about $1,000), not per month, put per year. To make up this funding shortfall, researchers are forced to depend on a high ratio of Grant-in-Aid and other competitive funding. Though such funding has been increased by quite a bit; nevertheless, the selection rate for Grants-in-Aid for Scientific Research is only in the low 20 percentile. Under these conditions, even research that yields excellent results is not guaranteed another grant.

Under the Grant-in-Aid system, funding is supplied for fixed-term projects with an established research plan. Speaking from my own personal position as a theorist, it is difficult to accommodate oneself to this system. In the realm of theory, there is a rapid transition in research phases: research cannot be pursued optimally by pre-formulating a detailed research plan. For people like me who do not have long interest spans, it's perplexing to be told, "Write a 2-3 year research plan." Well, given this perception and the fact that I have not received Grant-in-Aid funding that many times, I may not be the most appropriate person to author the first article of this series. Nevertheless, there are aspects of research funding, including Grants-in-Aid, about which I'd like to share some thought.

Competitive funding does provide an effective framework for selecting and advancing excellent research initiatives; the problem, however, arises with the system shift to competitive funding as the predominate source of research financing. There are many cases where a stable source of relatively small funding is desirable, including research to prepare for drafting a research plan, research to accumulate working data, and, as I have noted, theoretical research. This sort of basic research funding used to be provided to researchers by Japan's national universities in the form of chair research funds. Since, however, the incorporation of the national universities, their operating budgets have been cut by one percent a year. Accordingly, we can surmise that funding for basic research will continue to decline. One can't help but think that the current policy to compensating for this underfunding with competitive grants is misdirected.

Another problem with competitive funding is the burden imposed by its application review process. Applications received for Grant-in-Aid categories administered by the Japan Society for the Promotion of Science (JSPS) number about 90,000 per year, with

more than 5,000 examiners used to carry out the reviews. Needless to say, it is necessary from a national perspective to conduct careful reviews of applications for large-budget research projects. However, it is doubtful whether the current review system is optimum for small-scale projects. When considering the amount of time and energy expended in calling for proposals, submitting applications and conducting reviews, one cannot help from feeling apprehensive about the enormous amount of research potential being usurped by the system.

What I believe desirable is to have a two-tier structure in which a competitive funding system is superimposed upon a stable funding system for supporting basic research. In the past, such regular funding has been criticized as “indiscriminate doling” or “lukewarm use” of research funds. While steps need be taken to eliminate such negative aspects of regular funding, to become overly reliant on competitive funding with its inherent demand for short-terms results threatens to erode the foundation for basic research in the university. Such would have grave consequences if it were to happen.

On the brighter side, the importance of basic research has of late received some focus in the mass media. Nevertheless, little progress has been made in advancing a dialogue on a concrete policy for supporting basic research. While it will of course be necessary to stop the slashing of operational budgets for national universities and financial support for private universities, I believe it also of vital importance to come up with a new scheme for funding basic research.