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## LETTERS

### Why People Should Be Paid To Do Research In Mathematics

Dear Editor,

Brendan McCann's question: "Should people be Paid to Do Research in Mathematics?" (Issue 19) is fair, and one which a mathematician ought to ponder. I hope you see fit to let me share some of my thoughts about it. In discussing any question beginning with "should", it is sure that varying ethical outlooks will produce different conclusions.

To begin with, I do not accept it as given that "technology has outstripped man's needs." In fact McCann refutes this in the same paragraph when he states that "over half the world's adults are illiterate." Perhaps he does not view this as a problem to which technology can contribute. But I do. In fact, I take it as given that technology has contributed more to the human condition including human rights than any philosophical or political movement. While it is true that Mr. McCann and I are receiving more material comforts than we really need, it does not follow that everyone is. The solution to this maldistribution is (A) more technology and (B) more generosity. And it seems to me that (A) is the best way to (B).

The assertion "There is no reason to suppose that mankind will perish without further mathematical research." is a gem. You can replace "further mathematical research" with so many things: art, journalism, rock and roll, Guinness, medicine even. It seems to me that bare survival is not the issue here. Nor is the potential contributions of mathematics to technology, despite my technophile assertions above. In the sequel I shall argue as follows: (1) all human creativity including mathematical creativity should be supported by society; (2) the scheme by which mathematical creativity is presently rewarded is better than that by which most other creativity is rewarded; (3) there are practical benefits to societies which adequately reward mathematical creativity besides the eventual application of mathematical theory to technology.

There is every reason to suppose that humanity will cease to be humanity without further creativity in literature, art, philosophy, athletics and mathematics. Creativity must be a defining factor of human culture. My definition of creativity is as broad as possible including motion picture actors and directors amateur and professional athletes, billiard and chess players, musicians, circus performers etc. All of these persons do their bit with greater or less proficiency, and seek a reward for it. At times the reward is given in a most indirect way. For example, outstanding college wrestlers, for whom there are few professional athletic opportunities after graduation, sometimes receive high paying jobs in sales and public relations from firms which feel that their customers have heard of these former champions and would like to spend time with them.

We all know the scheme by which creativity in mathematics is rewarded, and I shall not dwell on it. Mathematicians are hired as professors, and their teaching load is reduced to allow time for research. Better research credentials lead to better positions and earlier promotion.

The first justification for this arrangement has nothing to do with research. It is this: teaching college level mathematics requires a tremendous preparation and intellectual effort. I claim that teaching calculus for a year requires the same intellectual effort as trying an involved case at law. A lawyer demands a high fee because of his preparation and effort. A mathematician demands a smaller fee and an environment in which he can do research. The value of the mathematician's teaching justifies his salary and the environment.

The second justification is this: The value of mathematical creativity in the educational process has long been recognized most visibly in the requirement of theses and dissertations. It is obvious that the best person to direct research is someone who does research.

Consider some of the alternatives to the system by which mathematicians are rewarded. Actors and actresses struggle in poverty until they are recognized, and then are overcompensated. This appears to be usual in the performing arts. Most writers are neglected, but the few who appeal to the public become wealthy. The case of the artist is the least happy. How many dealers and collectors became rich because of Van Gogh? And what good did this do Van Gogh? The rewards of a mathematician are most equally distributed even in comparison with practitioners of other sciences.

The support of mathematicians by royalty is a historical fact. The monarch had various motivations for doing this besides help with infrequent technical matters; namely, to ornament his court, to prove his nation was more civilized

or just as civilized as another. The public relations value of mathematics still exists, and it works at many levels. If a state university boasts a productive mathematics department, it helps to attract industry. Does it help very much? Probably not; but how much is one half of one percent of fifty billion dollars? Moreover, the reputation of the mathematics department helps the graduates of the university when they seek employment. The added cost per student of a research oriented department versus a department of exploited teachers probably amounts to half of what the student spends on preparing his resume. And it probably makes twice the impression on the average prospective employer.

The much repeated argument that the most unlikely mathematical theory has resulted in advances in applied science is probably true enough; but I'm not fond of it. In the first place most mathematical contributions to technology have been by mathematicians who have been directly motivated by the technology. In the second place, a lot of mathematical applications turn out to be of this sort: some economist or physicist comes upon some mathematical theory which appeals to him; he continues to expand the theory and but now calls it mathematical economics or mathematical physics. It seems to me that the other reasons I have cited demonstrate that the answer to McCann's question is "Yes."

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