may in fact be mere popular prejudices, or unconscious rationalizations of the status quo.

It is plain confusion to identify creative output, which may be readily defined in simple terms, with creativity, which is something quite different, and is at least as hard to define and measure as intelligence, emotional maturity, integrity, and other personality traits.

What is at issue is not a mere matter of verbal nicety, but the possibly erroneous inferences for social policy that may arise from the confusion. We refer, for example, to personnel policies of employers and to funding policies of agencies and foundations that support research.

If one assumes that the declining portion of the output curve is rooted in psychological limitations inherent in *homo sapiens*, one will draw one set of conclusions and will lean toward one set of policies; but if one surmises that the curve is merely the expression of a widely prevailing set of socially determined factors, one's policies and attitudes will almost certainly be more flexible, and one will deal with individuals as they should be dealt with according to law—that is, according to individual merit and not according to age.

There is probably some temptation to assume that the later stage of aging is a degenerative process, and that the downward trend of output in later years is an expression of that process. But there is a contrary view, which needs to be stated explicitly: Creative output is almost certainly facilitated by a fund of accurate, discriminatingly collected knowledge, proven judgment, success experience in a variety of undertakings and the corresponding increase of self-confidence, and these can only come with age. If the downward trend prevails in spite of these factors, there is an abundance of social factors to account for that trend, including the misinterpretation of output-versus-age curves, and career patterns that confine the individual to a narrow subject-matter range (job-equals-rut syndrome), or which channel the creativity of later years into non-scientific areas.

The role of reward and recognition systems may also be important in shaping the output curve. In this connection, it is interesting to compare the careers of Newton and Galileo.

Newton, showered with honors, terminated his scientific career in his early forties. But Galileo, under house arrest to the end of his years for his challenges to the "establishment," continued his remarkable scientific career into his seventies.

Proven creative talent is too scarce and valuable a social resource to allow it to become the victim of fatalistic policies and attitudes that have a dubious foundation in theory, or no foundation at all.

LAWRENCE CRANBERG
Austin, Texas

Physicists die young?

In reading the obituaries in PHYSICS TODAY over the years, I have often been struck by the young age at which many prominent physicists die. I began to wonder if I had joined an especially hazardous profession.

So, one evening I sat down in front of the fire and checked the age at death for physical scientists whose obituaries were published in PHYSICS TODAY from August 1969 to January 1975. I found 192 deaths, with the mean (and median) age at death of 64 years. The standard deviation appeared to be about 15 years. The youngest physicist was 29, the oldest 102.

What conclusions can be drawn from this? I do not know. The human beings in the sample were mostly Caucasian male physicists. The cause of death was either accidental, natural, or not given. If you assume that the production rate of physicists between 1880 and 1940 was roughly constant, then you might say the life expectancy for the physicists you see around you is about 65. You might guess that half of the physicists you know will not live to collect their retirement benefits.

JOHN F. DAVIS
Abilene Chistian College
Abilene, Texas

Error in space science

I would like to point out a serious error in your reporting of the recommendations of the National Research Council's Space Science Board for FY 1976 (March, page 70). The Board did not, as you reported, recommend either or both the elimination of the Jupiter Uranus program or the delay of the Pioneer Jupiter orbit. Instead the Board merely concluded[1] that the ". . . fiscal constraints do not permit the early start of two large programs (Pioneer Jupiter Orbiter and Mariner Jupiter Uranus) for the exploration of the outer solar system . . .". In their report the Board identified slipping Pioneer Jupiter Orbiter or eliminating Mariner Jupiter Uranus as *separate* alternative ways for meeting the fiscal planning wedge of NASA's Office of Space Science. The Board did not, however, specifically recommend that one or the other of these alternatives be adopted. Instead they recommended that an immediate reexamination of the strategy for outer planets be undertaken by NASA.

In my view this was a wise decision by the Board, since both of these projects are of great scientific leverage and of

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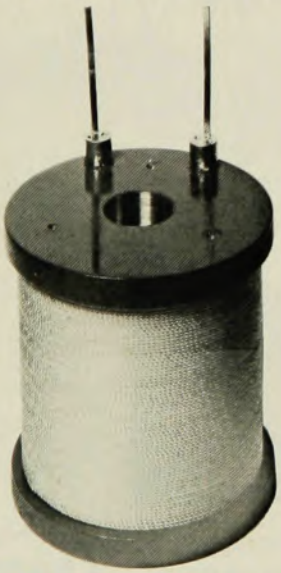

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tremendous interest to the planetary and space-science community: Mariner Jupiter Uranus because it would explore the only remaining unvisited category of planet in the solar system (the physical domains in Uranus and Neptune are quite distinct from those of Jupiter and Saturn) as well as being the first *in situ* observatory in interstellar space with an appreciable communication rate and design lifetime; Pioneer Jupiter Orbiter because of the desire to understand the details of the rich and varied physical phenomena revealed by Pioneers 10 and 11 in the atmosphere and magnetosphere of Jupiter.

Reference

1. "Opportunities and Choices in Space Science, 1974," Space Science Board, National Research Council; N.A.S., Washington, D.C. (1974).

MICHAEL J. S. BELTON
Kitt Peak National Observatory
Tucson, Arizona

EDITOR'S COMMENT: Michael Belton is correct. Our report should have read "... recommends elimination of the Jupiter–Uranus program *or* delay of the Pioneer Jupiter Orbiter" instead of "and."

Jewish physicists on trial

We have been informed by our colleagues, Yuri Gurevich, of the plight of two Jewish Russian physicists who, because of their desire to emigrate to Israel, have not only lost their jobs but are now facing criminal prosecution. Their crime, that they spoke the truth as they saw it, in the Soviet Union can be construed as a criminal offense—"Slandering the State." The files of Grigory and Isai Goldstein (ages 41 and 34 respectively) have just been turned over to the state prosecutor to begin criminal proceedings. They are being threatened with jail sentences from three to seven years for refusing to give up their fight to leave the Soviet Union and immigrate to Israel.

Their travail began in November 1971, when they, Isai Goldstein, his wife Elizabeta and his brother Grigory applied for permission to emigrate. Permission was immediately denied them, and in December 1971 both brothers were dismissed from their positions. Isai was the Director of the Safety Department of the Tibilisi Branch of the Institute for Meteorology (Mendeleyev Institute), and Grigory was the Director of the Laboratory of the Institute of Cybernetics, also of the Tibilisi Branch of the Mendeleyev Institute for Meteorology. Between them they are the authors of thirty scientific papers, and Grigory has six inventions to his credit. Both are PhD's in physics. Elizabeta Bikova, Isai's wife, was dismissed from the University of Tibilisi while studying for her PhD in physics.

In shock at the USSR's indifference and blatant acceptance of the Munich massacre of Israeli athletes, they renounced their Soviet citizenship in a letter to the Soviet president Nikolai Podgorny in October 1972 and criticized the USSR for supporting the terrorists. They again reaffirmed their request to emigrate to Israel.

Since that time they have been subject to frequent harassment by the KGB and have had their mail deliveries suspended, their telephone disconnected and their internal passports taken from them, so confining them to Tibilisi.

More recently, while public attention in many parts of the world was focussed on events in Southeast Asia, the Soviet authorities moved against the Goldstein brothers. On 24 March 1975 they were taken off a train by the KGB who accused them of defaming the USSR. On 5 April 1975 the KGB informed them that sufficient evidence had been collected to bring their case to court. Information that has leaked out from the USSR indicates that their trial is imminent and they face long jail sentences.

We ask our American colleagues to help publicize the Goldsteins' case and help bring to bear any pressure at their disposal to secure the release and emigration of the Goldsteins from the USSR.

Not only must scientific freedom and integrity be protected everywhere, but we must all act to increase human values and freedom whenever we are able. It is only by our individual and joint actions that we may obtain a better and safer world. Please help!

DAVID A. OWEN
AND SIX OTHER FACULTY MEMBERS
Ben Gurion University of The Negev
Beersheva, Israel

UNESCO and Israel

I was deeply disturbed by the letter of A. P. French and W. C. Kelly (May, page 13) concerning the UNESCO sponsorship of the international conference on physics education. French and Kelly mildly refer to "certain resolutions, discriminating against Israel," which were taken recently by UNESCO. They fail to mention that:

▸ UNESCO decided to expel Israel from all its regional bodies. These are the only bodies that are active on educational, scientific and cultural matters. The only activity in which Israel is still allowed to participate is in the meetings of the general UNESCO council in which these political resolutions are voted.