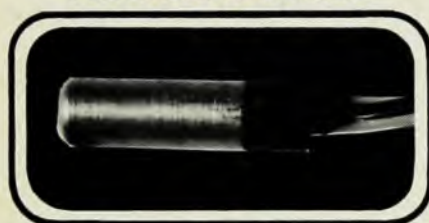


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letters

continued from page 15

sential point of stimulating and encouraging public interest in modern science.

Unfortunately, the management of KGO and I learned something else from this experiment: My original plan was for a three-hour show that would cover modern physical science more generally by, for example, demonstrating how our everyday experience produces intuitions that are not valid in the microcosm. I had hoped for some discussion of Schrödinger's cat paradox, and the various ideas advanced to resolve that problem. Analogies for the wave function had been worked out involving an electron that goes to lunch and is subsequently sought by its secretary who, not looking too hard at first, finds the electron dining all over town, until she opens the door of a particular restaurant. However, this more ambitious plan had to be abandoned.

There were just too many physicist colleagues who were unwilling to participate in the program because of petty rivalries, ego problems, fear of peer reaction to what they might say, arrogance, and just plain disinterest. This attitude did a lot to offset the demonstration that the public is indeed interested in pure science. The networks want to broadcast interesting programs. But they're not about to come begging to us when the ESP and flying-saucer advocates are lined up at their door, and there is equal public interest in the latter subjects.

To put it bluntly, those members of Congress who believe pure science is largely irrelevant for the general public have numerous allies in the physics community. That's something to consider the next time the NSF turns down your proposal.

ALLEN D. ALLEN
Algorithms, Inc.
Northridge, Calif.

3/17/78

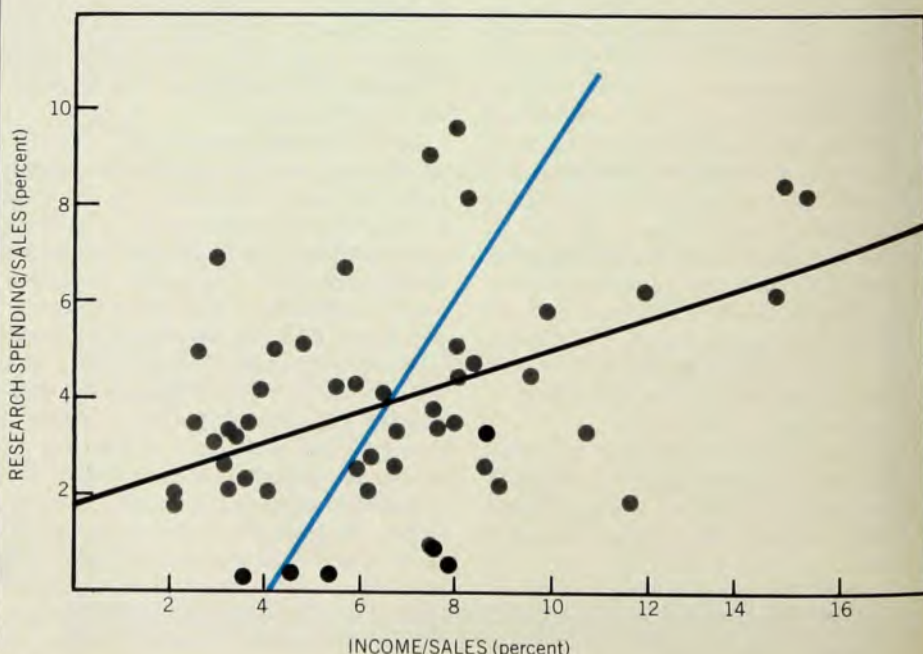
Research profits

Shaky statistical inference should not go unchallenged, especially when an alternative inference is equally or more likely to be true. I refer to the guest comment by J. J. Gilman and R. H. Miller in March (page 9). Their figures 1 and 2 appear to support the popular belief among scientists that corporate support of research increases profits. I do not quarrel with this belief—only with their application of statistics and their unconvincing inference.

Many scientists and engineers working with linear regression do not seem to be aware that one can always construct two regression lines for any set of data and that the quotient of their slopes gives

$b_1/b_2 = r^2$. Thus in figure 1 of Gilman and Miller the second regression line has a slope of 3.07, intercepts the abscissa at $x = 1.71$ and passes through the centroid of the data at $\bar{x} = 3.87$ and $\bar{y} = 6.63$.

To emphasize the alternative inference that I wish to explore, however, I have replotted their data in my figure with I/S as the abscissa and R/S as the ordinate, and have plotted both regression lines. What I referred to as the second regression line now has the slope 0.33 (the black line). An interpretation of this line might well be that major corporations with large profits support research rather than research supports profits. Surely this is a more appropriate interpretation of the data, especially in view of the simultaneity of the profits and the research support.



Let me now make a few additional remarks on linear correlations and their interpretation. Suppose for simplicity that x and y are indeed linearly related. The lack of a perfect correlation in samples of x and y can occur because of: (1) errors in the samples of y , (2) errors in the samples of x , and (3) the influence of other variates. If the lack of a perfect linear correlation is due to (1) then the black regression line in figure 1 is the correct estimate of the true linear relation between x and y . If the variation of the data from a straight line is due entirely to (2), then the colored line in the figure is the appropriate line. If the relative errors of x and y are unknown, or if other variates are responsible for the scatter, there is no way of choosing one or the other regression line and some *ad hoc* assumption (or further information) must be applied. The question of the prediction of one variate from a sample of the other is still another matter I will not deal with here.

Returning to the problem at hand; apparently the scatter in the data is due to the influence of other variates. Therefore the preference for one regression line over the other is unwarranted as an estimate of the possible linear relation between the two variates. But let us suppose that there were a perfect linear relation in the observations. Would that justify a claim that research supports profits? Certainly not, for the alternative, that profits support research, is equally plausible and perhaps even preferable in this instance because of the timing of the observations.

ALAN J. FALLER
University of Maryland
College Park, Maryland

3/27/78

THE AUTHORS REPLY: Alan Faller suggests that our correlations indicate that profits support research, as an alternative to our interpretation that research supports corporate-income production—particularly future income production. However, several specific case histories can be cited in which research has clearly led to specific products. Therefore, logical induction supports our interpretation of the correlations. Also, Faller points out that the correlation between net relative income and relative research spending is weak. We agree. Much stronger is the correlation between P/E ratio and R/S as discussed in our commentary.

We should like to take this opportunity to point out two errata. The phrase at the end of the third paragraph should read "... related to a 0.65 percent increase in relative income;" and "(percent)" should be deleted from the legend of the ordinate on figure 2.

J. J. GILMAN
R. H. MILLER
Allied Chemical
Morristown, N.J. □

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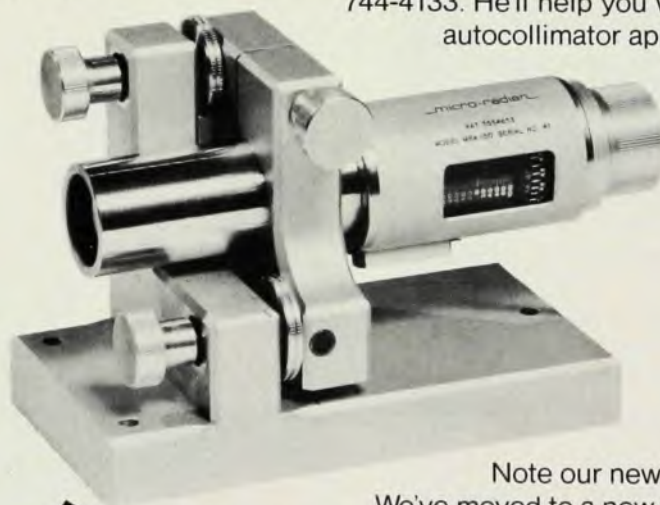
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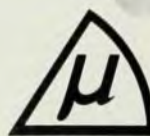
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