Two Famous Papers

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It is common in editorials to discuss matters of general policy and not specific research. But the two papers I would like to describe have been written so often, by so many different authors under so many different titles, that they have earned editorial consideration.

The first paper has the generic title "Information Theory, Photosynthesis and Religion" (title courtesy of D. A. Huffman), and is written by an engineer or physicist. It discusses the surprisingly close relationship between the vocabulary and conceptual framework of information theory and that of psychology (or genetics, or linguistics, or psychiatry, or business organization). It is pointed out that the concepts of structure, pattern, entropy, noise, transmitter, receiver, and code are (when properly interpreted) central to both. Having placed the discipline of psychology for the first time on a sound scientific base, the author modestly leaves the filling in of the outline to the psychologists. He has, of course, read up on the field in preparation for writing the paper, and has a firm grasp of the essentials, but he has been anxious not to clutter his mind with such details as the state of knowledge in the field, what the central problems are, how they are being attacked, et cetera, et cetera, et cetera.

There is a constructive alternative for the author of this paper. If he is willing to give up larceny for a life of honest toil, he can find a competent psychologist and spend several years at intensive mutual education, leading to productive joint research. But this has some disadvantages from his point of view. First, psychology would not be placed on a sound scientific base for several extra years. Second, he might find himself, as so many have, diverted from the broader questions, wasting his time on problems whose only merit is that they are vitally important, unsolved, and in need of interdisciplinary effort. In fact, he might spend so much time solving such problems that psychology never *would* be placed on a sound scientific base.

The second paper is typically called "The Optimum Linear Mean Square Filter for Separating Sinusoidally Modulated Triangular Signals from Randomly Sampled Stationary Gaussian Noise, with Applications to a Problem in Radar." The details vary from version to version, but the initial physical problem has as its major interest its obvious nonlinearity. An effective discussion of this problem would require some really new thinking of a difficult sort, so the author quickly substitutes an unrelated linear problem which is more amenable to analysis. He treats this irrelevant linear problem in a very general way, and by a triumph of analytical technique is able to present its solution, not quite in closed form, but as the solution to an integral equation whose kernal is the solution to another, bivariate integral equation. He notes that the problem is now in a form in which standard numerical analysis techniques, and one of the micromicrosecond computers which people are now beginning to discuss, can provide detailed answers to specific questions. Many authors might rest here (in fact many do), but ours wants real insight into the character of the results. By carefully taking limits and investigating asymptotic behavior he succeeds in showing that in a few very special cases (which include all those which have any conceivable application or offer any significant insight) the results of this analysis agree with the results of the Wiener-Lee-Zadeh-Raggazzini theory—the very results, indeed, which Wiener, Lee, Zadeh, and Raggazzini obtained years before.

These two papers have been written—and even published—often enough by now.

I suggest that we stop writing them, and release a large supply of manpower to work on the exciting and important problems which need investigation.