not enough time to read everything, the Russian translation journals are not even to be scanned.

How is it we never hear of a researcher in Boston who didn't know for years of some significant publication by a colleague in San Francisco? Because Dr. X and Dr. Y also communicate personally—by phone, by letter, by the grapevine, or by osmosis in the hotel lobby at meetings they both attend. And Dr. Y probably forwarded Dr. X a reprint as soon as the paper appeared.

If such intimate exchange of information ever occurs between top Soviet and American researchers, there may be little need for translation journals. But so long as it is a bibliographic rarity to see the name of a Soviet worker followed by "private communication," it behooves our scientists to use an *a posteriori* approach to the problem —to get themselves into the library once or twice a month, place the old *posteriori* firmly in a chair, and devote a couple of hours to browsing through the latest issues of the pertinent translated Soviet journals.

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Suggestion and Sensory Deprivation

In a recent report entitled "Influence of suggestion and subjects' prior knowledge in research on sensory deprivation" [*Science* **135**, 211 (1962)], Jackson and Kelly end with the following statement: "it is essential that the possible influence of suggestion be allowed for in the design of, and in interpreting the results of, future studies of sensory deprivation." I do not wish to quarrel with this statement; on the contrary, I believe this is one of the prime considerations of workers in this area. I do wish, however, to question the design and interpretation of the research reported.

Fourteen paid subjects were told that, during the course of an experiment like that in which they were about to participate, previous subjects had experienced peculiar cognitive and perceptual feelings. The 14 subjects were then given (placebo) pills to help bring on the hallucinations. Twelve of the 14 subjects reported peculiar sensations during the 1-hour sensory-deprivation situation. However, there is no mention of control groups. It would have

been interesting to observe the experiences of a group of subjects placed in the same situation for 1 hour without having received any suggestions as to anticipated results. Another possible control group would be a group that received the suggestion but no sensory deprivation, or a different degree of deprivation.

Jackson and Kelly draw the following conclusion: "Since 1 hour is so much shorter than commonly used deprivation periods, the effects reported by our subjects are considered to be due primarily to the subjects' prior knowledge of the anticipated results and to the creation of the attitude 'it is appropriate to experience hallucinations in this situation.' " On the assumption that 1 hour *is* a much shorter period than usual, does the above conclusion necessarily follow? I think not. In the absence of control groups, who is to say why the subjects experienced peculiar sensations? To my mind, this research is a demonstration of one method of causing subjects to report hallucinatory experiences. However, nothing can be said about specific causes, such as suggestion, sensory deprivation, and placebo.

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The study about which Stern comments was the first in a series of related experiments conducted by a group of investigators at the University of Michigan. Although we agree with Stern that additional comparison or control groups would be interesting and worth while, we do not agree that "nothing can be said about specific causes." The two principal alternative explanations are that the reported effects were due to 1 hour of sensory deprivation per se or that they were due to what is broadly called "suggestion"—that is, the subjects' previous knowledge, expectations, sets, and so on.

With very few exceptions, the length of time people have been deprived in experimental sensory deprivation has varied from about 8 hours to a week or more. Most investigators have indicated that only some of their subjects reported unusual effects, in some studies a small proportion of the total groups. Moreover, in at least one study (*1*), in which as much as a week of sensory deprivation was employed, hardly any unusual effects were elicited. By contrast, all 14 of our experimental subjects

(subjected to suggestion plus 1 hour of sensory deprivation) reported auditory, somesthetic, and cognitive experiences, and 12 reported visual effects and emotional reactions. Some of these subjects described very peculiar effects within the first few minutes of deprivation. Consequently, it did not seem to us that the quality and quantity of experiences reported by our subjects could reasonably be attributed to 1 hour of sensory deprivation per se.

Stern suggests using control subjects "who received no suggestion as to anticipated results." We understand, of course, that he is referring to the deliberate suggestions which we gave to the experimental subjects. We contend, however, that it is almost impossible to select, screen, instruct, and place in situations of experimental sensory deprivation normal, bright subjects, particularly college students or professional personnel, without creating a wide variety of anticipations, expectations, and sets through which experimental effects may be suggested. This view is elaborated elsewhere (*2*).

It is possible, of course, to vary the amount of suggestion, and we have done this in a more recent study (*3*). Subjects with 3 hours of sensory deprivation plus suggestion reported significantly more effects, and much more unusual effects, than subjects who received relatively neutral instructions plus 3 or even 8 hours of sensory deprivation. These findings support the conclusions drawn from our initial study.

Stern also suggests using a control group which receives suggestion but no sensory deprivation. This too would be interesting, but to accomplish this and still maintain a genuine control for our experimental group would be rather difficult. First, the suggestion that the subjects would have hallucinations within the next hour for no apparent reason probably would be rejected by them as absurd. In other words, we firmly believe that an experimental sensory-deprivation situation contributes considerably to an appropriate set for reporting unusual experiences, and that differences in experimental situations and experimental "atmospheres" partially account for differences in results from different studies. Secondly, even if it were feasible to use such a control group, without any form of deprivation or isolation, the normal environment is sufficiently engaging to divert the subjects' attention from the experimental task. Seeing real objects would lessen and probably eliminate any tendency to see hallucinations, thus impairing the usefulness of this comparison group as an experimental control.

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Patent Protection and New Drugs

A recent news item on the Kefauver hearings [*Science* **134**, 1349 (1961)] contains the following statement: "The American Institute of Chemists warned that federal regulation would delay the discovery of remedies for heart disease and cancer and added that the research