

extremely unlikely that the effect of such a small dose, even if it existed, could be demonstrated as statistically significant with the sizes of populations available."

Finally, I must disagree with Verduin's quaint notion that any of my own supposed or, alas, real deficiencies of knowledge make it unwise or unnecessary for the General Advisory Committee to rely on the advice of biologists in preparing a statement about biology. An individual, such as Verduin or I or anyone else, should and must speak out freely at the command of his conscience, even at the risk of making a fool of himself. I stated, and I repeat, that it is presumptuous of an official committee, whose membership comprises not one biologist, to issue what purports to be a definitive statement on a crucial biological matter. This would be so even if the statement did not include the misleading material to which I have drawn attention.

Following my own advice, I conclude by repeating my urgent conviction that nuclear bomb tests must not be resumed.

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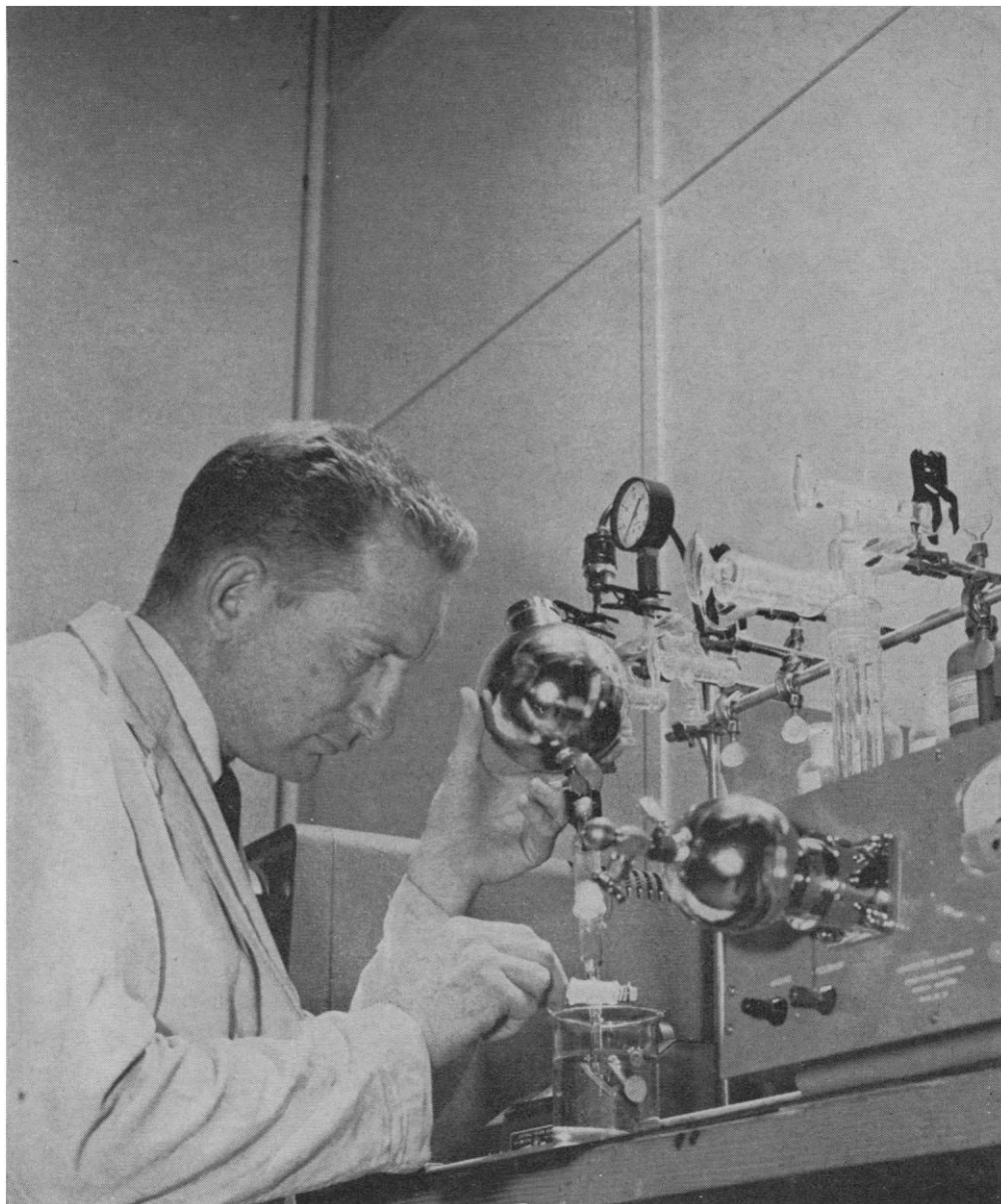
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#### User's Need of Scientific Information

What is the use of devising highly expensive machinery for searching information, and spending a great amount of money on its development, if we have no clear picture of what the users require? Who ought to benefit from greater availability of information if not the user? For whom is literature produced if not for those who read and use it?

The Royal Society Conference in London in 1948, and still more strongly the International Conference on Scientific Information in Washington in 1958, clearly showed that the user must be made the central focus of all research in improvement of scientific information methods.

Apparently the user wants only those items that are of interest to him at that moment. That means selection—elimination of superfluous texts (for in-



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stance, through abstracts); readable texts (preferably not reduced on microfilm); and easy access to the world's literature.

I do not claim to solve the problem in this letter but I want to draw attention to the undiscovered possibilities in the present set-up of abstracting services and automatic searching systems.

It is quite wasteful, both of intellectual manpower and money, to continue as we are now going. Far better service could be produced by more limited means. The greatest trouble seems to lie in the very strength and vested interests of the existing abstracting services. There is, however, no urgent need to put these aside; on the contrary, through close cooperation of

these interests, duplication of efforts might be avoided.

It would be worth while to consider the establishment, in place of the many hundreds of abstracting services in all disciplines that now exist, of a limited number of such services—one or two for each branch of science. These should not duplicate each other. These services—with an excellent staff of abstractors, obtained through combining the existing services—would adequately cover the field. These major abstracting centers would be provided with the best machinery available for searching the literature. Moreover, these centers would cooperate with a few regional centers for translation of abstracts into particular languages.

The user would then place subscriptions for abstracts in the subjects in which he has a particular interest. The abstracting services would use an internationally accepted classification system, so that orders might be placed without language difficulty. Such an abstracting service, for instance, would be able to supply abstracts covering certain subjects in a certain country during a certain period; or it would meet broader requests, even requests for complete coverage of scientific literature.

In those cases where the demand for abstracts on a given subject is regular, information could be obtained more quickly through specialized national centers which would receive copies of the material abstracted at the international centers.

For efficient operation, the abstracting services should rely on national depository centers of primary publications. These centers need not necessarily be national libraries or the like, as these do not exist in all countries, but could be set up for each discipline in cooperation with the international abstracting services. Wherever possible, however, central national services should be created, if they do not yet exist, in order to eliminate the possibility of duplication of work and, what is worse, loss of primary material.

A selection of the more important materials for abstracting would be made by the national centers. The remainder might be recorded in bibliographical lists only.

I have not mentioned, so far, the production of original literature. It would be very difficult to eliminate publication in journals, conference reports, and so on. If, however, everything produced is deposited nationally, there would be no danger of loss (unclassified military reports and the like are not discussed here). The abstracting services would publish classified lists of everything produced, whereas the contribution itself need not be produced in print but could be deposited only in manuscript form. Any request for a full paper—which a user would select from the abstracts or lists—could be met by supplying a photocopy or film of the manuscript—or, if published, of the periodical article.

As a first step towards the realization of this program, a conference of the editors-in-chief of some 25 of the bigger abstracting services should be convened to study the possibility of reducing the number of services by pooling manpower and money. Then the program of national services for primary publication should be studied.

Mention should be made here of the work of the International Council of Scientific Unions Abstracting Board, under the direction of Professor Boutry.

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In this organization the question of publication of scientific abstracts is under constant discussion.

The International Federation for Documentation could play an important role as a central guiding and information office on abstracting services and translation centers.

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Documentation, The Hague,  
Netherlands*

### Perceptual Constancy

The very interesting findings by Leibowitz and Hartman on developmental changes in the magnitude of the moon illusion [*Science* **130**, 569 (4 Sept. 1959)] remain ambiguous in one respect. The data of Fig. 1 indicate that the illusion—that is, the disparity between the perceived sizes of the horizontal and overhead disks—diminishes with increasing age. The authors attribute this lessening of the illusion to an increase in the phenomenal size of the overhead disk; in other words, the perceived size of the overhead disk more nearly approaches its objective size—that is, constancy. One could, however, just as easily attribute the shrinkage of the illusion to a decrease in the apparent size of the horizontal disk, which would mean that with increasing maturity perception becomes less constant, that one perceives the moon at the horizon more nearly in terms of retinal size. It is not safe to say that the authors' interpretation is the logical one in the light of known principles of perceptual development, for, as C. E. Osgood [*Methods and Theory in Experimental Psychology* (Oxford, New York, 1953), pp. 227-280] points out, the evidence on developmental changes in constancy is at best inconclusive and at worst downright confusing.

One possible way of removing the ambiguity is to test the authors' conclusions in a size-distance constancy experiment for objects in both the overhead and horizontal positions. Such an experiment might show (i) that constancy increases with age for objects at the zenith; (ii) that constancy decreases with age for objects at the horizon; or (iii), that both (i) and (ii) occur. I would be willing to bet on (iii). Or the authors might want to try out the related hypothesis that individuals who habitually operate in three-dimensional space—construction workers, circus aerialists, aviators—are less subject to the moon illusion than the rest of us horizontal-oriented mortals.

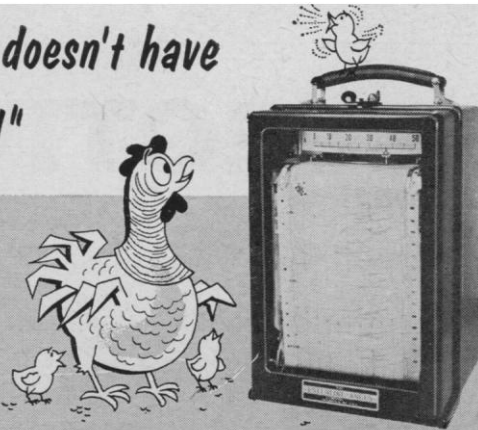
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