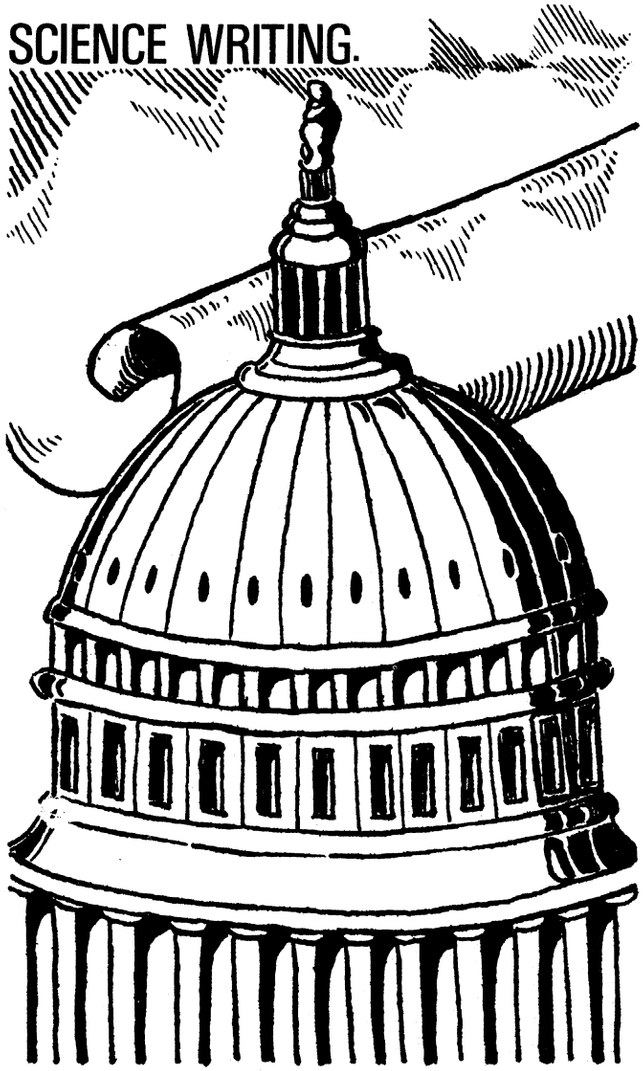
SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

29 July 1977, Volume 197, No. 4302

1977 AAAS-Westinghouse SCIENCE WRITING AWARDS FOR NEWSPAPERS AND MAGAZINE SCIENCE WRITING.



RULES

1) The aim of this competition is to encourage and recognize outstanding writing on the sciences and their engineering and technological application in newspapers and general circulation magazines. The following categories are not eligible: articles on the field of medicine, articles published originally in AAAS publications, articles by employees of the AAAS or Westinghouse Electric Corporation.

2) Each entrant in a newspaper award competition and each entrant in the magazine award competition may submit three entries.

3) An entry for a newspaper competition may be any of the following: a single story; a series of articles; or a group of three unrelated stories, articles, editorials, or columns published during the contest year. A magazine entry may be a single story or series published during the contest year.

4) A completed entry blank must be submitted together with five copies of each entry in the form of tear sheets, clippings, reprints, or syndicate copy (not over 8½" x 11"), showing name and date of the publication. ENTRIES MUST NOT BE ELABORATE.

5) Each entry must have been published in a newspaper or general circulation magazine within the United States during the contest year — 1 November 1976 through 31 October 1977. (In the case of a series, more than half of the articles comprising it must have been published during the contest year.) Date on the issue in which an article appeared will be considered as the date of publication. All entries must be postmarked on or before midnight, 15 November 1977.

6) Persons other than the author may submit entries in accordance with these rules. Entries will not be returned.

7) Winners of the 1976 awards are not eligible for the 1977 awards. Persons winning three times are no longer eligible.

8) The Judging Committee, whose decisions are final, will choose the winners. There are three awards of $1000: for the winning entry in the over-100,000 daily circulation newspapers competition, for the winning entry in the under-100,000 circulation newspapers competition; and for the winning entry in the general circulation magazine competition. For award purposes, newspaper circulation will be sworn ABC daily circulation as of 30 September 1977. The Judging Committee may cite other entries for honorable mention.

9) The awards will be presented at the dinner meeting of the National Association of Science Writers, during the 1978 meeting of the American Association for the Advancement of Science in Washington, D.C. Travel and hotel expenses of the award winners will be paid. Entrants agree that, if they win, they will be present to receive their awards, unless prevented by circumstances beyond their control.

Grayce A. Finger

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Nocturnal sand-dwelling scorpion (*Paruroctonus mesaensis*) exhumes burrowing cockroaches it locates by sensing compressional and surface waves generated by the prey's movements in sand. Photograph was taken under ultraviolet light at night. See page 479. [P. Brownell, D. McFarland, and R. Farley, University of California at Riverside]

LETTERS

Landsat's Role in Brine Discovery

In his Research News article of 29 April "Remote sensing (I): Landsat takes hold in South America" (p. 511), Allen L. Hammond attributes the recent discovery of lithium- and potassium-rich brines in Bolivia to analysis of Landsat imagery. This statement should be clarified. The brines were discovered in Salar de Uyuni, which is a 9000-square-kilometer salt pan in the southern part of the Bolivian Altiplano and the largest hard, flat surface on Earth. The suggestion that lithium- and potassium-rich brines might occur in this salar was first made in a paper (*1*) presented at a symposium on lithium in Denver in January 1976. The paper was based primarily on an evaluation of the environment of lithium- and potassium-rich brines in salars of nearby northern Chile. As a consequence of this work, brine samples were collected by a Landsat team that visited Salar de Uyuni in April 1976 for the purpose of gathering data about the salar surface to aid in interpreting patterns recorded by Landsat. Two samples collected and analyzed in laboratories of the U.S. Geological Survey proved to be high in lithium and potassium.

GEORGE E. ERICKSEN
U.S. Geological Survey, Reston, Virginia 22092

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Nighttime Driving Accidents and Selective Visual Degradation

It has been established that the incidence of serious traffic accidents, particularly those involving pedestrians, increases at night (*1*). While variables such as fatigue and drinking behavior are more prevalent at night, and variation in traffic flow may be important, the striking reduction in the nighttime accident rate as a result of illuminating highways argues for the importance of vision (*2*). In view of the significance of visual factors, the influence of low illumination on specific aspects of driver performance merits further attention. In this context, the recent emphasis on multiple modes of visual information processing provides a heuristic basis for analyzing the driver's perceptual-motor tasks (*3–5*). According to this point of view, visual processes can be dissociated into at least two subsystems. "Focal" vision is mediated primarily by the central retina and subserves form perception (identification), while "ambient" vision is mediated primarily by the peripheral retina and provides information regarding spatial localization. These processes differ with respect to their subserving neurological structures (*3*), modifiability (*4–5*), sensitivity to blur (*6*), degree of consciousness, temporal courses, and luminance response characteristics (*7–8*), all of which suggest physiological as well as behavioral dissociation of function.

Held (*4*) has suggested that localization and mobility in space are primarily dependent on the ambient peripheral system, and Dichgans and Brandt (*9*) have shown that peripheral vision is of great importance, both for the perception of body orientation and motion and for the control of posture. Since the automobile driver's primary task, which demands his immediate and continuous attention, is dynamic spatial orientation, one would expect this activity to be mediated mainly by the peripheral retina. It has been established that peripheral localization is independent of target luminance (*7*), that resolution acuity in the periphery is relatively unaffected by optical blur (*6*), and that dynamic spatial orientation is independent of both luminance and refractive error. Thus, there should be relatively little degradation of performance of the ambient system with lowered illumination. The driver should suffer little or no loss of steering ability under low illumination and his self-confidence should remain high. Therefore, he might neglect taking appropriate precautions at night. Such behavior is consistent with reports that drivers generally do not reduce their speed at night and with clinical observations that many individuals with central scotomata continue to drive (*10*).

In contrast with the relatively high level of performance of the ambient system, the performance of the focal (form identification) system is seriously degraded under low illumination. Major visual functions, such as resolution acuity, contrast sensitivity, and stereoscopic depth perception, are reduced substantially at lower luminance levels. In addition, darkness-induced refractive errors or "night myopia" will, for many individuals, increase the blur of the optical image and further reduce performance for those functions requiring a sharp retinal image (*11*). Such blurring will also hinder the detection of dim stimuli (*12*), which is of great importance to the driver at night. While some stimuli containing important information, such as pavement markings, road signs, and other traffic, are usually sufficiently illuminated to be easily seen under favorable weather condi-

tions, other less predictable but equally important stimuli, such as pedestrians, cyclists, and disabled vehicles, are often only dimly illuminated, resulting in hazardous situations. Due to the blurring as a result of night myopia, the detection and recognition of such dimly lit obstacles may be delayed until the braking or evasive maneuvers necessary to avoid an accident are impossible.

Since the major tasks of driving are relatively unimpaired by reduced illumination, the driver does not anticipate and is not prepared to deal with stimuli for which the focal system suffers a selective deficit. In effect, the driver is unjustifiably reassured by the high performance level of the dynamic spatial orientation system and is unaware of a loss in focal visual abilities. Since the visual deficit is only partial and of consequence only for low-probability stimuli, the driver is unaware of the loss of function and does not take the necessary precautions. In contrast to such naive overconfidence, drivers who are aware of their visual loss, such as those with incipient cataracts (*13*) or with small pupils associated with glaucoma therapy, are reluctant to drive at night.

Several precautions can be taken to improve this situation. An obvious one would be to increase the visibility of unexpected obstacles by continued efforts to improve roadway illumination and by increased usage of highly reflective markings. A more general and presently unused measure would be to screen drivers for night-time as well as daytime visual performance and to optimize their abilities by providing optical corrections at night when necessary. In the past, the cause and correction of night myopia have been topics of some controversy. However, recent studies from this laboratory, which attribute night myopia to a shift in ocular accommodation toward the individual's resting or dark-focus (*Akkommodationsruhelage*), suggest a simple method for counteracting the loss of image clarity at night. An evaluation of the dark-focus with a laser optometer has permitted us to recommend an individually determined optical correction specifically for night myopia which substantially improves form perception under both laboratory and field conditions (*14*). In a small sample of college students, this correction was found to improve visual acuity by as much as 25 percent under simulated night-time driving conditions; similar improvements for the detection of weak stimuli would be expected. At highway speeds this added margin of visibility could weigh heavily in the interest of accident prevention. It is hoped that awareness by drivers and traffic safety authorities of the selective nature of the visual losses at night will provide the basis for measures to reduce the appalling frequency of accidents at night.

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15. Sponsored by NIMH grant MH08061.

Is Small Always Beautiful?

I would like to add one more note to the many that have undoubtedly been received concerning the use of natural gas, uncoated, nonglossy paper, or coated paper in the production of *Science*. In the 1 April issue the increased costs related to using the uncoated paper were provided, not the least of which is the environmental impact of producing the extra 16 tons of paper required for the 11 February issue. By imposing the single criterion of "low cost," it has been determined that a coated, glossy paper should be used. The significant point is that these coated papers are the result of "high technology."

Thus we have a dramatic example that the "small is beautiful" philosophy and its "intermediate technology" do not always provide the best solution; nor do they implicitly improve the quality of life, save natural resources, or protect the environment.

DANIEL D. WHITNEY
Rancho Seco Nuclear Generating Station, Sacramento Municipal Utility District, Sacramento, California 95813

A 73-year-old stuntman, Henri LaMothe, dives 35 feet into 13 inches of water. He does it regularly. Without harm. Now that says something about body toughness.

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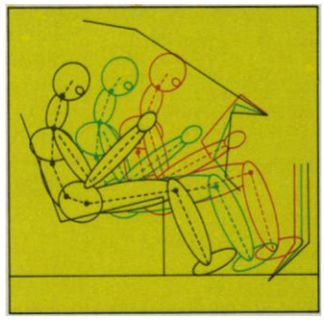

To this end we have done mechanical response and trauma studies on the head, chest, and leg; on tissue; and on the body as a whole. We've also developed mathematical models of the man-car system for simulating crashes in a computer and predicting car occupant kinematics.

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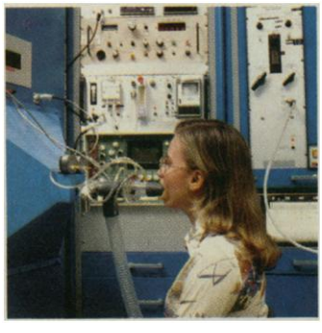

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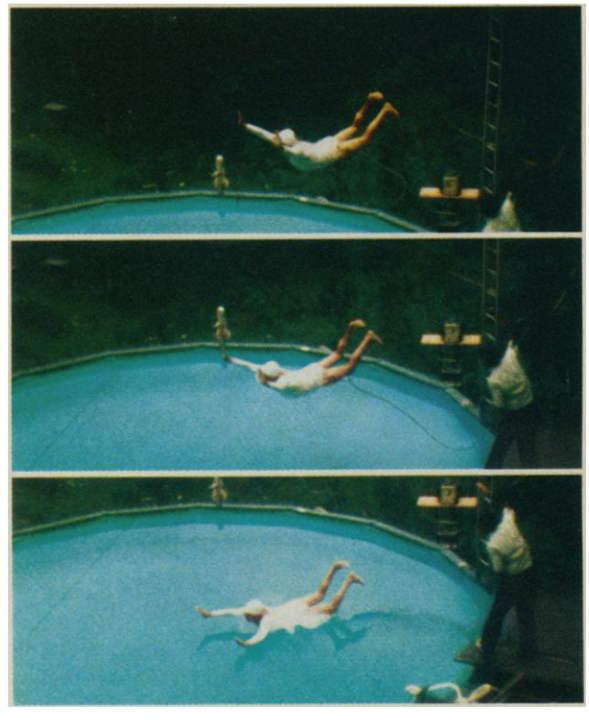

GM

General Motors Research Laboratories
Warren, Michigan 48090

29 July 1977, Volume 197, Number 4302 **SCIENCE**

Federal Reorganization: Science and Technology

As plans for the reorganization of the government are drafted and redrafted, rumors about changes in the organization of science and technology programs abound. It seems timely, therefore, to consider some general principles of organization and management in relation to science and technology in government which should be kept in mind as new arrangements are sought.

Mission agencies need strong R & D programs. The vast majority of federally supported R & D activities is intended to enhance specific policy goals. There are few policy missions, if any, that will not benefit from a well-designed research program. This includes research and development proper as well as policy and evaluation research. It also includes development of institutional linkages for diffusion and extension and, where appropriate, social demonstrations. Both programmatic and regulatory agencies need R & D activities directly related to their policy missions.

Mission agencies need their own science policies. There is no single model for organizing and managing an agency's R & D program, for the appropriate mix of private and public involvement, for the use of internal or external R & D capabilities, for establishing linkages between policy planning, program implementation, and the R & D function. What makes sense in the case of Defense is unlikely to work in Agriculture, and vice versa. Agencies must learn from each other, but there is no substitute for developing agency-specific R & D strategies in response to agency-specific responsibilities and environments.

Mission agencies need basic research. R & D programs of individual mission agencies must not be restricted to applied work or to exclusive concern with short-term solutions. Mission agencies, instead, must be organized and funded in such ways that they can support basic research in their broad areas of responsibility. Without such a policy the research work of agencies will become stale.

A central science policy capability is needed. Science advice for presidential decision-making will take on different organizational forms under different Presidents and for different issues. However, it would be a grave mistake if the need for a strong science policy capability had to be rediscovered every few years. The range of issues to be decided by the President, many of them with important scientific and technological components, requires a stable White House capability with access to the best available scientific and technical information.

Promotion and regulation should be separate. We have learned, over time, that the two functions of promoting and regulating innovation should not be kept under the same organizational roof. The recent congressional decision providing for separate organizations responsible for promotion of new energy sources and for regulation of safety and impact indicates the direction to follow.

Administrative controls must not become ends in themselves. There should be more emphasis on quality control of work proposed or completed and less concern with administrative red tape. With regard to quality control, recent studies support the claim that peer review ensures high standards of performance in scientific research. Agencies should extend the areas of funding decisions subjected to peer review. Other forms of administrative control tend to become counterproductive. There is disturbing evidence that increased reporting requirements and tacked-on civil rights and equal opportunity rules, however well intended, result in formalistic arrangements which endanger creativity and the willingness to take risks. Unless this trend can be reversed and a bond of mutual trust is rebuilt between those funding R & D activities and those performing these tasks, we will pay the same high price in reduced originality and productivity that other nations have paid before.—JURGEN SCHMANDT, *Lyndon B. Johnson School of Public Affairs, University of Texas, Austin 78712*

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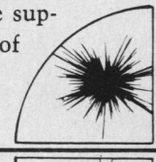

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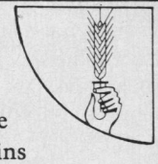

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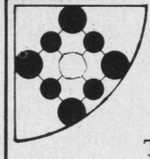

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