that are not directly determined by the focal stimulation. These ongoing activities include spontaneous events, which would presumably be of significance at near-threshold stimulus levels, and usually also include induced activities that depend on immediately preceding stimulation of the focal area, or on induced activities dependent on simultaneous stimulation of the nonfocal, surround areas, or on both. The latter two factors are clearly involved in the ordinary brightness contrast and constancy situations, of which the experiments discussed here are an example. The general nature of induced effects has been shown to be one of antagonism and proportionality. Illumination of an area surrounding a focal area induces blackness in the focal area, and in proportion to the magnitude of the surround excitation. The relative effectiveness of a constant blackness increment (or brightness decrement) in a focal area is small where the direct response to the focal stimulus is large, and the induction increment becomes progressively more significant as the direct focal response decreases in magnitude. This concept of opponent spatial interaction at the physiological response level accounts for the perception of increasing blackness with increasing illumination of the surround—a phenomenon that cannot be accounted for in terms of adaptation or sensitivity changes alone. The physiological, opponent induction concept derives from both Hering (*13*) and Mach (*14*). The perceptual effects of such induced response activities have long been obvious in unusual phenomena such as Mach rings, as well as in the commonplace observation that dark objects definitely become "blacker" as the room illumination is increased from an initially "dim" level; and quantitative results of the sort reported here for a relatively complex stimulus pattern are actually predictable from the classical experiments with simple infield-surround field configurations of the sort first reported by Hess and Pretori (*3*) and from the shadowed illumination experiments of Helson (*15*). Direct evidence for the physiological basis of opponent induction processes is more recent, and is beautifully demonstrated in the work of Hartline and Ratliff (*16*) on the electrophysiological responses recorded from the eye of *Limulus*. The systematic, physiologically based, visual response relations involved in contrast and constancy situations need to be more fully explored and understood before we shall be able to deal with the nonspecific "judgmental" and "interpretive" processes that also influence our perceptions of real objects in the natural environment.

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Science in the News

The Last Days: Ike's Final Budget; Reports to Kennedy on Space and Disarmament; Wiesner's Appointment

The last Eisenhower budget, presented to Congress this week, is a liberal budget by the standards of 1953, or by Senator Goldwater's standards today, but a conservative one by the standards set during the campaign by both Kennedy and Nixon.

The budget calls for moderate increases in almost all categories of scientific research, and an aid to education program to assist both colleges and public schools in financing bond issues (as opposed to the more expensive grant programs talked about by Kennedy and Nixon during the campaign). The student loan program under the National Defense Education Act would not be increased, "pending further information as to the rate of applications."

In all, the budget recommends about $1 billion for support of education and $9.4 billion for support of research and development, mostly by the Defense Department. Both figures represent modest increases over last year's recommendations.

Even without a change in Administration, it is difficult to translate these recommendations into precise estimates of how much will be spent. Congress revises the budget, normally cutting more than it adds, and the Administration, although it is bound by the cuts, does not have to spend all the additional money voted. The result is that actual spending is usually less than the budget predicts.

This year the Eisenhower budget will serve primarily as a gauge to suggest how great a difference there is between Eisenhower's and Kennedy's views of what the federal government should do. Kennedy's revisions of the budget should begin to appear soon after his inauguration, and everyone assumes that the revisions will be uniformly upward, particularly in the areas of science and education.

Eisenhower, in closing his budget message, took special pride in pointing out that under his Administration the

country had succeeded in slightly reducing the share of national income being spent by the government. "We are convinced," he said, quoting from his first budget message in 1954, "that more progress and sounder progress will be made over the years as the largest possible share of our national income is left with individual citizens to make their own countless decisions as to what they will spend, what they will buy, and what they will save and invest." "This philosophy," he said, "is as appropriate today as it was in 1954. And it should continue to guide us in the future."

But it is clear that Kennedy has no intention of continuing this philosophy, nor that of Eisenhower's Secretary of the Treasury, Robert B. Anderson, whose comments on the budget re-emphasized his belief that "any decision to engage in overt fiscal action to stimulate the economy during a period of economic slack should await clear indications that [built-in stabilizers and expansive monetary policies] are not sufficient to promote resumption of growth."

Public Spending

The view of the Kennedy people is that while compelling cases can be made for a wide variety of projects that can only be financed through public spending, no one has made a compelling case for more consumer goods, the principal thing supported by private spending. And they reject Anderson's notion that the government should not decide to pump money into the economy in slack times until it becomes obvious that such a decision is unavoidable.

Both beliefs suggest that there will be very substantial increases in spending under Kennedy. He will be limited by his ability to get Congress and the public to accept tax increases, rather than by a belief that tax increases making a larger share of national income available for public spending are bad; and he is committed to press for more active federal intervention in the economy to try to assure a constantly growing national income, if only to assure a constantly growing tax base.

The Eisenhower budget shows only little evidence, for example, of being influenced either by the latest report of the President's Science Advisory Committee or by the report of the President's Commission on National Goals (*Science*, 2 December), both of which saw an urgent need for a sharp increase in government programs of support for basic research and higher education.

Eisenhower's view is that the nation cannot afford sharp increases in spending with the economy and tax rates as they are, and that tax increases or strong government action to avoid recessions are unthinkable. Kennedy's view is that, with national survival in danger unless we do better than we have been doing, Eisenhower's view is unthinkable.

The Kennedy people, and a good many others in Washington not associated with Kennedy, see Eisenhower's philosophy of government as coming close to a philosophy of government by wishful thinking. They had difficulty seeing the basis for Eisenhower's statement that "the economy is operating at a high level" at a time when the latest government report showed the number of unemployed to be the highest in 20 years, when we are facing a gold crisis, and when even the most conservative economists have come around to conceding that we are in a recession.

They were sadly amused at Eisenhower's prediction that the budget will be balanced this year, both because hardly anyone else believes it will be, whether the government intervenes to try and halt the recession or not, and because of the preoccupation with a balanced budget during a recession, when even Eisenhower's own staff economists believe that the government should incur a deficit rather than continue to let the economy stagnate. (The Associated Press reported that Eisenhower's prediction of a budget surplus was arrived at by simply taking the most optimistic assessment of several prepared by the Bureau of the Budget, one which by fine calculation managed to predict a surplus of $0.1 billion.)

His critics see the tone of Eisenhower's thinking reflected in the closing, and presumably climactic, paragraph of the opening section of his State of the Union message. "Success in designing and executing national purposes, domestically and abroad," he said, "can only come from a steadfast resolution that integrity in the operations of government and in our relations with each other be fully maintained. Only in this way could our spiritual goals be fully advanced." Just what this means, or was intended to mean, no one is quite sure. But it was assumed that Kennedy's inaugural address would offer something more specific as a basis for national policy making.

The President-Elect, meanwhile, continued to announce appointments and to receive the reports of his task forces. Jerome Wiesner, of MIT, for several years Kennedy's closest science adviser, was chosen as special assistant for science and technology. Wiesner had been assumed to be in line for the post, but what seemed to be a long delay in announcing the appointment had caused speculation that perhaps it would go to someone else.

A fairly reliable source says that Wiesner himself was reluctant to take the job, on the grounds that he would have preferred to devote his full time to problems relating to disarmament. The same source reports there has been lobbying against Wiesner's appointment from within the Defense Department—on the grounds that he was too much interested in disarmament.

Wiesner will have little trouble acquainting himself with his new responsibilities. In addition to having been for some time Kennedy's principal science adviser, he has been a member of Eisenhower's Science Advisory Committee for 3 years. Wiesner, as special assistant, will be *ex-officio* chairman of the Science Advisory Committee, as well as of the Federal Council on Science and Technology.

Kennedy announced the appointment simultaneously with the release of a task force report on space policies produced under Wiesner's chairmanship, which stressed above all what it saw as a need for firmer management of the program. The report suggested that there are too many competing programs, too much emphasis on the man-in-orbit project, a need to reinvigorate missile programs, lack of strong central direction to set priorities and keep the various programs in touch with one another, and not enough "vigorous, imaginative, and technically competent top management people in the National Aeronautics and Space Administration." Kennedy has assigned Lyndon Johnson, who was chairman of the Space Committee while he was in the Senate, general responsibility for seeing that all this is done.

Disarmament

Kennedy also received a report on disarmament, also put together under Wiesner's chairmanship. Although the full report was not made public, the New York *Times* said that it included

a recommendation to put off a resumption of the Geneva test-ban negotiations for about 6 months. This was part of a recommendation to avoid doing or saying anything much about disarmament until the new Administration could reach some firm decisions on a disarmament policy.

The delay on the general question was expected, for more than any other policy area the new Administration's policy on disarmament necessarily requires breaking new ground, and consequently time to develop a policy to which this country feels it can commit itself.

For the most part, this is easy enough to do: when nothing has been happening nothing is easier than to let nothing happen a little longer. But assuming its advisability, it will be awkward for Kennedy simply to postpone resumption of the test-ban talks. Opposition to continuing the present unpoliced ban has been growing throughout the year, and Kennedy, during the campaign, promised a prompt effort "with a reasonable but definite time limit" to see if the Russians are willing to come to realistic terms on the question. Dean Rusk, the incoming Secretary of State, said last week he expected a prompt effort to be made.

Kennedy would be opening himself to strong attack at home if he were to ask for a lengthy postponement. It is more likely that the talks will be resumed on schedule even if the Administration may feel that it will not have much to say until next summer, although this, too, would lay Kennedy open to criticism; he would hardly be in a position to set a "reasonable but definite time limit." We will know soon enough which course he decides to take, for scheduled resumption of the talks is only 3 weeks off.

There has traditionally been at least one scientist among the five Atomic Energy Commissioners, and there has therefore been an opening for a scientist since last summer, when John Williams, director of research at AEC before he was appointed a commissioner, resigned because of poor health.

But except for 2 weeks in 1958 when Willard F. Libby served as acting chairman, there has never been a scientist commission chairman. This week Kennedy chose Glenn T. Seaborg, chancellor of the University of California and a Nobel laureate in chemistry, as a commissioner, and designated him as chairman.

Apparently Kennedy wanted the chairmanship to go to a scientist, for the other man to whom the post was reportedly offered was also a scientist, James Fisk, president of Bell Telephone Laboratories and, like Seaborg, a member of the President's Science Advisory Committee.

All members of the Science Advisory Committee, incidentally, have submitted *pro forma* resignations as a courtesy to the new president, even though their terms do not expire with the old Administration. The offers of resignations are expected to be declined.

Of other major science posts, Herbert York has been asked to stay on as chief of research and engineering in the Defense Department; Keith Glennan has resigned as head of the National Aeronautics and Space Administration, but his successor has not been appointed; James A. Shannon apparently will continue to head the National Institutes of Health.

These three offices, together with the AEC chairman, are the chief ones responsible for overseeing more than 95 percent of the government's investment in research, and over 60 percent of the entire nation's research funds. A rough breakdown of figures: Defense, $7.4 billion; AEC and NASA, $1 billion each; and NIH, $500 million.

So far, virtually everyone is agreed, Kennedy has done very well. His appointments have been almost universally praised as the most intelligent, competent, and experienced group of officials Washington has seen in some years. Kennedy has achieved a principal preinaugural goal of broadening his base of support by bringing a number of widely respected Republicans into the top levels of his administration, giving weight to his claim that what he wants to do is not based on either doctrinaire liberalism or fuzzy do-goodism, but on a tough-minded appraisal of what the national interest demands.

Arthur Krock reported in the New York *Times* that there was more sense of excitement in Washington as Kennedy's inauguration drew near than he could remember since Franklin Roosevelt's first in 1932. Times have changed and problems are different. No one expects a very exact repetition of FDR's hundred days. But there is a feeling around that life will be interesting on the New Frontier.—H.M.

News Notes

Cockcroft Selected for $75,000 Atoms for Peace Award

Sir John Cockcroft, Nobel Prize winning British physicist, research administrator, and educator, has won the $75,000 Atoms for Peace Award, established as a memorial to Henry Ford and his son Edsel. Cockcroft will receive the gold medallion symbolizing the award at a ceremony to be held at the Massachusetts Institute of Technology on 6 April. In making the announcement, James R. Killian, Jr., chairman of the award trustees, said:

"Sir John's contributions to the peaceful uses of the energy within the atom range from the first demonstrations that this energy can be released by man's ingenuity and skill to the direction of the development of full-scale nuclear-powered generating stations supplying electricity to England. He has taken a leading part in the development of large-scale test reactors, in the organization and direction of one of the great research centers for the exploration of the peaceful uses of atomic energy at Harwell in England, in the distribution of radioactive isotopes for research and for medical therapy to many countries throughout the world, in the organization of a Middle Eastern Atomic Research Center in Teheran, in the organization of the Geneva Conferences on the Peaceful Uses of Atomic Energy under the sponsorship of the United Nations, in the training of scientists and engineers from many parts of the world at the school for the study of isotopes

Sir John Cockcroft. [Elliott Fry, Ltd.]