

The report also urges the Federal Government to establish the controversial centralized national data system (SN: 3/25/67, p. 278), collecting all Government statistics of interest to the social sciences in one place—a move some say would facilitate invasion of privacy. Even in a non-census year, the Government spends more than \$100 million annually on statistical programs; a computerized national data system would make it possible to combine the programs in such a way as to produce new data and to perform experiments which are presently impossible.

The final major recommendation of the report calls for the creation of interdisciplinary graduate schools of applied behavioral science. At the present time, scientists from different social disciplines collaborate on projects in urban research or the study of emerging nations; the graduate institutions envisioned by the survey committee would allow scientists to expand their collaboration beyond the demands of a specific project.

Although the new Report on the Behavioral and Social Sciences foresees an expansion of Federal social planning and cites the past successes of the applied social sciences (among them, the city-manager form of government, the social security system and the census), it also deals with the problems of applying these sciences to national difficulties.

**One problem** is simply the question of whether the behavioral and social sciences are competent to solve the riddles they would like to tackle. The report mentions the 1964 income tax reduction as an example of the "spectacular success" of applied econometric theories: Faced with a comparable situation in 1932, the Government raised taxes, and, says the report, "The difference between 1964 and 1932 reflects the substitution of systematic social science for the obvious 'common-sense' solution."

Ironically, some economists feel that the inflation of the past few years demonstrates the failure, rather than the success, of modern theories. Other economists blame inflation on the Vietnam War, but in any case the issue is more disputed than the report suggests. Nevertheless, the survey committee points out that "most actions the society takes to improve social conditions are untried, risky and undertaken in at least partial ignorance of their effectiveness."

A more subtle problem is one concerning the political inclinations of behavioral and social scientists as a group. It can be argued that, because social scientists are interested in normal social functioning and require a degree of social and institutional regularity in

order to perform their studies, they are inherently conservative. The survey committee argues, on the contrary, that the social sciences challenge traditional concepts of human nature and society and hence are "potentially some of the most revolutionary intellectual enterprises ever conceived by the mind of man."

The survey committee does not offer the behavioral and social sciences as a panacea for all the nation's ills. Social problems frequently arise that are too

#### PULSAR TOOL

### Testing relativity, measuring corona

The pulsar in the Crab nebula, NP 0532, has served astronomers as a kind of exemplar since it was found a year ago. Theoretical models have been made with NP 0532 in mind, and much of what has been learned about pulsars comes from studies of it.

**Now, because** the sun passes in front of it, NP 0532 is being put to additional use; its radiation will help to study the structure of the solar corona and may enable astronomers to distinguish between two rival theories of gravity.

When the pulsar passes behind the solar corona, the arrival of its pulses of radiation is delayed. The delay comes in part from a slowing of the signal by the electrons in the solar corona and in part from the effect of the sun's gravitational field.

Observations now underway at the Arecibo Ionospheric Observatory in Puerto Rico, which is operated by the Cornell-Sydney University Radio Astronomy Center, are aimed at determining the amount of the slowing, and separating its two parts. In this way the Arecibo scientists hope to learn more about the structure of the corona, and to test theories of gravity.

There are two theories of gravity now under serious consideration. One is the general relativity theory proposed 50 years ago by Albert Einstein; the other was put forward during the last decade by Drs. Carl H. Brans of Loyola University and Robert H. Dicke of Princeton University (SN: 6/1/68, p. 532). The two theories differ in the way they describe gravitational forces, and their cosmological predictions vary widely.

Both theories predict that a strong gravitational field, like the sun's will slow down an electromagnetic wave passing through it. The amount of slowing differs by about 10 percent from one theory to another.

The data from the Arecibo observations are not yet completely analyzed, but Dr. Frank Drake of Cornell reports that what has been done so far shows

urgent to await a considered scientific opinion, or that involve fundamental questions of value.

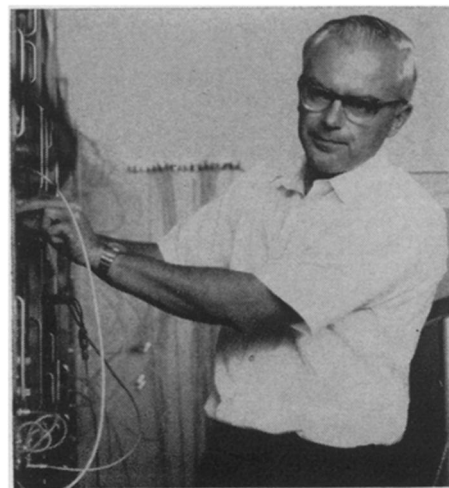
"Many problems of human behavior," the report concludes, "are solvable only through political decisions and are aided only moderately by scientific knowledge." But the committee suggests that the social sciences are "our best hope, in the long run, for understanding our problems in depth and for providing new means of lessening tensions." □

a definite time lag in the arrival of NP 0532's pulses when the solar corona was in front of the pulsar. Dr. Yervant Terzian adds that the experiment seems to be improving the picture of the solar corona.

**Separating the amounts** of slowing due to each of the causes has yet to be done. To do it requires comparing data taken at two different frequencies. According to both theories, the gravitational slowing should be the same at all frequencies, but the electrons in the corona will retard the less energetic lower frequencies more than they will the higher frequencies.

Subtracting one set of data from another should separate the two components of the slowing. But the data reduction is delicate, since the amount of slowing due to the electrons is about 50 times the expected contribution of the gravitational field.

That such a gravitational slowdown of electromagnetic radiation does happen was shown by an experiment last year that sent a radar beam past the sun to the planets Venus and Mercury (SN: 3/9/68, p. 229). But the radar experiment was not accurate enough to choose between the two gravitational theories.



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*Drake: Testing gravity theories.*