

Meanwhile it should be remembered that the whole discussion rests on the axiom that Edwin Hubble was right. In studying galaxies Hubble noticed that the light of each was always redshifted. He assumed this was a Doppler shift arising from a difference in velocity between our galaxy and the distant one. Since all the differences were positive, every galaxy seemed to be flying away from every other galaxy.

So Hubble postulated the expanding universe and derived a relationship between distance and redshift that goes as a simple proportion, a linear relation. At the meeting was one devil's advocate, a mathematician from the Massachusetts Institute of Technology named I.E. Segal, who proposes that this emperor has no clothes.

The problem on which he chooses to bite is the so-called Hubble diagram. The apparent brightness of galaxies also varies with distance, so it should be possible to graph apparent brightness against redshift and get a nice clean line representing Hubble's linear relationship. In fact, the diagram comes out a broad smear. Astrophysicists explain this by saying that the galaxies are wrong, not Hubble: All galaxies don't have the same intrinsic luminosity so the luminosity-distance relation is not exact. Segal says let's forget this and simply apply statistics to the data as they stand. He finds the graph best fits a second-order or squared relationship rather than Hubble's linear one, and he asserts that the expanding universe hypothesis is all wet.

The assertion was greeted by the assembled astrophysicists with a chill as cold as intergalactic space. After the formal close of the session, a heated argument ensued between Segal and several prominent astrophysicists over a number of points, including whether the galaxies whose redshifts are known are a fair sample for statistical analysis.

It's a good question. Of the uncounted galaxies in the sky, only 3,000 have had their redshifts measured, and most of these have been special-interest items. A systematic field of redshifts, those in a given volume around our own galaxy, which would make a regular sample, extends only to 200. One of the great future needs is a much more exhaustive redshift catalogue. Getting it with ground-based observations is difficult, because each measurement is time consuming and must compete for telescope use with more glamorous observation programs. A not entirely facetious suggestion by Herbert Gursky of the Smithsonian's Center for Astrophysics is to put up an orbiting telescope that could do them wholesale at a rate of 25,000 a year. In contrast Mt. Palomar does about 20 a year. If all of Palomar's time were used, denying the world's largest telescope to other investigations, it might increase that number by a factor of about 10. □

The incompetent society

The most encompassing of several recent surveys testing the basic verbal and mathematical literacy of the American public is also the most reproachful. The study, conducted for the U.S. Office of Education, somberly concludes that less than half the nation's adult citizens are really proficient in handling their daily affairs, one third have just the minimum competency and about 20 percent—23 million people—simply cannot function effectively.

Earlier studies have focused on the continuing inequality of skills between the sexes (SN: 10/18/75, p. 246), the inability of most people to add correctly (SN: 8/2/75, p. 71), and the steadily declining knowledge of everyday science and health (SN: 3/29/75, p. 206). The present survey covers the widest and most fundamental areas of daily skills: Can people read the signs, fill out the forms and compute the arithmetic necessary to survive in a complex society? Even Education Commissioner Terrel H. Bell called the findings "startling":

- One fifth of the adults surveyed did not know the meaning of: "We are an Equal Opportunity Employer."

- Though most adults say they have handled bank accounts, 14 percent were unable to fill out a check correctly enough to be processed.

- Similarly, 29 percent could not compute a week's paycheck if it included some hours of time-and-a-half pay for overtime; and 27 percent didn't know what normal body temperature is.

As in the previous studies, many people could not read a simple graph, pick the best buy from a grocery shelf or name their state's senators. Consumer economics questions gathered a particularly poor showing: Only 37.6 percent of the adults were rated "proficient"; while 29.4 percent rated "incompetent." Again, the weakest performances were found among Blacks, Southerners, Hispanics and low income families.

Bell said the results indicate a need for "major rethinking of education on several levels."

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One attempt at rethinking has already begun. The College Entrance Examination Board—which administers the Scholastic Aptitude Test (SAT) to a million high school students annually—has appointed a high level panel to investigate why students' scores on the test have been steadily slipping. Willard Wirtz, former Secretary of Labor and president of the National Manpower Institute, will chair the panel.

For a decade, SAT scores have gradually declined, but last year they took a dive. In 1963, the average scores were 478 (verbal) and 502 (math); in 1975 the

averages were 434 and 472, respectively. The drop in the last year alone was 10 points (verbal) and 8 points (math).

While the board has refused to speculate publicly about the cause of the decline, it has apparently become concerned about the possible significance, since the test scores are widely used by college admission officials in judging students from different high schools. □

Amniocentesis seen as safe technique

More than 20,000 babies will be born in the United States this year afflicted with mongolism or other serious chromosomal defects—defects that could be detected and averted before the child is born. The diagnostic technique used for this prenatal detection is amniocentesis. A major Government study on the safety of amniocentesis has just been released, calling it, with "virtual certainty," a "safe technique that can be applied to larger segments of the population without undue risk or hazard." Before the report was even made public, however, warnings of potential risk to society—social, personal and moral—were coming from a different source.

Amniocentesis, which involves removing, culturing and examining amniotic fluid during the second trimester of pregnancy, was first used in 1968. The procedure gained wider clinical application by 1970, even though no detailed studies had been done on potential danger to the fetus or to continuation of the pregnancy. Accordingly, in 1971, the National Institute of Child Health and Human Development sponsored the nationwide study just released. Nine medical institutes co-operated, and the study involved more than 2,000 pregnant women. One group of 1,040 women underwent amniocentesis during the test period and another group of 992 control subjects did not. Comparison showed no statistically significant differences in "the rate of fetal loss, prematurity, newborn status, birth defects or developmental status at one year of age," between the two groups.

The warning of potential nonmedical risks to society associated with amniocentesis was issued by sociologist Amitai Etzioni, director of the Center for Policy Research in New York. Although he does not question the statistical accuracy of the nationwide study, Etzioni says it must be considered incomplete because it "does not systematically explore the social, personal and moral issues which this medical procedure raises: Who shall receive the test? How shall the results be used? What are the costs to society versus the benefits? Amniocentesis implies the possibility of abortion. How should this be approached by Government programs? Society must answer these as well as questions of medical safety, he says. □