PSYCHOLOGY

Man Superior to Machine

Man's senses of seeing, hearing and touch make him a highly reliable receiver, American Association for the Advancement of Science meeting is told by psychologist.

➤ IN THIS AGE of push-buttons and automation, do not underestimate the abilities of the normal human being in controlling machines, receiving and processing information, and computing, whether in war or in everyday living.

Dr. Max W. Lund, head of engineering psychology for the Office of Naval Research, Washington, in a paper before the American Association for the Advancement of Science meeting in New York described man's sensory, computational or motor capacities, used in a partnership of man and machine.

Man's senses of seeing, hearing and touch make him a highly reliable receiver, Dr. Lund declared. Man can see color, brightness and form.

The highest intensity at which the eye can function is about a hundred million times the lowest. The eye responds to as little as three or four quanta of energy. Under ideal conditions, it can detect the presence of an object that subtends about a half second of visual angle, which is roughly equivalent to seeing a sixteenth-of-an-inch wire from a distance of a half mile.

Man's auditory response is so acute it is only slightly greater than the energy released by the collision of air molecules in random Brownian movement. The loudest sound he hears, without pain, is roughly ten trillion times as much.

Man can receive communication code through tactual vibration more rapidly than he can receive auditory Morse code. His sensitivity ranges are limited, 20 to 20,000 cycles per second in the sound spectrum and from 4,000 to 7,000 Angstroms in the electromagnetic spectrum. He can receive an input of only ten successive items per second.

Today man is required to do certain jobs nature never intended that he do, Dr. Lund observed, such as function on an aircraft carrier deck in noise of 140 to 150 decibels, and fly at altitudes and speed where his sensory equipment is not adequate.

Man is an exceptionally good evaluative computer. For instance, from radar he is able to estimate courses, velocities, times and points of interception with considerable accuracy. Man has good long-term memory for generalized experience, but rather poor immediate memory for most sensory functions, especially in audition.

Man is a relatively poor numerical computer, especially under stress, but he is the only available computer that can solve problems by logical induction.

A human being can talk, push buttons, use handcranks and joy sticks. His output in highly developed skills, such as typing or playing the piano, appears limited to approximately 25 bits a second, which is five or six letters or notes per second.

Man can supply several hundred pounds of force with leg and back muscles for short periods of time. Man's work output is variously estimated at from one-tenth to a half horsepower for continuous operation to as much as one and a third horsepower for 20 seconds.

While human beings vary widely in capacities, body sizes, training and skills, Dr. Lund emphasized that the engineer should design equipment that can be used by anyone likely to use it.

Performance tends to deteriorate with time on the job, Dr. Lund found. This is seldom a result of physiological tiring as such, but rather results from boredom, inattention and lack of motivation.

Science News Letter, January 12, 1957

ASTRONOMY

Small Planetarium Made Available

➤ A SMALLER MODEL of the Zeiss Planetarium that is suitable for use by medium-sized towns and educational institutions is now available at considerably less cost than the larger unit.

It offers an effective variety of celestial shows for public presentation, according to the Ercona Corporation, which represents the optical works of Carl Zeiss Jena in the United States.

Both models work on the same principles. Dome size of the smaller model is 20 to 26 feet in diameter, under which from 50 to 90 persons can be seated.

All stars visible to the naked eye, roughly 5,000, are represented faithfully in accordance with their degree of brightness. This is accomplished by means of 31 separate projectors arranged on the surface of a hollow sphere.

The sun and the five planets visible to the naked eye are displayed in their relative positions, and the Milky Way galaxy in which they are located is presented with the aid of a special projector.

The precessional movement of the earth may be followed for one complete revolution, covering a period of 26,000 years.

Science News Letter, January 12, 1957

MEDICINE

Record Medical Research

➤ RESEARCH on America's major killing and crippling diseases reached an all-time high during 1956, Marion B. Folsom, Secretary of Health, Education, and Welfare has announced.

More than $180,000,000 was appropriated by the Federal Government to the National Institutes of Health of the Public Health Service, he said, and this sum was further subdivided among the hundreds of hospitals and universities carrying on medical research throughout the country.

Polio got the largest amount of money ever alloted by the Public Health Service to prevent a specific disease, the Secretary reported.

"More than $53,000,000 was appropriated for use between August, 1955, and June 30, 1957, to help buy polio vaccine for children under 20 and pregnant women," he said.

Although the number of polio cases dropped almost in half during the past year, cancer and heart disease continued to take their heavy toll. Seventy percent of all deaths were caused by these two illnesses in 1956, with heart disease accounting for 54% of the total.

However, in other areas, there were "proud gains" noted by the Public Health Service. These included new techniques for heart surgery, the development of an experimental vaccine for use against viruses causing a grippe-like illness, and use of a new test to detect early cervical cancer.

The birth rate continued to climb, and a record number of more than 4,000,000 babies were born in 1956.

The death rate was not expected to change much from the 1955 figure of 9.3 per 1,000 people, Mr. Folsom said.

Science News Letter, January 12, 1957

GEOPHYSICS

Discover Sulfur Isotope Made in Atmosphere

➤ DISCOVERY of the sixth isotope, or chemical twin, of elements being produced by the cosmic rays constantly showering down on the earth's outer atmosphere is announced in *Nature* (Dec. 29, 1956).

Sulfur 35 should be added to the list of isotopes of carbon, hydrogen, beryllium and two of phosphorus already known, an Indian physicist reports.

Dr. P. S. Goel of the Tata Institute of Fundamental Research in Bombay found the sulfur 35 in samples of rain water collected at a 7,500-foot mountain remote from industrial pollution.

Dr. Goel believes the sulfur isotope is produced from bombardment of argon in the atmosphere by cosmic rays. However, he points out, it could be produced by nuclear explosions, and is making further tests to check this possibility.

Science News Letter, January 12, 1957