

The normal curve is used extensively in many applications, for example, in showing the variations of I.Q. in a certain age group or the heights of different races. Where natural phenomena can be measured, such as the number of peas in a pod or the weight of children of a certain age, the normal probability distribution is closely followed.

In genetics, the Mendelian theory of the transmission of traits can be predicted by probability theory.

If a red flower is crossed with a white flower, the red gene will unite with the white gene to form a pink flower. If two pink flowers are then crossed, the next generation will produce one red, one white and two pinks, following the pattern of the probability distribution of heads and tails when two coins are tossed.

This ability to predict offspring of plants is most useful to agriculturists and botanists in hybridizing and improving plants and animals.

### Random Sampling

It is often desirable to know how a population will vote or how well a machine is turning out a product. A system of random sampling has been devised.

The straw vote taken before an election is an example of random sampling. From such a vote, the trend of the election can be predicted.

If the product of a new machine is to be tested, samples selected at random can give the manufacturer an indication of the quality of the whole.

Sampling is a convenient and oftentimes the only method by which a study of large groups can be made.

In physics the behavior of atoms and molecules and the paths of electrons and protons are determined probabilistically. Since it is impossible to determine the exact

position or exact motion of an electron at a particular moment, its position or direction of movement must be based on probability and must be estimated.

Most physicists believe that probability behavior governing electrons must also apply to the universe, but the late Prof. Albert Einstein, among other scientists, believed there is an underlying order in the universe that does not involve probability.

Astronomers apply probability statistics when determining the position of stars and space scientists calculate travels in outer space on a probabilistic basis.

### New Method of Calculation

A new method of calculating probability that uses only existing factors rather than previous events has been recently devised by Prof. Marcel Neuts of Purdue University, Lafayette, Ind.

Prof. Neuts reported that his method can be applied to actual biological and physical phenomena as well as purely theoretical mathematical problems.

The concept of mathematical probability is far reaching and enters into virtually all phases of our lives, from birth rates to death rates, with all the probabilities and statistics that can happen in between.

Since this is so, an early introduction to the concept of probability and statistical methods would be extremely valuable to students in almost every field of study. To help make this important step in the introduction of probability theory to younger students, SCIENCE SERVICE has issued a THINGS of science kit on probability containing problems and explanations of elementary mathematical probability and the materials necessary to perform the experiments. The unit is available at 75¢ each from SCIENCE SERVICE, Washington, D. C. 20036.

• Science News Letter, 85:138 Feb. 29, 1964

### TECHNOLOGY

## Highway Safety Studied

➤ A MECHANICAL "YO-YO" and a machine that shocks drivers who take risks are among many devices being used to study highway safety at Ohio State University, Columbus.

The yo-yo consists of a reel of steel cable attached to the front on one car and running to the rear of another car. It records the relative speeds of the two cars and the distance between them on the highway, thus enabling engineers to learn what influences one car following another.

Another device, called a risk simulator, tests drivers with many traffic violations and those without any to see why some drivers take risks on the road. At certain intervals, the subject passes his hand about 10 inches through a small window, taps a switch and tries to remove his hand before being hit by a rotating arm that gives him a sharp electric shock.

Each time he completes the risk before being shocked, the "driver" receives a certain amount of money. In another part of

this study, a "passenger" receives a shock at the same time as the subject, thus indicating if drivers behave differently when they have passengers.

One result from early studies showed the non-violator group took the same number of risks whether alone or with a partner. The violator group, however, took fewer chances when with a partner.

A driver's ability to judge speed is being determined by velocity sensing tests. Subjects drive without speedometers and are supposed to reach different speeds. Most of these preliminary tests have shown that drivers are unable to judge the rate of speed accurately. Their judgments vary between 10 miles per hour too fast or too slow.

The effects of highway lighting on drivers are being studied by special instruments in test vehicles that measure the amount of glare striking the driver's eyes and the windshield.

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### TECHNOLOGY

## Classroom Computers, TV Replace Blackboard

➤ COMPUTERS and closed circuit television are putting the traditional blackboard out of a job.

Instead of burning the midnight oil over an engineering problem involving a great deal of computation, students can reach a solution quickly on the classroom computer.

At the Massachusetts Institute of Technology's department of civil engineering, Boston, the automated classroom minus blackboards is a reality. College freshmen, after a single session with the specialized computer languages, are ready to design highway interchanges using the machines to perform their computations.

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General Dynamics/Electronics

**HAND-HELD RADAR**—The hand-held radar system detects moving targets and warns a military observer by means of audio signals through earphones.

### TECHNOLOGY

## Hand-Held Radar Device Spots Nearby Movement

➤ A NEW self-powered radar unit, carried in the hand, can detect any moving object up to six-tenths of a mile away.

The eight-pound unit and antenna detect targets and warn the operator by signals through earphones or over a small loud-speaker on the rear of the unit.

Developed by General Dynamics/Electronics, San Diego, Calif., the new radar can be used by soldiers for spotting enemy movements in foggy or wooded areas. Soldiers also can contact low-flying friendly aircraft with it.

The new radar also can be used by border patrols, police and factory guards. Developers expect improved wiring will lighten future versions even more.

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