

PHYSIOLOGY

Talk Via Brain Waves

Controlling the activity of brain waves might enable paralyzed stroke victims, despite their lack of muscle movement, to communicate with others—By William MacLaurin

➤ A NEW TWIST in interpreting brain waves shows promise as a possible way to bring paralyzed stroke victims out of their "living death" world of no muscle movement back into the world of communication.

As with many great scientific advances, the discovery was made unintentionally. During an experiment in which a scientist was measuring his own brain waves, he was suddenly impressed with the fact that he could control their activity.

Dr. Edmond M. Dewan, Air Force Cambridge Research Laboratories, Hanscom Air Force Base, Bedford, Mass., told SCIENCE SERVICE it was at that time that he recognized the possibility of communicating with brain waves.

The particular brain waves he has been working with are called alpha waves. It is believed these waves are produced by a generalized flow of electricity through the gray matter of the brain.

The interesting thing about these waves is that they can be controlled without muscle movement. All a person has to do to turn them on is relax as if going to sleep. To turn them off, all one has to do is concentrate on a scene or object.

For this reason, Dr. Dewan believes these waves can conceivably be used as a communication device for persons who have lost their ability to move. Once such a person has learned how to manipulate his alpha

wave rhythm pattern, it becomes possible for him to communicate through Morse Code, or some other simple response system.

Dr. Dewan said one possible drawback to his idea is that all people do not have the ability to turn their alpha waves on and off. It is believed by some experts, however, that the majority of people can.

The process of recording these brain waves is really quite elementary, Dr. Dewan said. It consists of nothing more than placing electrodes on the head and running the signals emitted through a special amplifier and filter to eliminate all other waves except the normal 10-cycle-per-second alpha waves.

This apparatus is hooked to a switch that allows electricity to flow when the alpha waves come through. When the alpha rhythm is blocked the switch goes off, stopping the current.

As of now, no stroke victims have been tested with the system. The only "guinea pig" who has been used is Dr. Dewan himself, but he is thinking about expanding his experimental sample.

Dr. Dewan said brain wave communication is not a way to read other people's minds. It is simply a device whereby one person can "speak his mind" without vocalizing or without moving a muscle.

Other brain waves could also be used someday for communication, Dr. Dewan said.

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have been testing arrangements of one to ten vibrators to determine what patterns can be discriminated from others. By doing this they hope to discover "vocabulary" patterns which will not become mixed up when a message is transmitted.

While the Princeton scientists are doing much that may be of great practical importance to man in the future, they emphasize that their role is that of basic researchers.

"We have not looked into the question of the whole range of individual differences in sensitivity, or things like that, very much—just what the skin can do," Dr. Geldard said. "If one subject can do it, that is enough to show that it is possible."

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PHYSIOLOGY

Brain Waves Link Blood Pressure and Mind

➤ BRAIN ACTIVITY is the major determinant of blood pressure during sleep, a medical researcher told the American Heart Association meeting in Atlantic City.

Dr. David W. Richardson of the Medical College of Virginia, Richmond, said he and other investigators found this to be so by measuring electrical brain waves in 19 healthy persons while they slept. Persons who were awake could not be used because the brain's waves are "drowned out" by other body processes.

Blood pressure was found to drop gradually as sleep deepened, Dr. Richardson said. However, an abrupt decrease in the depth of sleep was always accompanied within two seconds by a sharp rise in blood pressure.

Co-authors of the paper presented by Dr. Richardson were Dr. John A. Honour of Oxford, England, and Dr. George W. Fenton of London.

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PSYCHOLOGY

'Hearing Through Skin'

➤ STEER an airplane without using eyes and ears?

Exciting research being conducted at Princeton University, Princeton, N.J., may someday make such a feat possible. It may also permit blind and deaf persons to gain experiences that would normally be outside their world.

This research deals with "skin communication," or perceiving through the skin, messages that have been restricted to other senses. At Princeton, scientists have been trying to get the skin to follow a language in much the same way that the ear does.

Dr. Frank A. Geldard, professor of psychology at Princeton, and a leader in skin communication research, is approaching the problem of hearing through the skin by using vibrations. These vibrations are arranged in "vibratese" or a vibrator language that has 45 elements.

This new language was developed because past experiments have shown that skin cannot distinguish well between voice frequencies. For example, when the fingertips are placed upon the diaphragm of a loudspeaker,

a rise in "loudness" is perceived as a drop in "pitch."

So far, experiments with the new language have appeared promising. One person who was taught vibratese received messages at 38 words per minute with 90% accuracy. The military standard for Morse Code is only 18 words per minute.

Vibratese is passed on to the skin by a small vibrator invented by Dr. Geldard's close associate at Princeton, Dr. Carl E. Sherrick. The vibrator is light, powerful and can be attached anywhere on the body.

Dr. Sherrick told SCIENCE SERVICE that definite learning processes are needed for people to pick up this skin communication. It does not have mystical and other-world connotations as does another skin phenomenon, "finger sight."

A big difference between the two is that finger sight—the ability some people seem to have of differentiating between colors with their fingers—does not involve pressure stimulus as does skin communication with vibrations, Dr. Sherrick indicated.

For the past year, the Princeton scientists



Cutler-Hammer

CELL ANALYZER—This new system for cellular studies, the CYDAC cytophotometer, speeds up cell analysis and records resulting data for later computer processing. The device was developed by Cutler-Hammer's Airborne Instruments Laboratory Division for the National Cancer Institute.