

# Body Dances to Speech

A close correlation between body motion and speech is a universal phenomenon in normal people—By Patricia McBroom

► **THE SPEAKER** who fervently stabs the air with his finger to emphasize a word is giving only a gross demonstration of what apparently goes on all the time between body and speech, a Pittsburgh scientist has found.

The body does not simply move randomly as a person speaks, nor is it still. Body movements have a pattern that corresponds precisely to the speech pattern, said Dr. William S. Condon of the University of Pittsburgh School of Medicine, Pittsburgh.

For instance, as a phrase of speech begins, a part of the body starts to move. As the phrase ends, so does the motion and another begins. Similarly, as an individual's stress in words changes, body movements follow suit. A "kick" in speech is accompanied by a "kick" somewhere in the body.

In other words, the body, in a sense, dances to the rhythm of speech.

Usually these motions are on an extremely subtle and complex level, Dr. Condon told *SCIENCE SERVICE*. The movement might be in only one part of the body, such as the head, but more often it is a matrix of move-

ment—finger, eyebrow, wrist, foot, and so on. This dancing phenomenon is most prominent at the syllable level, said Dr. Condon. As words break, so do body movements shift direction. For instance, in the phrase, "I was gon-na," a subject closed his eyes on "gon" and opened them on "na."

Evidently, said the scientist, syllable breaks are extremely important stops in the continuity of language and are therefore clearly reflected in movement.

However, shifts sometimes take place on a sub-syllable level. In speech the vowel *i* breaks into four *a*'s and two *e*'s. Always, body motion, as in the hands, will change direction after the *a*'s. It is difficult to describe verbally, said Dr. Condon. "You have to see it to believe it."

Throughout close study of 30 or 40 films during the past four years, Dr. Condon has found this precise and consistent correlation between body motion and speech. Moreover, the body-speech unity is universal in normal people.

It existed whether the people in the films were Mexicans or Americans, but broke down when the subjects were

schizophrenics or brain damaged patients, he said.

Speech has a high degree of structure and order, said Dr. Condon. Theoretically, it is possible that when the mind is involved with speaking, it just naturally imposes the same order on the rest of the body. Most recently, Dr. Condon and his colleague, Dr. William Ogston, have found that brain waves as measured by an electroencephalograph also are synchronized with speech. Phrases repeated by subjects in the study appeared to leave traces on the EEG charts that resembled speech patterns.

Even stranger, Dr. Condon said, was the discovery that a listener's body also will dance to the rhythm of speech although he is saying nothing. Perhaps this research is actually tapping what could be called the basic rhythm of life.

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## EVOLUTION

### Man May Owe Hearing To Ancient Fish

► **MAN MAY** be indebted to a 350-million-year-old fish for his ability to hear today.

Some members of an ancient family of fish, called Eusthenopteron, had an air-filled "spiracular pouch" or sac in their heads which was very similar to man's middle ear, said Dr. Willem A. van Bergeijk of Bell Telephone Laboratories.

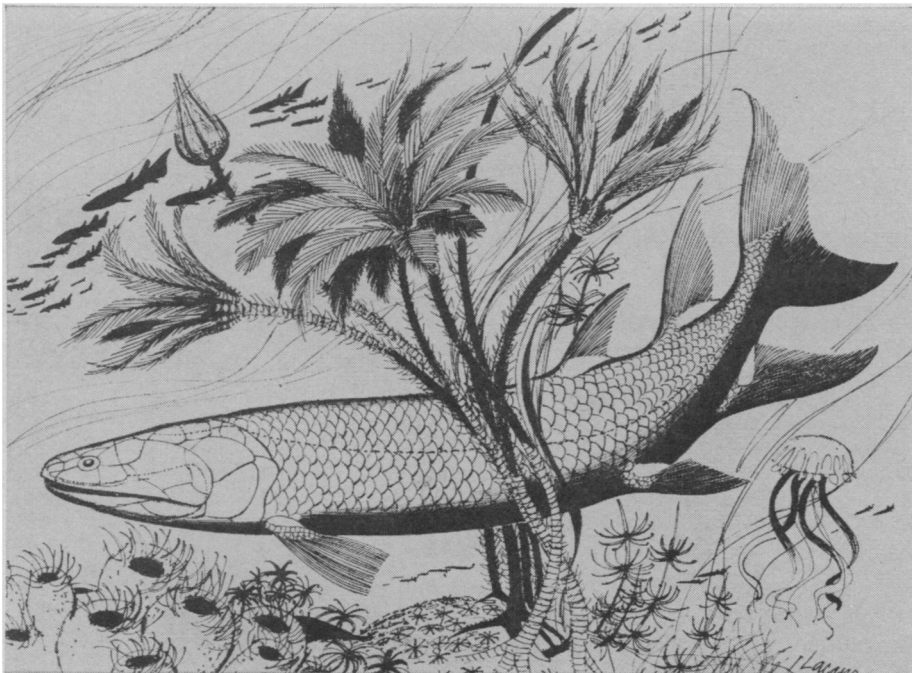
These fish also must have had an outer eardrum, Dr. Bergeijk reported to the Acoustical Society of America meeting in Boston. From estimates of the size of the eardrum and the air sac, the scientist calculated that the fish would have heard sounds not only through the water but also through the air.

Hearing capability of a very primitive sort first appeared in early fish as a system of sensory cells of the sides and head that responded to water motions.

As fish evolved, they developed a swim bladder, which was essentially a trapped air bubble changing volume under the influence of pressure waves. This probably functioned originally as a buoy or aid in respiration, obeying the gas laws and changing volume when pressure changed, but incapable of locating any source of sound waves. However, this swim bladder was close enough to affect an "inner ear" labyrinth located deep inside the fish's skull.

The swim bladder and the extensions it later developed could be considered a middle ear, and the labyrinth an inner ear, said Dr. Bergeijk, whose studies on primitive hearing organs of the ancient fish will provide insight into the hearing capabilities of higher animals including man.

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Bell Telephone Laboratories

**ANCIENT FISH**—A fish that lived some 350 million years ago, the Eusthenopteron, is shown in an artist's concept of the animal and its environment. Bell Telephone Laboratories' scientists have found evidence indicating man's hearing mechanism, particularly the middle ear, may have evolved from this fish species or its family.