DOCUMENT RESUME

ED 050 915 RE 003 601

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TITLE	Implicit Speech--Some Conclusions Drawn from Research.
PUB DATE	Apr 71
NOTE	12p.; Paper presented at the meeting of the International Reading Association, Atlantic City, N.J., Apr. 19-23, 1971
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	*Inner Speech (Subvocal), *Language Development, *Language Research, Linguistic Performance, *Literature Reviews, Physiology, Reading Comprehension, *Reading Research, *Silent Reading

ABSTRACT

An overview of research on implicit speech from 1868 to 1970 is presented. Various studies are reviewed in which a variety of mechanical devices were used to examine the physiological changes that occur during silent reading. Edfelt's use of a mingograph in 1950 was considered a breakthrough, along with his conclusion that efforts to eliminate implicit speech should be discontinued. Clinical applications of these experimental results are also examined, as well as a more recent area of inquiry, that of causation theories. The accumulated opinions of specialists in this area supported the theory that implicit speech may aid comprehension in the primary grades. Research of the 1960's which has direct bearing on implicit speech as a covert-overt form of linguistic behavior includes studies by Cleland et. al., (1968), Laffey (1966), and Hardyck (1968). Conclusions are drawn from these studies which are pertinent to learning theorists, psycholinguists, and classroom teachers. A bibliography is included. (VJ)

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"IMPLICIT SPEECH - SOME CONCLUSIONS DRAWN FROM RESEARCH"

Reading as Behavior Session 2:15 - 3:15 P.M., Wednesday, April 21

THE CURRENT STATUS OF IMPLICIT SPEECH

Few of today's leaders in the teaching of reading would challenge the statement that one of the main thrusts of learning research during the decade of the sixties has been an intensive reexamination of language development in infancy and early childhood. From Piaget and Gagne to Tolman and Bruner, today's "burning question" emerges as, "How soon and through which mode(s) does a child develop language?" Prerequisite to further understanding of this faculty is a better analysis of the phenomenon of implicit speech.

Implicit speech compounds its confused image by subtending at least six synonyms--as covert behavior: silent speech, subvocalism, and inner

speech; and as overt behavior: lip reading, faint whispering of many words, and saying every word. The basic concept inherent in all of these terms is that it is inseparable from any act of thinking itself; as well as being concomitant to any instance of speaking, listening, reading, or writing. Our purpose is to present an overview of the century-long experimental and clinical development of implicit speech and to assess the implication of recently completed research in this area.

A BRIEF EXPERIMENTAL HISTORY

Consideration of implicit speech began in 1868 with Bain and Ribat (2) physiological psychologists, who considered thinking to be more or less restrained vocalization or acting. Curtis (7) in 1899 bandaged a tambour over the larynx to record movements simulated by silent reading. He concluded: silent reading produced considerably more movement than any other mental activity. A telegraph-key device activated by the tip of the tongue through a suction cup was devised by Tomor (25). He concluded: "All thinking is accompanied by activity in the musculature of these (speech) organs." Work with a small rubber balloon and a pneumograph connected to a kymograph caused Scheck (21) to announce that mental stress heightens tongue activity, and that this activity varies as to rate and amount.

A significant breakthrough came with Edfelt (11) in 1950, who used rubber bulbs attached to an Elmquist Mingograph (an electronically activated direct-writing instrument). He concluded: "New techniques (electromyography) are needed for any further progress." With the

publication of Silent Speech and Silent Reading in 1960, Edfelt (11), Director of Reading Research at the University of Stockholm, reports the only comprehensive, adequately instrumented, and scientifically controlled study of the decade 1950-1960. His conclusions were: "Silent speech is universal during silent reading; it increases with the difficulty of the material; efforts to eliminate it should be discontinued."

Edfelt formed three hypotheses, namely:

1. Good readers engage in less silent speech than do poor ones.
2. The reading of an easy text results in less silent speech than does the reading of a difficult one.
3. The reading of a clear text results in less silent speech than does the reading of a blurred one.

CLINICAL APPLICATION OF EXPERIMENTAL RESULTS

Gerald A. Yoakam (28) quotes W. A. Smith (23) as follows: "It must be borne in mind however that the written word is a mere transposition of the spoken word and that the two are intimately associated. . . . It is therefore not surprising that the perception of the written word should be accompanied by some degree of articulation and hearing." Yoakam goes on to summarize in his book Reading and Study, as follows:

1. The process of vocalization goes on even in silent reading in the case of almost if not all readers.
2. The amount of vocalization varies with the reader.
3. Lip movements accompany the silent reading of young children and also of inefficient adult readers.

4. It is thought by some that vocalization of a perceptible sort is unnecessary and could be avoided by the right kind of training.

Cole (6) coded five stages of vocalization in a reader as follows:

1. Saying or whispering every word.
2. Faint whispering of many words.
3. Pronounced lip movement but no sound.
4. No lip movement or sound, but palpable movement of the tongue.
5. No lip movement, sound, or palpable movement of tongue, but palpable movement of the throat.

To the above stages Edfelt would add a sixth:

6. No movements discernible except by electromyography.

CAUSATION THEORIES OF IMPLICIT SPEECH

A major area of inquiry has been the causes of implicit speech. Contributors to this field have included:

1. Secor (22) in 1900 considered "inner speech" of children and poor readers as distinct from "inner hearing."
2. Huey (15) states: "For the readers tested . . . it seemed that inner speech was a combination of auditory and motor elements, with one or the other predominating according to the reader's habitual mode of learning."
3. Watson (27) hypothesized that implicit speech might be physiologically required as a factor in the process of reading.

4. Gates (12) supports the theory that implicit speech, being a motor habit, originates in earlier training and experience in oral reading.
5. Betts (3) suggests that lip readers are using silent speech and that this mechanically restrains the silent reading rate. Bond and Bond (4) concur with Betts in this respect.
6. DeBoer and Dallman (10) state that after a pupil has learned to read more rapidly silently than orally, vocalization is a detriment to the rate of silent reading.
7. McKim (17) feels that vocalization is properly frowned upon as a hindrance to reading speed, but it is not necessary to become disturbed if a good reader occasionally resorts to this device.

The accumulated opinions of specialists in the field of reading, as the samples above would indicate, would support the theory that implicit speech may aid comprehension in the primary grades, but that it can be a deterrent to adequate rate in the intermediate and upper grades. To eliminate or inhibit implicit speech, O'Brien (18), McDade (16), and Buswell (5), suggested a non-oral method of reading instruction, and McDade's program was administered in the Chicago Public Schools. The results were inconclusive and disappointing. The non-oral method did not eliminate implicit speech to any greater degree than did any other method. It has been suggested that implicit speech is a developmental reinforcement activity and would be eliminated or reduced to a minimum according to Hollingsworth's (14) cue-reduction theory by increasing the rate of silent reading.

Finally, as the cumulative fruition of these decades of years of investigation and experiment, Anderson and Dearborn (1), seconded by Tinker (24), in 1952 made the revolutionary recommendation that implicit speech is a desirable, developmental learning reinforcement activity, and that its elimination should not be prematurely precipitated. This position was acclaimed by Edfelt (11) in 1960.

IMPLICIT SPEECH RESEARCH DURING THE DECADE 1960-1970

An exhaustive search of the literature in addition to query of the ERIC/CRIER data base reveals nine major investigations central to implicit speech from 1960 to 1970. Three which have direct bearing on implicit speech as a covert-overt form of linguistic behavior in beginning reading are set forth in the ERIC/CRIER Document Resume' format as follows:

1. ED 027 154 - 24 - RE 001 519 Cleland, Donald L. and Others
   Vocalism in Silent Reading, Final Report - Pub. Date 68
   Pittsburgh University - School of Education
2. ED 012 682 RE 000 195 Laffey, James L.
   Behavioral Research That Has Promise in the Teaching of Reading
   Pittsburgh University - School of Education - Pub. Date 66
3. ED 022 656 - 24 - RE 001 441 Hardyck, Curtis D.
   The Effect of Subvocal Speech on Reading - Final Report
   California University - Berkeley - Pub. Date 68

The results of these studies can be summarized:

Cleland (8) satisfied Edfelt's (11) criterion demand that better instrumentation in electromyography (including quantification validation by electronic integrator-circuit recorders) was necessary for further research productivity. He also qualitatively endorsed the contentions of Anderson and Dearborn (1), Tinker (24), and Edfelt (11), that implicit speech is a normal adjunct to the reading process; that it is a natural developmental comprehension reinforcement, and that, consequently, classroom techniques for its repression should be minimized if not abandoned altogether.

Laffey performed a descriptive study of the previous parameters of implicit speech research superimposed upon the new framework of interdisciplinary behavorial study coming into vogue in the first-half of the 1960-1970 decade. He attempted to relate how this new interdisciplinary behavorial research:

1. Applies basic scientific techniques to practical learning situations.
2. Helps bridge the gap between learning theory and practical classroom application.
3. Represents an interdisciplinary attack on educational problems.
4. Encompasses the essential task of education, behavioral change.

Laffey's contribution in synthesizing the previously known but jumbled mass of experimental data into a codified and meaningful context is a

significant one. He provides points of entry from each of the five behavioral sciences involved. Of particular value are his bridges from scientific techniques to learning theory to practical classroom application.

Hardyck essentially replicates Edfelt's (11) college-level comprehension-testing design done at the University of Stockholm in 1960. His experimental study was well-designed and competently executed. His findings do in fact support many of the hypotheses which Edfelt (11) recommended for further testing. However, because the levels of development concerned were college and secondary, Hardyck's research does not have the degree of applicability to the process of learning to read of Cleland's (8) and Laffey's.

CONCLUSIONS DRAWN FROM RESEARCH FINDINGS

The century of interest in implicit speech as a correlate of language acquisition in general; and beginning reading in particular, from Bain and Ribot (2) in 1868 to Laffey in 1968, has proved to be an intriguing and fruitful epoch. Based upon the preceding evaluation of the pertinent evidence available, we would offer a concluding statement to each of three classes of educational practitioners:

1. Learning Theorists - current reassessments of learning theory from Piaget(1) to Bruner(2) suggest that in infancy and early

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(1.) Raven, Ronald J., and Salzer, Richard T. "Piaget and Reading Instruction" The Reading Teacher, April, 1971. p. 630.

(2.) Pines, Maya "Jerome Bruner Maintains - Infants Are Smarter Than Anybody Thinks." New York Times, November, 1970.

childhood a precocity and sophistication of learning through application of language skills exists to a greater extent than has been previously suspected.

2. Psycholinguists - every shred of evidence in the past decade from Goodman(1) to Wardhaugh(2) highlights a glittering metallic thread of inner language activity weaving through the entire fabric of human thinking responsive to external (and internal) stimuli from the "first birth-cry of language expression" onward.

3. Classroom teachers - a final reiteration of the yield of this century of scholarly inquiry into the nature of implicit speech which has potential for benefit to the art of the teaching of beginning reading is appropriate. Anderson and Dearborn(3), Tinker(4), Edfelt(5), and Cleland and Davies(6) -- reinforce to the point of conviction:

(1.) Goodman, Kenneth S., and Fleming, James T. Psycholinguistics and the Teaching of Reading, International Reading Association, 1969.

(2.) Wardhaugh, Ronald Reading: A Linguistic Perspective, Harcourt, Brace and World, Inc. 1969.

(3.) Anderson, Irving H., and Dearborn, Walter F. The Psychology of Teaching Reading, New York, Ronald Press, 1952. p. 160.

(4.) Tinker, Miles A. Teaching Elementary Reading, New York, Appleton-Century-Crofts, 1952, p. 14.

(5.) Edfelt, Ake W. Silent Speech and Silent Reading, Chicago, University of Chicago Press, 1960.

(6.) Davies, William C. "Silent Speech: Its Development and Current Status in Experimental Research, Clinical Practice, and Classroom Application" Unpublished Ph.D. Dissertation, University of Pittsburgh, 1962.

"Implicit speech is a desirable, developmental learning reinforcement activity; and that its elimination should not be prematurely precipitated."

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