COGNITIVE PROCESSES IN READING: WHERE DEAF READERS SUCCEED AND WHERE THEY HAVE DIFFICULTY

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The act of reading involves the recognition of individual words and the integration of the meanings of those words for text comprehension. The present paper reports on studies with deaf college students, focusing first on their word recognition processes and then on their short-term memory representation of those words.

The approach of this paper will be to focus on analytic reading, in which the reader takes advantage of the linguistic information reflected in the orthography and performs a grammatical analysis on the words of a sentence, thus leading to comprehension (Mattingly, 1980). While some have taken the position that reading need not involve such linguistic mediation, there is a great deal of evidence in the literature indicating that such analytic processing promotes acquisition of reading among beginning readers and facilitates reading (especially of difficult material) for more advanced readers (Gleitman & Rozin, 1973; Liberman, 1983). Evidence of this sort provides the motivation for focusing on analytic reading in the present paper.

The orthography of English is an alphabetic writing system that reflects the morphophonemic structure of the language (Chomsky & Halle, 1968; Klima, 1972; Venezky, 1970). Hearing college students exploit this structure in the reading of words, even in the reading of those words that are familiar (Brooks, 1977; Massaro, Taylor, Venezky, Jastrzembski, & Lucas, 1980). Similarly, deaf college students are sensitive to orthographic structure (Hanson, 1983; Hanson, Shankweiler, & Fischer, 1983), and they take advantage of this structure to facilitate word recognition (Hanson, 1982b, 1983). For example, in a study in which deaf students were presented printed letter strings that were orthographically regular (e.g., REMOND, SIFLET) or orthographically irregular (e.g., RDEMNO, EPLSTI), these deaf students were found to recall letters of the orthographically regular strings more accurately than those of the irregular strings (Hanson, 1983). Similar results were obtained in an experiment investigating the recognition of fingerspelled words in which deaf adults were asked to report the letters of fingerspelled strings that were orthographically regular (e.g., S-N-E-R-G-L-I-N) or orthographically irregular (e.g., F-T-E-R-N-A-P-S). They more accurately reported the letters of the regular strings (Hanson, 1982b).

This superior performance on the regular strings suggests that skilled deaf readers, like skilled hearing readers, are sensitive to orthographic


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structure. As further support for this suggestion, nearly all of the incorrect letter reports in the experiment on fingerspelling were found to be orthographically permissible. Particularly striking was the finding that for the orthographically irregular strings, many of the errors in reporting letters tended to result from the subjects' attempts to regularize the spelling of these strings. For example, in recalling the string F-T-E-R-N-A-P-S, some subjects omitted the letter that made the sequence irregular and wrote fernaps. Others added a letter to make the sequence regular and wrote afternaps, while others rearranged the letters of the sequence and wrote fernaps.

So far, this discussion has concentrated on reading at the level of the single word. But, in addition to the ability to deal with the structure of individual words, reading requires holding words and their order of arrival in memory long enough to permit sentence comprehension. Short-term memory studies have been used to examine the nature of the internal representation (or code) used by deaf readers to mediate this comprehension process.

In studies of short-term memory with deaf college students, two primary findings have emerged. The first has been that these students, particularly the better readers, tend to use a speech-based code in the short-term retention of printed English words (Hanson, 1982a; Lichtenstein, in press). These results are consistent with Conrad’s (1979) finding that the better deaf readers among high school age students tend to use a speech-based code. These results extend Conrad’s work, however, in an important way: While the students tested by Conrad attended schools that were strictly oral in their educational approach, the college students tested in these more recent studies have had manual language experience, some even being native signers of American Sign Language. The second finding to emerge from the short-term memory studies with college students has been that deaf readers have difficulty in using a speech code. Even deaf readers who do use it, use it less efficiently than hearing readers (Hanson, 1982a; Lichtenstein, in press).

Given this difficulty in using a speech-based code, why might the better adult readers tend to prefer it over a manual code? A partial answer to this question is suggested by research on the retention of serial order information. Since English is a language in which word order carries critical syntactic information, the retention of word order during sentence comprehension is essential. In an experiment comparing the memory of deaf and hearing college students for sequences of printed English words, deaf college students had poorer recall only when they were required to recall the words in their order of occurrence; the deaf students were comparable to the hearing students when recall of order was not required (Hanson, 1982a). Thus, the deaf students had specific difficulty in retaining information about the order in which words were presented. The extent of this difficulty appears to be related to deaf individuals' ability to use a speech code; in tests of short-term memory, those students with the larger memory spans have shown the greatest use of a speech code (Conrad, 1979; Hanson, 1982a; Lichtenstein, in press). These results suggest that the retention of word order information depends on the ability to use a speech code.

In summary, this research suggests that deaf college students are quite proficient at using the orthographic structure of words in word recognition, but that even these readers experience persistent difficulties in the
short-term memory processes that mediate comprehension. The difficulties appear related, at least in part, to inefficient use of a speech-based code.

The question remains as to the nature of the speech-based representation used by deaf readers and how this representation is developed. Deaf readers could acquire information about a speech-based code from the orthography or through speaking and lipreading. It may be the case that deaf readers' ability to use some form of speech-based code is not well reflected in the intelligibility ratings of their speech. These intelligibility ratings are based on listeners' ability to understand the deaf speakers' utterances, not on the deaf individuals' ability to utilize speech in reading. Further research needs to be directed at determining how an effective speech-based code might be acquired by deaf individuals for the purpose of reading.

References


