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ABSTRACT

A word recognition model involving four processing stages was used, and tests of various word recognition strategies were administered to 25 fourth graders and 25 college students. The model included the following stages: (1) using information in a passage; (2) generating hypotheses from what the next word might be; (3) testing these hypotheses using cues such as partial perception of letters, word length, etc.; and (4) accepting or rejecting the hypotheses. A scientific prototypal two-channel tachistoscope and 10 word-pairs were used to test speed of word recognition of both adults and children. Then the word recognition strategies test was given. Thirty adjective-noun pairs were typed on index cards such that the first word was complete and the second word had missing letters indicated by dashes. Each card was flashed twice to all subjects. The subject's first report of the second word was recorded, as well as his response certainty. For each of five treatment conditions analysis by t-test indicated that adults were significantly faster in recognition; in the absence of a recognition, adults also reported a significantly higher proportion of correct partial perceptions at significantly faster speeds. References are included. (AW)

COMPARISON OF WORD RECOGNITION STRATEGIES OF ADULTS AND CHILDREN

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Two previous studies provided suggestive data indicating adults can recognize familiar words more rapidly than children (1, 2). The purpose of this study was to provide an answer to the following question: If adults recognize words more rapidly, what differences in recognition strategies give adults this advantage?

The strategies investigated were derived from a model of the word recognition process. Simply stated the model is an information use-hypothesis-test-accept/reject procedure. There are four stages in the

model: Stage 1 (information use). Information from the reading material already read is utilized. Ex. Father cut the green _____. Stage 2 (hypothesis making). Information from the reading material as well as knowledge of the structure of English is used to formulate hypotheses, i.e., make predictions, of what the next word will be. Ex. Father cut the green _____(next word could be emerald, grass, money, plant, etc.) Stage 3 (test). The hypotheses are tested using new information gathered from visually discriminating the next word. Information used to test the hypothesis may be a letter, group of letters, or the whole word. Ex. The reader may see letters "em," which match the word "emerald." Stage 4 (accept/reject). If the new information matches one of the predicted words, the hypothesis is accepted and recognition is rapid. If the new information does not match any of the predicted words, the reader must engage in careful time-consuming visual analysis to recognize the word.

If adults are more adapt at word recognition, the model suggests several strategies to account for faster recognition: (a) more and faster partial perceptions in absence of total recognition, (b) better ability to utilize clues such as first and last letters and word length, and (c) greater willingness to alter incorrect hypotheses as to the identity of a word.

Method

Subjects. Twenty-five fourth graders and 25 college students were used. Fourth grade Ss were pretested one week before the experiment was started to ensure they could read the words which were to be flashed. The

pretesting included filler words. All the Ss pretested could read all the words used in the experiment. After a screening test to ensure the Ss could read flashed words, the Ss within each group were randomly assigned to a row of a 5 x 5 repeated-measures Latin square design and were tested individually.

Materials

T-Scope. A scientific prototype two-channel tachistoscope and the ten word-pairs used by Samuels (1, 2) were used to study speed of word recognition. The ten word-pairs were: BLUE-SKY, SALTY-SEA, DARK-NIGHT, LOUD-NOISE, BEAUTIFUL-GIRL, GREEN-GRASS, RED-COLOR, SWEET-CANDY, HEAVY-WEIGHT, COLD-WINTER. The first word of a pair served as a stimulus word and the second word was the target word. Speed of recognition was determined for the target word only.

Word Recognition Strategy Test. Thirty adjective-noun word pairs balanced in association strength for adults and children were used. Every word-pair was typed in upper case on a 3" x 5" index card. First word of the pair was typed but the letters of the second word of the pair were typed under three conditions: (a) first letter only, (b) first letter and second letter, (c) first letter and last letter. Every missing letter of the word was indicated by a dash. Examples of the 30 word pairs are: HIGH H___, DEEP HO__, SOFT C____N.

Procedure. In the speed of word recognition test, five treatments (facilitation, interference, neutral, control-1, and control-2) were presented in succession, but the order of presentation was randomized between rows and fixed within a row. Following a practice and a familiarization

training, the test list was presented. The first word of a pair was shown for one second, the S read it aloud, and this was followed immediately by the exposure of the target word. After the target word was flashed, an erasing image was flashed for one second. The target word was shown starting at 10 millisecond (msec.) exposures and increasing by 2.5 msec. each time through the list. The S reported whatever he had seen for the target word and was asked to indicate his response certainty in one of three ways: (a) I am very sure, (b) I am not so sure, (c) I am guessing. No feedback was given. The entire list was shown until each target word was recognized twice. The average exposure duration of the first and second correct report of the word was used as S's speed of word recognition.

Following speed of word recognition test, the word recognition strategies test was given. Each card was shown to the S for 10 seconds. The S was to recognize the second word with some letters missing. Thirty cards were shown in random fixed order. The S's first report of the second word was recorded. No feedback was given.

Results

The same target words were flashed to adults and children in five treatment conditions. Mean recognition speed in milliseconds and standard deviation for adults for the conditions were: Facilitation = 19.35 (sd = 4.77), Control-1 = 19.63 (4.68), Interference = 22.70 (5.81), Control-2 = 23.08 (6.12), Neutral = 23.25 (5.53). Mean recognition speed and standard deviations for children were: Facilitation = 21.55 (5.40), Control-1 = 21.65 (5.86), Control-2 = 26.38 (8.05), Interference = 26.52

(9.68), Neutral = 28.00 (10.30). For each of the five conditions, analysis by t test indicated adults were significantly faster than children in word recognition.

In the absence of a recognition, Ss were asked if they recognized any part of the word. Adults reported a significantly higher proportion of correct partial perceptions than children ($z=2.00$, $p<.05$).

Furthermore, when adults and children were compared in speed of the fastest partial perception, adults reported the partial perceptions at significantly faster speeds ($t = 2.62$, $p<.01$).

When an S reported a flashed word, he was asked how sure he was. There was no significant difference between adults and children in the proportion saying, "I am sure," when the response was correct. However, when the response was incorrect, significantly more adults reported they were guessing ($x^2 = 11.32$, $df = 1$, $p<.001$). By being aware they were guessing, adults were more apt to alter an incorrect response for the correct one on the next presentation of the flashed word.

On the word recognition strategy test, the S was given word pairs such as PEEP HO__. Two analyses were done: (a) counting those words which matched the target words, and (b) counting those words which matched the number of letter spaces. Under both criteria adults were significantly better than children.

Discussion

If adults and children are presented words which are common to both, will there be a difference between them in speed of recognition? Data from this study indicated that in every condition, adults were significantly

faster at recognizing the flashed words. The more important questions dealt with what recognition strategies accounted for this superiority.

When a word was flashed at speeds too fast to recognize, adults were able to perceive significantly more of the letters than children. Not only did they see more letters, but they saw them at significantly faster speeds. The partial perceptions are useful in word recognition in two ways. First of all, partial perceptions can be used to test hypotheses. For example, the S can test the hypothesis by matching the letters of the partial perception to the letters of the predicted words. Secondly, if none of the letters of the partial perception match the predicted word, by combining prior information from Stage 1 with the new information from the partial perception, new hypotheses can be generated.

On the word recognition strategy test, where word pairs such as PEEP HO__, R__ were given, adults were far superior at using single letter cues, double letter cues, first and last letter cues, and word length to identify a word. Skills such as this are useful in reading. In meaningful reading, we are using prior information to make predictions of the words to follow. As we discriminate the next word, we frequently get only a partial perception of a few letters and some idea of word length and configuration. If this combination of cues matches our prediction, we accept the hypothesis without having to visually discriminate all the letters. It is this use of partial cues rather than the detailed analysis of the whole word to which we refer to as "stimulus sampling." Frequently, if we are familiar with the reading passage, in terms of content, syntax, morphemes, etc., stimulus sampling is sufficient and we can read with speed and comprehension.

Finally, the information on how confident the S was in his report of the flashed word indicated that adults were significantly more aware than children when their response was incorrect. This ability is important because if the S is aware that his response is probably incorrect, he is more apt to reject a false hypothesis. We found Ss in this study who mis-identified a word, but reported they were confident that they were correct. Several of these Ss kept reporting the wrong word each time it was flashed, until the speed got so slow that they were able to correct their mistake.

Summary

The four stages of processes in the word recognition model are: Using information contained in a reading passage, generating hypotheses from what the next word might be, testing these hypotheses using cues such as partial perceptions of letters, word length, etc., and accepting or rejecting the hypotheses. Any strategy which facilitates a process should facilitate recognition. In this study, with every strategy test used, adults were superior to children and the superior strategies should account for their faster speed of recognizing words.

References

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