Intraverbal associations in sentence behavior¹

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Word-associates occurred as intrusion errors reliably more often than did non-associates in a paced recall task. In a sentence completion task, word-associates were put into the same sentence reliably more often than were non-associates. Sentences embedding word-associates were rated more fluent than sentences embedding non-associates. These results suggest that intraverbal association is a variable influencing the selection of words in sentence production.

Pre-existing association between words was hypothesized to be a variable influencing choice of words during the process of sentence construction. The relevance of previously established word associations in selection of words for use in a sentence is evidenced in a series of studies described by Jenkins & Palermo (1964) in which phrases embedding stimulus words tended to elicit word associates. Koen (1965) has demonstrated selection and recovery of specified alternative words in sentence context, given the additional context of word associates unique to one word or the other. That associativity contributes to recall both of specified words in connected discourse and of the embedding context is demonstrated in several studies reported by Rosenberg (in press). The focus of the present study is on the use of associativity in sentence production. It was predicted that one item rather than another would be chosen to complete a sentence if it is elicited as a word associate to another previously selected item in the communication.

Experiment 1

Materials. Two sets of 12 pairs of adjectives were selected from the Palermo & Jenkins (1964) word association norms. The second member of each pair is a low frequency associate (college norms) which is elicited by no other first member of any pair within either set of 12 at any age level. Pairs were grouped in triplets to be embedded in a sentence frame. Second adjectives within a triplet could be interchanged without gross distortion of sentence meaning. For example, the sentence frame embedding the triplet rough-ready, salty-crisp, slow-quick was The _____ skipper gives _____ commands. Within a triplet of adjective pairs, members were re-paired such that the second adjective was not a normative associate of the first, e.g., The rough skipper gives quick commands.

Materials were prepared in primary-size type for presentation on a memory drum. Three sentences, identical except for adjectives, were typed consecutively in random order, followed by a row of five digits selected from a table of random numbers. The row of digits reappeared immediately, with one digit replaced

by a blank. Then the three sentences reappeared consecutively, in random order, with the second adjective replaced by a blank. An empty space separated each triad of sentences. Four sentence triads were repeated in two different random orders in one list. There were two sets of materials, and two lists of the alternative adjective pairings were prepared for each set.

Procedure. Thirty-two paid volunteer undergraduates were randomly assigned to materials and lists in order of appearance in the laboratory. Starting order for each list was counterbalanced. Materials were presented at a 2-1/2 sec rate through the double-width aperture of a Stowe memory drum. The S read aloud each of the three sentences, the row of digits, the row of digits including the presently omitted number, and each of the three sentences (reordered) including the presently omitted second adjective. A 2 1/2 sec pause separated different groups of sentences. All Ss were run for eight trials. Study-recall of four triads comprised a trial. The Ss were encouraged to guess when they were not sure of a missing word or digit.

Experiment 2

Materials. Six sets of eight-page booklets were prepared with one of the sentence frames used in Experiment 1 appearing per page. The sentence frame, with two adjectives omitted, was typed twice on a page. Two adjectives were typed above the sentence in line with the first omission, and two adjectives in line with the second omission. Adjectives were two of the three pairs of a triplet appropriate to the sentence. Each adjective and its word associate occurred once with each of the other two adjective pairs, making three different sets of booklets, all with identical sentence frames. For example, typed above the frame A _____ look accompanied the _____ reply, were cold, hard, and then freezing, brittle in one set of booklets, cold, long and then freezing, distant in another, and hard, long with brittle, distant in another. Assignment of adjective combinations to booklets and order of listing the first two adjectives was random. Alignment of the second adjective with its associate or non-associate was counterbalanced. Three additional sets of booklets were made by reversing the alignment of the second adjective. At the bottom of each page were two 5 in. rating scales labeled Sentence 1 and Sentence 2. Phrases, evenly spaced above the scales, were very awkward, slightly awkward, fairly smooth, and very smooth. The same set of instructions was used as the cover page for all booklets.

Procedure. Booklets were randomly stacked and distributed to an undergraduate history class of 44

students and an undergraduate government class of 39 students. The Ss were instructed to construct the two best possible sentences with the materials provided, using each word only once and in its appropriate slot. After he had completed all the sentences, the S rated each sentence for fluency. The Ss worked independently. Data from 11 Ss were discarded for failure to follow instructions. To obtain proportional Ns, the total N for the first analysis was reduced to 60 by random discard within classroom and booklet groups. Because ratings on both kinds of sentences by each S were needed for the ratings analysis, rating data from those Ss who constructed only one kind of sentence were discarded, leaving N=63 for the second analysis.

Results and Discussion

In the paced-recall experiment, only the incorrect responses which were intrusions from within the triad were of interest. If adjectives were paired incorrectly within a triad, there were only two alternatives, viz., a pre-experimentally associated pair (PreX), or an un-associated control pair (C). Chance combinations attributable to guessing were equally distributed among the three possible kinds of pairs: pairs presented in Training (T), PreX, and C. The dependent variable was a difference score: PreX-C. The mean difference score over eight trials, 6.8, was significantly greater than zero ($F=33.19$, $df=1/30$, $p<.01$), indicating recall errors were biased in favor of word-associates. Response biases peculiar to materials were amenable to test because two sets of materials were used. Which set of materials the Ss responded to seemed to make little difference; the F for materials was <1 . The results of the first experiment may be interpreted as evidence that, if Ss fail to recall a sentence verbatim, they will be more likely to use, in their paraphrase, an appropriate word which is associated with another word in the sentence rather than one which is not.

In the second experiment, the dependent variable for sentence construction was the number of sentence pairs completed by using word associates. Had the adjectives been inserted at random into the sentence frames, half, or four, of the sentence frame pairs would have been completed with PreX words, and the other half with C words. The mean number of sentence pairs actually completed by PreX combinations was 5.7, and this was reliably more than chance number of such combinations, ($F=88.82$, $df=1/48$, $p<.01$). That is, word associates were used in the same sentence significantly more often

than were non-associates. Differences in sentence construction between classes, between booklets, and in the classes by booklets interaction were not significant; in each case, $F<1$.

Each S rated for fluency the 16 sentences he had completed. A two-factor mixed design analysis of variance was used (Lindquist, 1953). Fluency ratings were significantly higher for the PreX sentences than the Ss had completed than for the C sentences they had completed ($F=7.05$, $df=1/61$, $p<.05$). The mean fluency rating, on a five-point scale, for PreX sentences was 3.30, for C sentences 3.02. The F for classes was significant ($F=5.72$, $df=1/61$, $p<.05$), indicating that the Ss from one class tended to give higher ratings over-all than did the Ss from the other class ($\bar{X}s=3.37$ and 2.29). The interaction between classes and PreX vs C ratings was not significant ($F<1$), indicating that the two classes were consistent in relative ratings of PreX and C sentences.

In summary, three cases of intraverbal associations in sentence behavior were demonstrated: (a) when Ss reconstructed sentences in a restricted paraphrase in a paced recall task, they were more likely to use word-associates than non-associates; (b) when Ss deliberately chose a word to complete a sentence, they chose a word-associate more frequently than a non-associate; (c) those sentences embedding word-associates were rated as being more fluent than those sentences embedding non-associates. These results suggest that intraverbal association is one of the variables involved in the selection of words in sentence production.

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Note

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