

Solving words as anagrams: A re-examined issue examined

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Mayzner & Tresselt's (1956) study of nonsense and word anagram solution time which uses a single set of solution words was replicated. Different results were obtained. The discrepancy is attributed in part to the method of computing solution times. The conclusion that word anagrams take longer to solve than nonsense anagrams still appears valid (Beilin & Horn, 1962).

The differential difficulty of nonsense and word anagram problem solving has been examined in several studies. Recently, Beilin & Horn (1962) reported evidence that word anagrams are significantly more difficult than nonsense anagrams. These findings were attributed to either stimulus word perseveration or organizational effects unrelated to summed transition probabilities or letter arrangements. These results were confirmed by Ekstrand & Dominowski (1965) employing the same methodology. A different explanation of the results is offered, however.

More recently, Mayzner & Tresselt (1965) report in this journal an attempt to re-examine the issue. They feel that by using a single sample of solution words, from which word and nonsense anagram stimuli are derived, that a potentially more sensitive method for contrasting word and nonsense anagram problem solving is obtained than from the Beilin-Horn method. In the latter approach two different samples of problems were equated along significant dimensions. On the basis of a test of the common solution word method, Mayzner and Tresselt conclude that no difference between nonsense and word anagrams exists and an explanation is proposed based upon an S-R mediational model.

The present report is of a replication of the Mayzner and Tresselt study with an analysis of their procedure and results.

Method

An attempt was made to conduct the study in the manner reported by Mayzner and Tresselt although their data actually derive from two different investigations. In the nonsense anagram part, "Ss were presented with eight test problems. Each problem consisted of a five-letter nonsense anagram to which there were two solutions, with S instructed to find both solutions within a 240 sec. time limit." "Although solution times for both solution-words were calculated *only the solution time for the appropriate solution word...was used for analysis purposes*" (italics added). As is evident, the solution word may be given first for second. Mayzner and Tresselt ignore the generation order of the solution word. When the correct solution word comes second, they give no

indication of whether the recorded solution time includes the time taken to produce the inappropriate solution or is recorded from the time the inappropriate response is given. It will be seen that these considerations are relevant to an understanding of the phenomenon studied.

A set of equivalent word anagrams to the nonsense anagrams was developed by them in a prior study. Since digram frequency totals effect solution time, anagram and word forms were selected to provide "as many equal digram frequency totals as possible."

The word anagrams were ostensibly designed so that only one solution was possible.

In the present replication, 40 Brooklyn College sophomore and junior Ss were individually tested. Twenty were presented with the word anagrams, 20 with the nonsense anagrams. Ss in the nonsense anagram group were told that "by rearranging the order of the five letters two correct words can be formed." The word group Ss were told that "rearranging the order would lead to a new word."

Results and Discussion

Response time for each anagram was recorded up to a maximum of 240 sec. Median response time for each test problem is presented in Table 1.

A feature of the Mayzner and Tresselt method presents a problem whose consequences are not known. The word anagram is designed so that two solutions are possible.

Table 1. Median solution times (sec.) for word and nonsense anagrams

STIMULUS Word	SOLUTION		RESPONSE TIMES				
	Word	Word ^a	N	Nonsense 1st	N	Nonsense 1st/2nd	Nonsense ^a Uncorrected
EARTH THREA	HEART	12.7	15	14.0	19	13.6	15.9
SHORE HOSER	HORSE	8.5	9	32.2	16	40.5	55.3*
TIRED TIDER	TRIFD	20.9	16	13.1	18	14.2	16.3
TOWER TWORE	WROTE	68.8	14	18.0	14	13.0	67.5
MARCH RHACM	CHARM	5.6	15	6.0	19	6.4	11.3
BROAD DORBA	BOARD	140.1	8	3.8*	17	11.6**	29.9
NIGHT GNITH	THING	32.8	15	3.0***	20	5.7**	6.0***
GROWN GORWN	WRONG	14.4	6	7.1	20	9.8	12.6

* $p < .05$

** $p < .02$

*** $p < .01$

^a N = 20 for each anagram

One is the stimulus of the word anagram set and the other is considered the correct solution word. What effect this difference of one solution word vs. two solution words has on the problem solving process is not clear. Since producing a second solution may be affected by the process of producing the first, anagram generation under these circumstances cannot be considered equivalent to the one solution condition. In order to delineate these effects the data for nonsense anagrams were prepared in three ways: "1st" response times were recorded for all Ss who gave the appropriate solution word first or gave no response at all within the time limit. "1st or 2nd" response times are calculated from the solution time for the appropriate response whether it came first or second. If it was second, the time recorded was from the moment the first inappropriate solution word was given. No time score was assigned to Ss who gave the inappropriate response first and failed to give the appropriate one later, which accounts for the unequal Ns. "Uncorrected" response times are for the appropriate solution words computed without regard for intervening inappropriate solutions. This value is presumed to be the value that most closely approximates the Mayzner and Tresselt computation method although their description of this is ambiguous.

The Median Test was used (Siegel, 1956) to test for significant differences between word and anagram solution times. The Sign Test (Siegel, 1956) used by Mayzner and Tresselt requires that Ss be matched within each pair on relevant extraneous variables, a requirement not demanded by the Median test.

For five of the eight test problems, using the "1st" and "1st or 2nd" response measures, word anagrams have longer solution times. Two of the solution time differences are statistically different. For two test items solution time medians are almost equal (i.e., 12.7 vs. 14.0; 5.6 vs. 6.4). When the "uncorrected" medians are used, three word anagrams have longer solution times, two are about equal, and three nonsense anagrams have longer solution times although by relatively short periods. Two of the differences, in opposite directions, are significant.

Parenthetically, one of the nonsense arrangements (HOSER) is interpreted by some Ss as a word (i.e., one who hoses), and two of the word anagrams permit solutions in addition to the solutions indicated by Mayzner and Tresselt (EARTH to HATER, i.e., one who hates; WROTE to RETOW, i.e., to tow again).

These results do not confirm the Mayzner & Tresselt (1965) findings. Although solution times for word anagrams were relatively similar to theirs, a major difference exists with nonsense solution times. Even the "uncorrected" solution time measure yields, for most anagrams, much shorter solution times than obtained by them. The "corrected" nonsense solution times differ from word anagram solution times to an even greater extent and leads to the conclusion that the method of computing solution time affects in part the interpretation of the findings. The most appropriate computation for solution time would be one uncontaminated by other response times. Where two responses are given, recorded solution times should be the elapsed time from the last response if the appropriate response is second, or from the start of the problem solving period if the appropriate response is first.

The results of this study support the conclusion drawn from our previously obtained data (Beilin & Horn, 1962), as well as from a more recent study (Beilin, in press) that word anagrams take longer to solve than nonsense anagrams. This outcome is evident with an application of the Mayzner-Tresselt single solution word method as well as from the Beilin-Horn technique which restricts the number of anagram letter switches and uses equated word and nonsense anagram lists.

References

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