Semantic satiation in paired associates

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This study investigated the relationships between recall and connotative meaning changes as a result of satiation in paired associates. It was found that connotative changes only occurred concomitantly with recall errors and then primarily on the activity factor. Scoring-method differences raise questions concerning the bipolarity assumption involved in the use of semantic differential scales usually employed to detect meaning change.

In a previous study (Goldman et al, 1968) semantic satiation of the B member of a pair of associates was found to affect the recall of the A member of the pair more drastically if the associates were either close in semantic space (connotative meaning) or close in common usage than if the pair were nonassociates in either respect. The results of the study might be taken to imply that either proximity in semantic space or proximity in common usage is equally efficacious in maintaining meaning. However, recall measures are logically a more natural index of surface meaning (common usage), and it could be argued that connotative-meaning changes among groups were not detected even though they may have been present and may have differed as a result of the satiation procedure.

The best method for detection of change in connotative meaning is currently open to question. Semantic differential measures of satiation in single words have been subjected to two types of analysis. The first, proposed by Lambert & Jakobovits (1960), is based upon the polarity difference score (PDS), and depends upon the absolute difference between any score and the neutral point (zero) of the scale. The second type of analysis, favored by Yelen & Schulz (1963) differs in the treatment of the midpoint of the bipolar and adjective scales. Kasschau (1969) pointed out that the MDS may present occasions when scores of opposite sign independent scales cancel each other out inappropriately with regard to Osgood's concept of meaning intensity. Accordingly, Kasschau employed both scoring methods and found that the greatest satiation occurred on the activity factor but that this was without regard to scoring method.

The present study investigates the effects of semantic satiation on connotative meaning changes in one member of a word pair (B) when that

member has been subjected to semantic satiation. Such connotative changes might be expected to vary among word groups in the same way that recall measures for the A member varied in previous work (Goldman et al, 1968) if both: (1) recall of (A) and connotative changes in (B) reflect the association established between the two words, and (2) satiation affects this association. Following this it would be predicted that loss of meaning in B would be found more often when A is subject to error of recall than when it is not subject to error.

METHOD

Ss were 33 college sophomores drawn from the psychology subject pool and randomly assigned to three word groups; common associates, semantic-space associates, and nonassociates. One member of each pair was identical from list to list. The second member of each pair of common associates (CA) was chosen to be moderately distant in semantic space. The second member of each pair of semantic-space associates (SS) was not a common associate but was close in semantic space. The second member of each nonassociates pair (NA) was not a common associate and was very distant in semantic space. The words were drawn from the 343-word cube of semantic space constructed by League (1970). The lists were the same as those used in the previous study (Goldman et al, 1968). Ss were trained to a criterion of one errorless trial on the lists of paired associates. Order of presentation of the pairs was randomized for each trial and was presented according to a typical anticipation procedure in an A, A-B order. After the first trial Ss were asked to anticipate B in the interval between the presentation of A and A-B.

In the second part of the study, the Ss were given a satiation treatment for each pair of associates in succession: B was projected for 40 sec while S repeated B aloud at least twice per second as long as it appeared. Following satiation Ss were asked to recall the appropriate A. In addition each S was asked to rate B words twice on the semantic differential, once previous to the learning phase and once

after S attempted to recall the appropriate A number of the paired associates following the satiation procedure. Both PDS and MDS scoring procedures were analyzed for the evaluative, potency, and activity factors in all analyses of connotative change.

RESULTS

Learning Phase

Trials to criterion for the learning phase differed significantly by word group ($F = 4.00$, $p < .01$) as in the previous study. Although means were in the expected direction ($CA = 1.64$, $SSA = 2.73$, $NA = 4.00$), paired comparisons did not achieve significance.

Single-Member Effects

An analysis of variance was performed with regard to recall of the A term, regardless of whether or not connotative changes occurred in the B term. Unexpectedly, satiation did not produce differences by word group. Mean recall errors were: $CA = 2.9$, $SSA = 2.00$, and $NA = 2.54$. This finding is contrary to that found in the previous study.

Analysis of variance were also performed on connotative changes of B members, regardless of status of recall of A. No differences were found by word group for either scoring method for any of the three factors.

Association Effects

In each word group, Ss with A words on which errors of recall occurred were matched with Ss for whom no errors were made for the same A words. Semantic differential changes on the evaluative, potency, and activity factors were then analyzed for the B members of the pairs for these two groups of Ss. A split plot design with repeated measures was employed (Kirk, 1968). Scoring method (PDS vs MDS) was also analyzed in this design.

It was found that Word Group by Error by Scoring Method interaction was significant both for the evaluative factor ($F = 3.86$, $p < .05$) and for the activity factor ($F = 4.07$, $p < .05$). For the activity factor the Word Group by Scoring Method interaction was also significant ($F = 9.64$, $p < .01$).

Analysis of paired comparisons for the evaluative factor revealed no significant differences. However, Tukey's tests for the activity factor revealed differences among word groups when error of recall occurred and the MDS scoring method was employed. These differences occurred between CA and SSA ($q' = 6.08$, $p < .01$) and between CA and NA ($q' = 7.11$, $p < .01$). Significant scoring methods effects for the activity factor were found to hold only for CA and then only when error of recall occurred. Both a significant

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Table 1
Mean Semantic Differential Changes

Word Group	Evaluation				Potency				Activity			
	PDS		MDS		PDS		MDS		PDS		MDS	
	Error	No Error	Error	No Error	Error	No Error	Error	No Error	Error	No Error	Error	No Error
CA	20.10	6.70	-33.30	13.40	20.00	16.60	9.90	-6.60	3.40	3.40	130.00	29.90
SSA	20.00	59.90	26.70	-6.70	10.00	40.10	-10.00	13.40	13.30	39.80	-6.70	9.90
NA	20.10	-16.60	-30.00	16.60	0.00	26.60	6.60	0.10	43.30	20.00	-29.80	13.30

method effect ($q' = -6.31$, $p < .01$) and a significant error effect ($q' = 4.50$, $p < .05$) confirm this finding. Of the interactions one Group by Method significant effect occurred. This was between CA and NA on MDS ($q' = 4.29$, $p < .05$).

Table 1 presents the means for the semantic differential changes. It may be seen that mean patterns for the evaluative and activity factors differ from each other as expected and in confirmation of the paired comparisons previously described.

DISCUSSION

The present study supports Kasschau's finding that connotative changes following semantic satiation occur primarily on the activity factor, even when paired associates rather than single words are employed. Loss of meaning does not occur, however, for either member of the word pair alone. Semantic satiation is associated with meaning loss only when both members of the word pair are affected, i.e., A is not recalled. This finding is consistent with the interpretation that meaning reflects association between words rather than something that affects either member of a word pair alone.

The finding of Kannango & Lambert (1963) that paired-associate learning is impaired when either of the associates is subjected to previous semantic satiation raises the question: Must initial meaning intensity be high for satiation effects to be found *after* the paired association is learned? In this study word group, effects occurred only on the activity factor and only when MDS was used, indicating that meaning intensity does not figure greatly in the present results. Kasschau (1969) also found for single words that high initial meaning was related to meaning loss only using the MDS measure. These results for both single words and paired associates question the propriety of the bipolarity assumption. Comparison of satiation effects for unipolar and bipolar scales should aid in the formulation of this problem.

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Proactive inhibition of initial items in short-term recall*

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Short-term recall of serial lists as a function of item frequency and prior testing was investigated. The experimental results suggested that (1) interference from prior testing obtained for initial items in the list but not terminal items, and (2) frequency had no effect on recall because the experimental method equated item availability across that dimension.

Repetition of inputs has long been regarded as a critical determinant of long-term memory; yet, there is evidence to suggest that a *single* input of digit strings may result in long-term store at least for some of the items (Hebb, 1961; Melton, 1963). Bartz (1969) has argued that such stable storage involves only the "first-presented" (initial) items in the string, while the "last-presented"

(terminal) items are carried in short-term store.

The present study represents a further investigation of the effects of single inputs on short-term and long-term store. However, in place of digits, verbal items varying in frequency of occurrence in the written language were used as experimental units, and the major focus was on cumulative effects of proactive inhibition (PI) deriving from repeated testing. It was anticipated that PI effects, which necessarily involve retention of prior inputs, would be greater for initial items in a serial list to the extent that these items are more likely to enter long-term store following a single input than are terminal items.

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