

Locus of the effect of distinctiveness on response recall

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Subjects were presented a PA list composed of one high and one low distinctive word as the compound stimulus and a single digit as the response. Recall of digits on a test trial to single words was a function of distinctiveness when Ss could not produce the remaining stimulus word for a group asked to recall the digits first. No such effects were found when Ss were asked to recall the words first. The results were interpreted to indicate that stimulus selection occurs and that response recall is based on the ability to recall the more distinctive stimulus.

In a previous study (Jacobus & Leonard, in press), Ss learned a paired-associate (PA) list in which each stimulus contained three adjectives that varied along a distinctiveness (D) dimension. After original learning (OL), each adjective was presented individually to the Ss and they were required to recall the response. Results indicated that as D increased there was an increased recall of the correct response.

It is possible to assume that these results are simply based on a greater cue value for the high D adjectives. However, in discussing the functional stimulus in trigrams, Postman & Greenbloom (1967) pointed out that one element of a compound stimulus might serve to evoke other elements thus reinstating the functional stimulus. The present study is an attempt to ascertain the way in which the more distinctive stimulus element operates to evoke the response. Is it a direct evocation or is it through the process of eliciting the remainder of the stimulus?

In order to evaluate this relationship it was necessary to determine the extent to which the remaining stimulus elements were recalled. To simplify the procedure, only words involving the high (H) and low (L) levels of D were employed.

If the influence of D on response recall (RR) lies in the ability of HD words to reinstate the remainder of the stimulus (whether it is the total stimulus or the LD word which is the effective stimulus) rather than simply selection of a single cue, then the conditional probability of RR when there is no stimulus recall (SR) should be the same for both HD and LD words.

METHOD

The Ss were 24 volunteers from introductory psychology courses. Because of E error two Ss were dropped from the final analysis.

The Ss were required to learn six PAs using the standard anticipation technique presented at a 3:3 rate with a 3-sec intertrial interval. Each of the six stimuli consisted of two words, one word from each of the two D categories. D was defined as a function of the results of a short-term recognition memory experiment of the sort performed by Shepard & Teghtsoonian (1961). The difference between hits (old words called old) and false alarms (new words called old) was the value taken for D. The six high D words (TARDY, ARCTIC, ZEALOUS, JUICY, UNDONE, and RABID) had values ranging from 43 to 45, while the six low D words (LUSTY, EXTREME, SIMPLE, JAGGED, VALID, and FATAL) had D values ranging from 24 to 32. The responses were single digits 2 to 7.

The PA lists were counterbalanced for order of D level and number of times each word in the compound stimulus occurred first. Ss were given 6 or 12 OL trials depending on whether or not a criterion of two successive correct anticipations of the list was reached in the first block of six trials.

After OL, the list of 12 adjectives was presented twice at a 4-sec rate per item. Two quasi-random orders of the words were used with the restriction that half of the words in each half of the list were at each D level. Ss were told to give the word associated with each adjective on one presentation of the list and the number associated with each adjective on the other presentation. Half of the Ss (Group W) recalled words first and numbers second, while the other half (Group N) recalled numbers first and words second.

RESULTS AND DISCUSSION

Two preliminary analyses made on the data are quite revealing in view of the results of the primary analysis. The first, an analysis of the effects of order of recall and D on SR in the test trial, showed significantly greater recall of the other stimulus word for Group W ($F = 4.39$, $df = 1/20$, $p < .05$). The mean number of words recalled was 8.67 for Group W and 6.09 for Group N. No other effects in this analysis were significant. The second analysis showed a significant Order by Distinctiveness interaction when examining RR ($F = 4.84$, $df = 1/20$, $p < .05$). Analysis of the simple effects showed that for Group N the D factor was significant ($t = 2.39$, $df = 20$, $p < .05$) while for Group W the difference was clearly not significant ($t = .5$, $df = 20$, $p > .50$). In addition, the difference between Groups N and W in RR to LD words was significant ($t = 2.39$, $df = 20$, $p < .05$) while for high D words it was not significant ($t = .46$, $df = 20$, $p > .50$). From these effects we might conclude that the immediate attempt to recall the second stimulus word has effects on ability to recall the word, and thus probably on the extent to which there is reinstatement of the second word in attempted recall of the response.

The primary analysis was performed in order to evaluate the effects of SR on RR. The criterion measure used was the conditional probability of a correct response given correct recall (R+) of the second word or given incorrect recall (R-) of the second word. Because several Ss in Group W had no instances of failure to recall the second word, separate analyses were performed for Groups N and W. Both D level and SR were within-Ss comparisons. Thus, a Treatments by Treatments by Subjects design was used (cf. Lindquist, 1953). For Group N the mean probabilities were $HR+ = .77$, $LR+ = .76$, $HR- = .68$, $LR- = .38$. For Group W the mean probabilities were .87, .73, .71, and .62, respectively. A significant interaction between D and SR was obtained for Group N ($F = 25.03$, $df = 1$, $p < .001$). Therefore, the simple effects were examined. Comparing between D levels over the two SR conditions no significant difference was found for the R+ condition; however, HD recall was significantly greater than the LD recall for the R- condition ($t = 9.22$, $df = 10$, $p < .001$). The comparison for R+ vs R- showed no difference for HD words, but for LD words, a significantly greater proportion of correct responses were made for the R+ than the R- condition ($t = 6.38$, $df = 10$, $p < .001$). Thus, the probability of a correct response is about the same for all conditions save LR-. From this it appears that if Ss are unable to recall the HD word it is unlikely they will recall the correct response. This seems analogous to the results obtained by Postman & Greenbloom (1967) for response recall given the first letter of the stimulus trigram in the hard-to-pronounce group. That is, recall occurred if the first letter was given. This indicates that the HD word is the functional stimulus for the PA task.

For Group W it was necessary to drop four Ss from the analysis. In SR they gave all words in one or the other D

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Table 1
Proportion of Subjects in Each Group Making Correct Judgments

Group	NSpSI	NSpWI	SpSI	SpWI
Proportion Judging Correctly	.25	.58	.75	.92
N	12	12	12	12

Table 2
Difference Between Arcsin Transformed Proportions of Table 1

Group	NSpWI	SpSI	SpWI
NSpSI	.63	1.04	1.52*
NSpWI		.36	.84
SpSI			.48

* $p < .05$

Table 3
Proportion of Subjects in Each Group Judging Deductively

Group	NSpSI	NSpWI	SpSI	SpWI
Proportion Judging Deductively	.17	.75	.75	.83
N	12	12	12	12

Table 4
Differences Between Arcsin Transformed Proportions of Table 3

Group	NSpWI	SpSI	SpWI
NSpSI	1.24*	1.24*	1.44*
NSpWI		.00	.20
SpSI			.20

* $p < .05$

"Since those angles aren't equal, those two triangles can't be congruent, so the lines can't be equal." As the example shows, S could give geometric (logical) reasons for an incorrect judgment. The details are given in Table 3. The statistical significance of the obtained differences for this distribution ($U_0 = 15.72$, $df = 3$, $p < .005$) and for all pairs are shown in

Table 4. These results allow us to assert that a significantly greater proportion of Ss in all of Groups SpSI, SpWI, and NSpWI solved the problem logically than did Ss in Group NSpSI.

DISCUSSION

Although Group NSpWI Ss did not make a significantly greater proportion of correct judgments than Group NSpSI Ss, they did derive their conclusions logically to a greater extent than Group NSpSI Ss. This finding is consistent with the hypothesis that as the strength of the empirical properties of the materials diminishes, the tendency to explicate the logical properties of the materials increases.

The results also show that well-specified logical properties are more likely to be explicated than not well specified logical properties, at least when the materials have pronounced empirical properties. This difference is not present when the materials *do not* strongly evoke a particularly strong response tendency. That SpSI Ss did not make more correct judgments than NSpSI Ss indicates that well-specified logical properties were not enough to overcome the influence of a strong illusion in determining the *kind* of judgment (right or wrong) Ss made, although they did determine *how* he made the judgment (i.e., logically vs perceptually).

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NOTES

1. Based on a part of a doctoral dissertation entitled "The effects of the representations of the goal and the problem materials on the problem solving process," supervised by Dr. M. Simmel and submitted to the Faculty of Graduate Studies, Brandeis University.
2. Now at the Institute for Cognitive Studies, Rutgers, the State University, Newark, N. J. 07102.

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category correctly, and it was impossible to compute probabilities for the R- condition. The results of the analysis showed no significant differences. While this might be attributed to the loss of df , it is more likely, in view of the small differences obtained, that it represents the true state of affairs. This is perhaps the result of some continued learning of the coordinate stimulus word during the presentation of the words alone. Certainly it was possible to have a certain amount of consolidation in the case where the LD member of the pair was recalled to the HD member following failure to recall the HD member to the LD.

The results of this study support the previous finding of Jacobus & Leonard (in press) that distinctiveness of words in a compound stimulus provides the basis for cue selection. The

results also indicate that integration of the stimulus components assists recall by the capacity of the less distinctive stimulus to evoke the more distinctive stimulus.

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