The generality of free-recall:

II. Performance as a function of type of material

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The Ss were tested on a variety of materials in a multiple trial free-recall paradigm. Correlations between performance on the differing materials suggest that S's score on any given trial represents a combination of general free-recall factors and factors specific to the kind of material.

In a previous article (Gorfein, Blair, & Rowland, 1968) we reported that subjective organization was not a general ability factor. Ss' ability to organize materials in free-recall was shown to be dependent on the content of the to-be-remembered list. This paper presents other analyses of that free-recall data. Correlations involving item acquisition and retention are examined in order to further clarify what part of performance is common to the free-recall task in general and what part is specific to a given class of to-be-remembered materials.

MATERIALS

Forty-item lists of four different materials were used: CCCs of 50% Association Value (Witmer, 1935); CVCs [full range of m' (Noble, 1961) from 0.17 to 4.14]; 10 most frequent words from each of Bousfield's (1953) four-category lists; 40 unrelated words matched for Thorndike-Lorge (1944) frequency with the Bousfield words.

SUBJECTS

Thirty-seven paid volunteers served in all conditions but the CVC condition in which one S was lost.

PROCEDURE

The Ss were divided at random into two groups. The CCC, Categorized (CAT), and word lists were tested on three consecutive evenings with one group receiving the list in that order while the other had the reverse order. CVCs were tested approximately four weeks later. Testing was at the same hour in adjacent rooms for the CCC and unrelated word lists. The categorized word list and CVC list were tested with both groups together. Items were projected visually at a 1-sec rate. Four minutes were allowed for recall. Seven trials were run in a session with items presented in new scrambled orders on each trial.

RESULTS AND DISCUSSION

In the scoring of all measures reported, each group was scored separately and individual scores were then converted to T-scores ($T = 50 + 10Z$) before correlations on the combined samples were run.

Table 1 shows the trial by trial correlations of performance

Table 1
Correlations of Trial Performance^{2,3}

	1	2	3	4	5	6	7
CCC-CVC	50	54	60	56	65	69	60
-Words	35	42	35	39	54	50	52
-CAT	20	46	46	27	44	44	44
CVC-Words	51	55	57	70	69	66	78
-CAT	54	64	77	70	73	75	78
Words-CAT	62	68	64	75	64	63	74

Table 2
Correlations of Relative Gain Item Scores (RGI)^{2,3}

	CVC	Words	CAT
CCC	55	51	72
CVC		49	63
Words			65

Table 3
Correlations of Relative Gain Score Measure (RGS)^{2,3}

	CVC	Words	CAT
CCC	52	43	51
CVC		60	55
Words			68

Table 4
Correlations of Retention Measures (R)^{2,3}

	CVC	Words	CAT
CCC	37	16	23
CVC		62	30
Words			22

for the four materials. In general the size of the correlation shows an increase across trials with Trial 1 the lowest in all rows and Trial 7 among the highest. This suggests that initially the factors that determine performance are more or less specific to the kind of material but more general factors tend to predominate as trials progress. The hypothesis of a specific factor of the kind of material is further demonstrated in that CAT and Words show the highest Trial 1 correlation and CCC, CVC is higher than any of the other correlations involving CCCs. Thus the more the materials are alike the greater the commonality in performance. This will be further tested by a study using lists of CVCs varying in meaningfulness (and presumably commonality).

In a previous study (Gorfein & Bennett, 1967) we presented a rationale for three measures derivable from intertrial free-recall performance: Relative Gain Items (RGI), Relative Gain Score (RGS) and retention of new items gained (R). These measures are computed as follows:

(1) *Relative gain items (RGI)*: For all but CCCs the number of new items gained on Trials 2-4 were counted and expressed as a ratio to number possible, $40 - \text{Trial 1 Score}$. For CCCs the learning rate was so slow that the measure was computed across Trials 2-7 in order to increase reliability.

(2) *Relative gain score (RGS)* = $(\text{Trial 4 Score} - \text{Trial 1 Score}) / (40 - \text{Trial 1 Score})$ for all but CCCs where Trial 7 was used instead of Trial 4.

(3) *Retention of new items gained (R)*: Each item reported for the first time after Trial 1 was counted and checked to see if it was reported on the next trial. $R = \text{Number retained to next trial} / \text{Number new items learned}$.

Tables 2-4 report analyses of these measures.

Table 2 shows the intercorrelations of the RGI measures, while Table 3 shows the matrix of intercorrelations for RGS. Both of these measures show higher correlations across materials than those found for Trial 1 performance. A lone exception to this trend is the correlation of CVC, Words for RGI. The overall result is consistent with the idea that as trials progress factors common to all free-recall performance play a larger part while the importance of factors specific to a kind of material tend to decrease.

An examination of the correlations among R scores (Table 4) presents a different picture. The only significant correlations in the matrix are CCC, CVC and CVC, Words. The reasons for this particular pattern are unclear to the authors. The pattern, however, does once again suggest the importance of material specific factors in the determination of intertrial performance. Further research is under way to determine the correlates of intertrial retention.

It therefore seems clear from these analyses and those we previously reported that an S's trial performance on a free-recall task is influenced by his ability to perform in free-recall studies in general as well as his ability to encode and retain specific kinds of to-be-remembered materials.

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NOTES

1. This is a report of an independent study project conducted by the two junior authors under the supervision of the senior author. It was written at the Human Performance Center, University of Michigan, while the senior author was in residence there under the NSF-RPCT program.
2. For CVCs: $N = 36$ $r > .43$ $p < .01$; $r > .33$, $p < .05$. For all other measures: $N = 37$ $r > .42$ $p < .01$; $r > .33$, $p < .05$.
3. All correlations are reported with decimal points omitted.