DIFFERENTIAL EFFECTS OF INCIDENTAL TASKS ON
THE ORGANIZATION OF RECALL OF A LIST
OF HIGHLY ASSOCIATED WORDS

THOMAS S. HYDE AND JAMES J. JENKINS

University of Minnesota

In three experiments involving 17 groups, the amount and organization of
recall of word lists varied with the type of incidental task performed by Ss
during presentation of the list. All Ss heard a randomized list of high-
strength primary word associates. When the incidental task required using
the word as a semantic unit (rating the word as to its pleasantness), recall
and organization were equivalent to those of a control group with no
incidental task. When the incidental task involved the word as an object
(checking for certain letters or estimating the number of letters in the
word), recall and organization were greatly reduced. The effects were
unaltered by incidental-plus-recall instructions, doubling presentation time,
and presenting the list twice.

The value of the free recall situation for
studying the organization of verbal materials
in memory is well known. Substantial dif-
ferences in amount of recall can be produced
by varying stimulus materials and, ordinarily,
theses differences can be attributed to differ-
ences in the organization imposed by Ss on
the material recalled. Such recall-facilitating
organization is variously referred to as sec-
ondary organization, subjective organization,
clustering, etc. Reviews of this literature
may be found in Cofer (1965), Mandler
(1967), and Tulving (1968).

In general, it appears that meaningful re-
lations (taxonomic classes, logical classes,
and prior associative relations) lead readily
to well-organized recall. Repetition of the
materials in new random orders and success-
ive recall attempts also lead to increasing
degrees of organization even in seemingly
unrelated materials.

A problem of particular interest now is the elucidation of the mechanisms which
bring this organization about. If, along with
Melton (1963), we conceptualize the mem-
ory sequence as trace formation, trace stor-
age, and trace retrieval, a first step in choos-
ing among mechanisms might be: Where is
this input, storage, and output model shall
we suppose the organization occurs?

Some studies have assumed that the or-
ganization takes place via mediation during
the activity of recall itself. This view, which
was explicitly advanced by Jenkins and Rus-
sell (1952), is compatible with Deebe's
(1959) work and is echoed in Cofer's (1965)
review. It holds that once a word is re-
called, it acts as an auxiliary stimulus to
help elicit another word that was on the list.

Tulving (1962, 1964, 1966), on the other
hand, views such organization as a storage
phenomenon, with the list of items being
stored under higher order units correspond-
ing to the relations existing in the stimulus
lists. Organization in free recall reflects the
organization within the memory storage it-
self.

Cohen (1966) and Slamecka (1968) sug-
gested mechanisms of still a different sort: Slamecka, e.g., postulated that traces of in-
dividual items are stored independently, but
that S also encodes some general representa-
tion of the list structure as a retrieval plan
or strategy which guides the recall of the
items. Highly organized stimulus lists pro-
duce greater recall and more organization

because they are more amenable to
highly organized and efficient retrieval
or strategy.

Both Cofer (1965) and Tulving (1)
suggested that it might be profitable to
the intra-experimental situation and loc
differences in organization of recall
holding the stimulus materials constant
large and consistent differences in orga
nization can be produced with intra-experi
manipulations, it may be possible to sep
the roles played by encoding, storage
retrieval in the production of organiza
The present study is an effort in that re

The experiments reported here
modeled on a study by Postman, A.
and Bohm (1956) which compared the
of high-strength primary associates in gr
that performed incidental tasks during
sentation of the words. The S' s whose
was to rate the words as to frequency
usage in English showed lower recall
S given standard recall instructions.
aced recall was not, however, accompa
by any reduction in the relative amount
organization (clustering of pa
Pilot work for the present study was
lar in design to the Postman et al. (1
experiment, but the results were quite
terent. Several types of incidental
were found to effect a marked reductio
both the organization and amount of re
Other tasks had little or no effect on e
dependent variable as compared to a co

The guiding hypothesis, arising from t
study, was that clustering in r
depends on the use to which Ss put
words during the incidental tasks. T
that involved meaningful interpretation
the stimulus materials (words as semi
ments) were expected to have little or
fect on clustering, while tasks which
quired nonmeaningful treatment of the s
(words as objects) were expected to
fect a reduction in organization (clust
ing) and a corresponding decrement in re

METHOD

In all experiments there were three basic gr
the recall only group simply heard the words,
INCIDENTAL TASKS AND ORGANIZATION IN RECALL

JENKINS

The experiments reported here were modeled on a study by Postman, Adams, and Bohm (1956) which compared the recall of high-strength primary associates in groups that performed incidental tasks during presentation of the words. The subjects whose task was to rate the words as to frequency of usage in English showed lower recall than the group given standard recall instructions. Reduced recall was not, however, accompanied by any reduction in the relative amount of secondary organization (clustering of pairs).

Pilot work for the present study was similar in design to the Postman et al. (1956) experiment, but the results were quite different. Several types of incidental tasks were found to effect a marked reduction in both the organization and amount of recall. Other tasks had little or no effect on either variable as compared to a control group which performed no incidental task.

The guiding hypothesis, arising from these pilot studies, was that clustering in recall depends on the use to which the primary associates are put during the incidental tasks. Tasks that involved meaningful interpretation of the stimulus materials (words as semantic units) were expected to have little or no effect on clustering, while tasks which required no meaningful treatment of the stimuli (words as objects) were expected to effect a reduction in organization (clustering) and a corresponding decrement in recall.

Method

In all experiments there were three basic groups: the recall only group simply heard the words, with the instructions that they were to recall the words later. The incidental group was given some task to perform on the stimulus materials during their presentation. The incidental + recall group performed the same task as that performed by the appropriate incidental group, but the subjects were also told that they would have to recall the words later. The major variable of interest within each experiment was the amount of organization of the recall of the word list by the groups of Ss who performed different types of incidental tasks during presentation of the words.

All Ss were students in sections of a course in introductory laboratory psychology at the University of Minnesota. All experiments were conducted in the classroom. Each separate section made one group. Assignment of sections to sections was not random, with respect to academic ability, college major, department, aptitude, sex, or any other variable known to be relevant to the learning of verbal material. Experimental conditions were randomly assigned to the sections, with the restriction that all sections were run first, in order to keep the true nature of the experiment from becoming known to these Ss.

Stimulus materials consisted of the 12 pairs of primary associates used by Jenkins, McNamara, and Russell (1958) in their high-strength recall list. These were the Kent-Rosanoff pairs with the highest associative strength in the early Minnesota norms (Rusell & Jenkins, 1954). The mean frequency of response for these pairs was 40.8%, with a range of 24.5% to 41.2%. The words were presented to Ss in a random order, with the restriction that primary associates could not occur together in the list. All groups in the first two experiments were presented with a list of the same word order. In the third experiment, where the words were presented twice, the second reading of the list was a different randomization. All word lists contained four “filler” words, two at the beginning and two at the end. Fillers were selected from the Minnesota norms so that they showed no appreciable associative strength with any of the 24 stimulus words. Filler words were not counted in any data analyses.

All stimulus materials were recorded and presented to Ss via tape recorder during the experiment. Within each experiment the same tape was used for all groups.

Although all experiments were conducted simultaneously and any condition may be compared to any other, for the sake of the reader, the findings are presented as three experiments, grouped on presentation conditions.
Seven groups of Ss in the first experiment were presented with one reading of the stimulus words at a rate of one word every 2 sec. The Ss in the recall-only group were told the list of words with the instruction that they would have to recall them as soon as E finished his presentation. The remaining six groups differed from each other in two respects. Three of them were incidental groups and three were incidental + recall groups. The former groups were not warned about the recall task, while the latter groups were. Within each of these conditions there were three different incidental tasks. It was hypothesized that one task (pleasant-unpleasant) would facilitate recall and clustering, while the other two tasks would adversely affect recall and clustering. The three tasks performed by Ss were as follows:

1. The pleasant-unpleasant task. Two groups of Ss rated the words as to their pleasantness or unpleasantness on a simple checklist with one line for each stimulus word.

2. The “E” task. Two more groups were given the task of detecting E’s in the words that were read to them. The Ss had a check list with spaces for each stimulus word. They were directed to check if the word contained an E, otherwise to leave the space blank. Eight of the 24 stimulus words contained at least one E.

3. The number-of-letters task. Two other groups of Ss estimated the number of letters in each word. They were told not to count letters, but to estimate the number and write it in the space provided for each word. The instructions for these same tasks to the subgroups in the incidental + recall condition were modified to indicate that Ss would have to recall the words when the task was finished. He was encouraged to do his best on both of the tasks and told that if he did not do his best on the first task, his results on the second (recall of the words) would be of little value. When the presentation of the list was finished, a set of standard recall instructions was read to all groups. The Ss were then allowed 5 min. to recall as many words as they could. Very few Ss recalled any words during the fourth and fifth minutes of the recall period.

Results and Discussion

Four different variables were analyzed:

1. Mean recall. This was the mean for each group of the total number of words recalled by each S, excluding the four filler words.

2. Percentage of clustering per opportunity. A cluster consisted of the recall of an associated pair together in either a forward or a backward order. Recall of one member of the pair constituted an opportunity for clustering to occur. If one member of the pair occurred alone, it was scored as a cluster for that opportunity. If one member of the pair occurred later in recall, it was not scored as an opportunity for clustering. The score reported for each group was the mean percentage of clustering per opportunity.

3. Mean categories. This was the following measure and the following measure are the same as those used by Cohen (1966). A category was simply an opportunity for clustering. When a member of a pair occurred in recall, it was scored as one category, whether or not it was followed by its associate. If one member of a pair occurred alone in recall and was scored as a category, the later recall of the other member of the pair was not scored as a category. The value reported for each group was the mean of the number of such categories recalled by each S in the group.

4. Mean items per category (IPC). This was simply the mean items per category for Ss in each group. This measure was the total recall for each S divided by the number of categories that he recalled. This measure differed from the clustering measure in that words did not have to occur together, i.e., clustered, to be counted as members of the same category.

Results for the first experiment are reported in Table 1. The means and standard deviations for each of the four variables are given for each group, as well as the number of Ss. In the table the groups are numbered from one to seven to facilitate the statistical analysis.

One-way analysis of variance indicated statistical significance for each of the variables across the seven groups. A value far exceeded the .001 level of significance.

Mean recall. Contrasts on individual means yielded consistent results across four variables. Consider first the mean recall variable within the incidental condition. Group 1 (pleasant-unpleasant task) was significantly different from Groups 2 (E) and 3 (number of letters), $F (1, 250) = 67.3, p < .01$; $F (1, 250) = 65.069, p < .01$. Groups 2 and 3 did not differ significantly from each other. Group 1 did not differ significantly from the recall-only group (Group 7). Both Groups 2 and 3 were significantly different from Group 7, $F (1, 250) = 59.718, p < .01$; $F (1, 250) = 35.151, p < .01$.

Results were almost identical for the mean recall within the incidental + recall condition. Group 4 (pleasant-unpleasant) was significantly different from Group 5 (E) and 6 (number of letters), $F (1, 250) = 50.9, p < .01$; $F (1, 250) = 23.064, p < .01$. Within this condition, Group 5 recalled words better than did Group 6, $F (1, 250) = 5.223, p < .05$. Group 4 did not differ from the recall-only group (Group 7). Groups 5 and 6 were both significantly

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean recall</th>
<th>Percentage of clustering</th>
<th>Mean categories</th>
<th>Mean IPC</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Mean recall</td>
<td>16.3</td>
<td>3.3</td>
<td>67.5</td>
<td>22.8</td>
<td>8.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Percentage of clustering</td>
<td>3.1</td>
<td>28.3</td>
<td>23.7</td>
<td>28.3</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Mean categories</td>
<td>8.9</td>
<td>6.3</td>
<td>1.5</td>
<td>1.5</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Mean IPC</td>
<td>1.5</td>
<td>3</td>
<td>1.5</td>
<td>1.5</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>SD</td>
<td>43</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INCIDENTAL TASKS AND ORGANIZATION IN RECALL

TABLE 1
MEANS AND STANDARD DEVIATIONS FOR ALL VARIABLES FOR EXP. I

<table>
<thead>
<tr>
<th>Variable</th>
<th>Incidental</th>
<th>Incidental + Recall</th>
<th>Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pleasant-</td>
<td>Unpleasant-</td>
<td>Pleasant-</td>
</tr>
<tr>
<td></td>
<td>Unpleasant</td>
<td>Unpleasant</td>
<td>Unpleasant</td>
</tr>
<tr>
<td>Mean recall</td>
<td>16.3</td>
<td>9.4</td>
<td>9.9</td>
</tr>
<tr>
<td>SD</td>
<td>3.1</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Percentage of clustering</td>
<td>23.7</td>
<td>23.8</td>
<td>22.8</td>
</tr>
<tr>
<td>Mean categories</td>
<td>8.9</td>
<td>6.3</td>
<td>6.5</td>
</tr>
<tr>
<td>SD</td>
<td>1.8</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Mean IPC</td>
<td>3.2</td>
<td>3.3</td>
<td>3.3</td>
</tr>
</tbody>
</table>

The scores reported for each group in the mean percentage of clustering are: Group 1, 23.7%; Group 2, 23.8%; Group 3, 22.8%; Group 4, 21.3%; Group 5, 27.1%; Group 6, 27.7%; Group 7, 28.4%. The mean and standard deviations for each of the variables are given in Table 1. The means and standard deviations for each of the four variables are given for each group, as well as the number of Ss. In the table the groups are numbered from one to seven to facilitate the statistical analysis.

One-way analysis of variance indicated statistical significance for each of the four variables across the seven groups. All F values far exceeded the .001 level of significance.

Mean recall.—Contrasts on individual cell means yielded consistent results across the four variables. Consider first the mean recall variable within the incidental condition. Group 1 (pleasant-unpleasant task) was significantly different from Groups 2 (Es) and 3 (number of letters), F (1, 250) = 67.778, p < .01; F (1, 250) = 65.069, p < .01. Groups 2 and 3 did not differ significantly from each other. Group 1 also did not differ significantly from the recall-only group (Group 7). Both Groups 2 and 3 were significantly different from Group 7, F (1, 250) = 59.718, p < .01; F (1, 250) = 66.151, p < .01.

Results were almost identical for the mean recall within the incidental + recall condition. Group 4 (pleasant-unpleasant) differed significantly from Groups 5 (Es) and 6 (number of letters), F (1, 250) = 15.231, p < .01; F (1, 250) = 23.064, p < .01. Within this condition, Group 5 recalled fewer words than did Group 6, F (1, 250) = 15.231, p < .01. Group 4 did not differ from the recall-only group (Group 7). Groups 5 and 6 were both significantly different from Group 7, F (1, 250) = 44.253, p < .01; F (1, 250) = 20.196, p < .01.

Analyzing differences within tasks across the intentionality conditions, only the number-of-letters task showed a significant difference, F (1, 250) = 9.176, p < .05, indicating that recall prewarning had a positive effect. Differences between Groups 1 and 4 and between 2 and 5 were not significant.

Clustering.—Results for the second variable, percentage of clustering, were almost identical to those reported for the first variable, mean recall. Within the incidental subdivision the results were exactly the same as for the first variable. All significant F values far exceeded the .01 level of significance. Within the incidental + recall subdivision there was a return to the general regularity; Groups 5 and 6 were not significantly different as they had been with mean recall. In analyzing differences within tasks across the intentionality condition, results were also slightly different from the first variable. Groups 3 and 6 (number of letters) were not significantly different as they had been with mean recall. Instead, Groups 2 and 5 (Es) were significantly different, F (1, 250) = 6.472, p < .05. In all other respects the results were the same as for mean recall. All significant F values far exceeded the .01 level of significance.

Categories.—The results for the third variable, mean categories, followed the same pattern as the results from the first two
INCIDENTAL TASK

THOMAS S. HIDE AND JAMES L. JENKINS

variables. Within the incidental condition, different effects on the groups in the

the results were identified to the main analysis for each task. The pleasantness
task showed a significant difference between the tasks as the results yielded. The pleasantness

The results from the mean recall of the incidental condition are also shown in Table 1.

The mean recall and mean recall in the incidental condition are also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.

The mean recall for the incidental condition is also shown in Table 1.
different effects on the groups in the tal and the incidental + recall condition. For mean recall, the number-of-letters showed a small but significant differ- for the percentage-of-clustering e the E task showed a small but sig- difference. For the last two vari- mean categories and mean IPC, none tasks showed a difference across these ons.

**TABLE 2**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Incidental</th>
<th>Incidental + Recall</th>
<th>Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pleasant- Unpleasant (1)</td>
<td>E (2)</td>
<td>Number of letters (3)</td>
</tr>
<tr>
<td>Mean recall</td>
<td>5.4</td>
<td>3.8</td>
<td>3.4</td>
</tr>
<tr>
<td>SD</td>
<td>1.7</td>
<td>1.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Percentage of mean recall/total recall</td>
<td>32.7</td>
<td>42.2</td>
<td>33.5</td>
</tr>
<tr>
<td>SD</td>
<td>7.9</td>
<td>18.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Percentage of clustering</td>
<td>50.0</td>
<td>40.4</td>
<td>41.3</td>
</tr>
<tr>
<td>N</td>
<td>28.9</td>
<td>34.0</td>
<td>38.6</td>
</tr>
</tbody>
</table>

In all cases where the recall was significantly different between groups, the mean recall of words with an E differences exceeded the .01 level of cance. But the recall of words containing an E corrected for total recall, a much different pattern emerged. Groups 2 and 5 that used the task of looking for E and the incidental condition, Group E and Group F (6, 250) = 3.596, p < .01, in the incidental condition. Group 2 was significantly greater than Groups 1, 7, F (1, 250) = 11.231, p < .01; F (1, 250) = 10.138, p < .01; F (1, 250) = 1, p < .01. Within the incidental + recall condition, Group 5 (Es) was significantly greater than Groups 6 and 7, F (1, 250) = 4.623, p < .05; F (1, 250) = 5.02, p < .05. Group 3 did not differ significantly from Group 4.

Analysis of the third variable, percentage of clustering of words containing an E, yielded statistically unreliable results. The rather high percentage of clustering found in all groups (see Table 2) can be explained as being due to the fact that half of the words containing an E occurred in words that were primary associates.

Groups that looked for Es showed higher proportional recall of words with an E. In the organizational measure, however, there were no differences. The Ss who performed the task of looking for Es did not show a significantly greater tendency to organize their recall around this dimension.

**EXPERIMENT II**

In the second experiment, Ss were given a much longer time interval per word during stimulus input. The words were read at a rate of one word per 4 sec. rather than one per 2 sec. as in the first experiment. This was the rate of presentation used by Postman et al. (1956) and was the major difference, other than the type of task, between our pilot work and Postman's experiment. This condition was run as both a systematic replication of the first experiment, and, also, as an attempt to clear up differences in results found between the pilot work and Postman's experiment.

The number-of-letters task was dropped from the study at this point. This made a total of five groups in all. The control group was similar in all respects to the control group in the first experiment, except that the words were read at a slower rate. The four remaining groups were made up of the two remaining incidental tasks, the pleasant-unpleasant task, and the task in which Es looked for letters. These were again subdivided into two subgroups across the intentionality condition. The task in which Es looked for letters was changed slightly to fill up the longer time interval; instead of checking the response sheet for the presence of the letter E, Es now looked for either Es or Gs and made a check if either or both of these letters were present in the word.

Instructions for all groups were changed slightly to accommodate the new conditions, and Ss were told that they would have plenty of time for the task.

**Results and Discussion**

Results for the second experiment are reported in Table 3. The results are almost identical to those in the first experiment. One-way analysis of variance showed highly significant results with all four of the variables. All F values far exceeded the .001 level of significance.
Comparisons of individual means yielded results that were consistent across the four variables and also consistent with the results for Exp. I.

**Mean recall.**—Within the incidental condition, Group 9 (E-G) was significantly different from both Groups 8 (pleasant-unpleasant) and 12 (recall only). Group 8 did not differ significantly from Group 12. Within the incidental + recall condition, the same pattern of differences emerged: Group 11 (E-G) was significantly different from Groups 10 (pleasant-unpleasant) and 12 (recall only), while Group 10 did not differ from Group 12. Within tasks across the intentionality conditions, the E-G task showed a significant difference, but Groups 8 and 10 (pleasant-unpleasant) were not significantly different. All significant $F$ values were beyond the .01 level of significance.

**Percentage of clustering.**—Exactly the same pattern of results obtained for the second variable, percentage of clustering. All significant $F$ values far exceeded the .01 level of significance.

**Mean categories.**—Results for the third variable, mean categories, were identical with the earlier findings except that the E-G task showed no difference across the intentionality conditions; i.e., the Group 9 vs. 11 comparison was not statistically significant. All significant $F$ values far exceeded the .01 level of significance.

**Mean IPC.**—Results for the last variable, mean IPC, were the same in all respects as those for the first two variables. All significant $F$ values far exceeded the .01 level of significance. It is again clear that the pattern is consistent for all four variables and the overall pattern is the same as for the first experiment.

**EXPERIMENT III.**

In the third experiment, the conditions were the same as in the first experiment except that the word list was read twice to Ss at a rate of one word per 2 sec. The first randomization of the list was the same as in the first two experiments; the second time through the list a second randomization was used. Treatments were arranged as in the second experiment. Instructions were the same as those in the first experiment except that Ss were told that many of the words would be read more than once. Response sheets included spaces to respond to 52 words, rather than 28 as in the first two experiments.

The third experiment was primarily a systematic replication of the first two experiments, across a different intraexperimental variable (repetition) known to have an effect on clustering in recall.

**Results and Discussion.**

Results for the third experiment, reported in Table 4, mirror those of the first two experiments. All consistent findings earlier experiments were significant beyond the .001 level.

**Mean recall.**—Results for the mean variable confirmed the earlier major finding. Group 14 (E) was significantly different from Groups 13 (pleasant-unpleasant) and 17 (recall only). Groups 13 and 17 differ significantly. Within the incidental recall condition, the same pattern of occurred; Group 16 (E) was significantly different from Groups 15 (pleasant-unpleasant) and 17 (recall only), while Group 10 did not differ significantly from Group 12. Differences within the tasks across intentionality variable were not statistically significant.

**Other variables.**—The results for the three variables were identical in all respects those for mean recall. All significant values far exceeded the .01 level of significance.

**GENERAL DISCUSSION**

The major finding from these three experiments is that the tasks performed by Ss, they listen to verbal stimuli greatly affect amount of free recall and the apparent organization of the material recalled. Two tasks studied here, having Ss look for the E in the words and having Ss estimate the number of letters in the words, greatly reduced recall and the organization in recall measured by percentage of clustering, other task, rating words as pleasant or unpleasant.
INCIDENTAL TASKS AND ORGANIZATION IN RECALL.

TABLE 4
MEANS AND STANDARD DEVIATIONS FOR ALL VARIABLES FOR EXPS. 1, 2, 3, 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>Incidental</th>
<th>Incidental + Recall</th>
<th>Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLEASANT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpleasant</td>
<td>(13)</td>
<td>(14)</td>
<td>(15)</td>
</tr>
<tr>
<td>Mean recall</td>
<td>18.7</td>
<td>13.1</td>
<td>18.5</td>
</tr>
<tr>
<td>SD</td>
<td>2.2</td>
<td>2.7</td>
<td>2.0</td>
</tr>
<tr>
<td>Percentage clustering</td>
<td>23.4</td>
<td>25.7</td>
<td>24.7</td>
</tr>
<tr>
<td>Mean categories</td>
<td>10.1</td>
<td>10.0</td>
<td>10.3</td>
</tr>
<tr>
<td>SD</td>
<td>1.0</td>
<td>1.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Mean IPC</td>
<td>1.7</td>
<td>1.7</td>
<td>1.8</td>
</tr>
<tr>
<td>SD</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>33</td>
<td>34</td>
</tr>
</tbody>
</table>

*IPC.—Results for the last variable, PC, were the same in all respects as the first two variables. All significant F values exceeded the .01 level of significance. It is again clear that the pattern is the same as for the first experiment.

EXPERIMENT III

The third experiment, the conditions were the same as in the first experiment except that the list word list was read twice to the subjects of one word per 2 sec. The first presentation of the list was the same as in the two experiments; the second time the list was a second randomization of the first. Treatments were arranged as in the experiment. Instructions were the same as in the first experiment except that the instructions were different. All significant F values exceeded the .01 level of significance.

Other variables.—The results for the other three variables were identical in all respects to those for mean recall. All significant F values exceeded the .01 level of significance.

GENERAL DISCUSSION

The major finding from these three experiments is that the tasks produced by the Ss while engaging in an incidental task, affect the performance of the task. Two of the tasks studied here, having Ss look for the letter E in the words and having Ss estimate the number of letters in the words, greatly reduced recall and the organization in recall as measured by percentage of clustering. The other task, rating words as pleasant or unpleasant, reduced neither recall nor organization in recall as compared to the recall-only group. Rather surprisingly, this result was obtained for both the incidental and the incidental + recall conditions. Furthermore, the effects attributable to the nature of the task were very large and reliable. For example, the differences in percentage of clustering between the pleasant-unpleasant and the Control group within the incidental condition were 40% or greater.

The E and the number-of-letters task sometimes showed higher recall and higher percentage of clustering in the incidental + recall condition than they did in the incidental condition. These differences were small, however, and often failed to reach statistical significance.

One possible explanation for the differences in organization and recall produced by the different tasks is that the two tasks, E and number of letters, somehow led to some type of "counterorganization," which was insufficient. To check this hypothesis, the occurrences in recall of words containing the letter E were analyzed. It was found that Ss showed no tendency to organize their recall around those words containing an E; it appears that we must look elsewhere for an explanation of these differences.

What can be said about the differences in the tasks which produced such widely different results in organization in recall? Before a definitive division can be made between tasks that produce decrements in recall organization and tasks that do not, more research on many different types of tasks is needed. Current findings suggest to us that when S is performing...
some task where he is using the word as a semantic unit, organization in recall and, consequently, recall itself are not adversely affected.

In the present experiments the pleasant-implausible task is of this type. The task used in the Postman et al. (1966) experiment where Ss rated the words as to their frequency of usage in the English language appears also to be of this type.

What about the other "type" of task? In the other two tasks, the present Ss appear to use words as objects or collections of letters rather than as units of meaning. This type of task seemed to lower the organization in recall consistently to a very great degree.

What do these results have to say with regard to the several mechanisms suggested to account for organization in recall? It seems that no matter how we characterize the differences between the tasks (the way S uses the word, amount of attention required of S, etc.) that produce differences in organization in recall, we are led to the same locus of the effect—the nature of the stored trace.

The first mechanism discussed was the notion that the organization in free recall is a primarily meditational phenomenon taking place during the recall itself. The results of the present experiments do not lend support to such a postulation. During recall all the groups in the study were under essentially the same conditions. It is hard to explain, therefore, why all the groups did not show the same degree of organization in recall. This suggests, rather, that the groups were somehow unequal with respect to organization before the recall process began.

Cohen (1966) and Slammeck (1969) emphasize the input stage, suggesting that S is acquiring both the individual words and also some representation of the general structure of the list (Slammeck) or codes corresponding to the categories (Cohen). This seems more plausible since it deals with the locus of the present experimental manipulations, but still fails to be very persuasive as an explanatory device. The most damaging part of the present results to such an interpretation is the lack of any consistent difference in organization within the same tasks across the intentionality variable. The differences within the tasks across the incidental and incidental + recall conditions were small and more often than not failed to show statistical significance. The incidental + recall condition produced decrements in organization nearly equal to the incidental condition for the two tasks that interfered with organization. If the organization in recall is due to some encoding of a general representation of the list structure, the group that knew they were going to have to recall the words ought to have superior organization in recall. Even if such a process is covert and more or less automatic, any instructions that the words are to be recalled should produce a set in Ss conducive to the operation of such a mechanism. (Incidentally, questioning of the 244 Ss in the seven incidental groups after the experiment showed only 10 Ss suspected that they might be required to recall the words.) The failure to find a difference associated with intention does not encourage us to believe we have a simple input variable.

The final suggestion as to a mechanism is that of Tulving (1962, 1966), who suggested that it is the traces of the words themselves that are stored together in some fashion that serves to facilitate organization in recall. The present work, like Tulving's, seems to fit with some type of storage suggestion more easily than with any other type of suggestion. The large differences between tasks, as well as the lack of differences along the intentionality condition, seems to suggest that differences in organization found in recall reflect differences in the way traces of individual items are arranged in storage. It is tentatively suggested that when words are used as units of meaning (the pleasant-implausible task, and the Postman et al., 1966, frequency estimation task), the semantic components of the words are activated. If the associates are strongly related semantically (and we know they are), this assures that common structures are activated in the task. Thus on the search for recall, the items to be recalled are found together. On the other hand, when words are used by Ss as a collection of symbols devoid of meaning (at least as far as the task is concerned), the common structures are not activated and the recall is unorganized. The effect may be further augmented by some general superiority of semantic activity in processing materials for later recall.

REFERENCES
JENKINS, J. J., MINE, W. D., & RUSSELL, W. A. 
Associative clustering as a function of verbal 
association strength. Psychological Reports, 

JENKINS, J. J., & RUSSELL, W. A. 
Associative clustering during recall. Journal of Abnormal 

MAHLEN, G. Organization and memory. In 
K. W. Spence & J. T. Spence (Eds.), The psychology 
of learning and motivation. Vol. I. New 

MAYES, A. W. Implications of short-term 
memory for a general theory of memory. Journal of 

POSTMAN, L., ADAMS, P. A., & BORTH, A. M. 
Studies in incidental learning: V. Recall for 
order and associative clustering. Journal of 

RUSSELL, W. A., & JENKINS, J. J. The complete 
Minnesota norms for responses to 100 words 
from the Kent-Rosanoff Word Association Test. 
(Received April 4, 1959)

REFERENCES

C. N. Some factors in the organizational 
determants of free recall. American 

B. H. Some-of-name characteristics of 
behavior. Journal of Verbal Learning 

J. Influence of inter-item associative 
threshold upon immediate free recall. Psychologi 
cal Reports, 1959, 5, 305-312.