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ABSTRACT

The purpose of this study was to investigate the effects of underlining on material which subjects were expected to learn. The subjects were 120 female undergraduate students enrolled in an introductory psychology course. All subjects were presented with a booklet containing instructions on the first page followed by a passage of approximately 700 words about the Isle of Capri. The experimental conditions consisted of: relevant underlining by experimenter, relevant underlining by the subject, irrelevant underlining by experimenter, and irrelevant underlining by subject. Relevancy was defined as being those words which were the correct alternatives to the test questions. A control group received the passage on Capri with no underlining included by the experimenter, and the subject was not permitted to underline. The results indicated that when relevant material was underlined, performance was better than when irrelevant material was underlined. The overall performance of the groups in which the experimenter did the underlining tended to be higher than the overall performance of groups in which the subject did the underlining. (WR)

# AN EXAMINATION OF THE PRACTICAL IMPORT OF THE VON RESTORFF EFFECT

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## Abstract

To investigate the effects of relevancy of isolation, source of isolation, and trials on the learning of prose material, 120 Ss (female, undergraduate students in introductory psychology courses) were assigned to one of four experimental conditions: relevant underlining by S (S-R), relevant underlining by E (E-R), irrelevant underlining by S (S-I), and irrelevant underlining by E (E-I). Relevancy, source of isolation, and trials were all significant beyond the .001 level. The interaction of source and relevancy was significant beyond the .01 level. The S-R and E-R and E-I groups were all significantly different ($p < .05$) from the S-I group.

## Introduction

Although the von Restorff effect has been investigated extensively (Wallace, 1965), this phenomenon has been given comparatively little attention when considered in relation to the learning of prose material. Taking one means of isolating material, underlining, and applying it to prose material follows as a necessary adjunct to the early studies of the phenomenon. One study by Klare, Mabry, and Gustafson (1955) examined the effect in a practical learning situation by underlining material in training manuals for servicemen. They found underlining to be effective only if the Ss had a pre-tested aptitude for the subject matte .

An examination of used textbooks shows that students isolate material by various means, but the effectiveness of the practice has not yet been established empirically. The purpose of this study was to investigate the effects of underlining on material Ss were expected to learn--an event which occurs daily in the classroom.

## Method

### Subjects

A total of 150 female subjects was employed, all undergraduates enrolled in introductory psychology classes at Ohio University. Of these, 30 were assigned arbitrarily to each of the four experimental conditions and 30 to a control group.

### Materials

A passage of approximately 700 words was written about the Isle of Capri and contained a number of facts about the island and its history.

A thirty item multiple-choice test was written on the material in the passage. To measure the reliability of the test, the Kuder-Richardson coefficient was computed and yielded a reliability of .77. None of the correct test alternatives contained more than two words and in most cases only one.

Procedure

All subjects were presented a booklet with instructions on the first page followed by three pages describing the Isle of Capri. Instructions and materials for all groups were identical except for special instructions added for the two groups where subjects were to underline all words which were followed by a superscript number.

The experimental conditions were a combination of subject vs. experimenter underlining and the relevancy or irrelevancy of the material underlined. The experimental groups were: relevant underlining by experimenter (E-R), relevant underlining by the subject (S-R), irrelevant underlining by experimenter (E-I), and irrelevant underlining by subject (S-I). Relevancy was operationally defined as being those words which were the correct alternatives to the test questions. Irrelevant words were selected by numbering each word in the passage and randomly selecting the words.

The control group received the passage on Capri with no underlining included by the experimenter and, also, the subject was not permitted to underline. This group was included to provide a baseline performance level when no cues were provided to the subject.

The subjects were asked to read the instructions carefully and then permitted ten minutes (the optimal time as determined by a pilot study) to read through the passage. At the end of the ten minute period the thirty item test was administered. After all subjects had completed the test, they were asked to re-read the passage on Capri, which was followed by a re-test.

The criterion measure for the study was the number of correct answers on each of the test administrations.

## Results

The results of the experiment are presented in Table 1. From this table it can be seen that when relevant material was underlined (S-R and E-R groups), performance was better than when irrelevant material was underlined (S-I and E-I groups). Similarly, the overall performance of the groups where the experimenter did the underlining (E-R and E-I) tended to be higher than the overall performance of groups in which the subject did the underlining (S-R and S-I). However, the difference between experimenter and subject underlining was due primarily to the extreme deficit in performance shown by the S-I group. In all groups, performance improved on the second test trial.

The results of the statistical analysis are presented in Table 2. All of the main effects (Relevancy, Source, and Trials) were significant beyond the .001 level ($F = 31.32$, $df = 1/116$; $F = 19.73$, $df = 1/116$; $F = 180.51$, $df = 1/116$). Of particular interest is the significant interaction ($F = 8.16$, $df = 1/116$, $p < .01$) between the relevancy dimension and the source of isolation. The trials dimension did not interact significantly with either of the other two dimensions ($F = 0.08$, $df = 1/116$; $F = 0.14$, $df = 1/116$). A Duncan's Multiple-Range Test showed that the S-R, E-R, and E-I groups all differed significantly from the S-I condition, but did not differ from each other.

An additional comparison was made between the experimental conditions and the control group which did not underline. This Duncan's Range Test revealed that both groups which received relevant isolated material (S-R and E-R) differed significantly ($p < .05$) from the control group. As can be seen from Table 1, the performance of the control group fell between the E-I and S-I condition, but was not significantly different from either of these groups.

For a further indication of the relationship between the experimental variables and the dependent measures, eta values were computed. The highest relationship was between the trials variable and the dependent measure with an eta value of .780. The other values were: R-I, .462; S-E, .381; and R-I X S-E, .255.

## Discussion

Of particular importance in the present study is the fact that when subjects did the underlining themselves (the S-R and S-I conditions), underlining of irrelevant material severely impaired their performance. Since it is almost a universal habit of students to underline and mark in their textbooks, it seems reasonable to expect that the student who is more adept at underlining relevant material and is, therefore, a "good source" of underlining, will excel. Conversely, the student who tends, for whatever reasons, to isolate irrelevant material will impair his performance.

When the experimenter did the underlining (the E-R and E-I conditions), irrelevant underlining did not significantly impair performance. A possible explanation for this finding can be found in a study by Klare, Mabry, and Gustafson (1954) in which peak (relevant) and random underlining conditions were investigated. This previous study noted that if a subject had a high aptitude for the material, there was no difference between peak and random underlining; however, if he had low aptitude, his performance declined under the random condition. The subjects in the Klare, Mabry, and Gustafson study were airmen and there was a wide range of aptitude for the material employed. In the present study, college students were used exclusively and it might reasonably be assumed that the subjects were of higher ability and aptitude to learn verbal material. Consequently, random underlining by the experimenter would not be expected to significantly impair performance. When comparisons were made between the irrelevant underlining conditions (S-I and E-I) and the control group, no significant differences

were found although the performance of the E-I group was above the control while the S-I was below. However, as noted above the difference between the S-I and E-I condition was significant.

The implications of an interaction between aptitude for the material and the relevancy of the underlining are vast for the majority of students. Since marking in textbooks is a common practice, a student who either dislikes or is relatively low in his ability in a particular subject area would be well advised to not underline his books (and also, not purchase used, marked texts) since he may be severely damaging his chances of doing well.

The possibility that the effect of isolating interacts with other variables suggests a need for more research. It is important to determine the technique used by individuals who can successfully underline (i.e. can pick out relevant material). Also important are the questions of how the phenomenon manifests itself in different contexts, with different age groups, with groups of varying ability and intelligence. An examination of how it maintains itself across time, the stability of the initial learning differences across time, and numerous other factors such as motivation, anxiety and type of material would be most beneficial for those interested in the learning process.

## References

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TABLE 1

Group Means

| | Test | |
|---|---|---|
| | 1 | 2 |
| E-R | 19.57 | 25.03 |
| E-I | 18.80 | 23.53 |
| S-R | 18.80 | 24.47 |
| S-I | 15.03 | 21.43 |
| Control | 15.87 | 22.30 |

TABLE 2

Analysis of Variance

| Source | df | MS | F |
|---|---|---|---|
| Between Subjects | 119 | | |
| Relevant-Irrelevant (R-I) | 1 | 308.27 | 31.32** |
| Subject-Experimenter (S-E) | 1 | 194.40 | 19.73** |
| R-I X S-E | 1 | 80.40 | 8.16* |
| Error | 116 | 9.85 | |
| Within Subjects | 120 | | |
| Trials (T) | 1 | 1,859.24 | 180.51** |
| T X R-I | 1 | 0.86 | 0.08 |
| T X S-E | 1 | 1.43 | 0.14 |
| T X R-I X S-E | 1 | 12.14 | 1.17 |
| Error | 116 | 10.37 | |

*p < .01
**p < .001