

**DIRECTED FORGETTING OF THEMATICALLY  
ORDERED PARAGRAPHS**

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**TONY DEWAYNE COOPERWOOD**



DIRECTED FORGETTING OF THEMATICALLY  
ORDERED PARAGRAPHS

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An Abstract

Presented to the  
Graduate and Research Council of  
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In Partial Fulfillment  
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by

Tony Dewayne Cooperwood

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## ABSTRACT

This experiment was designed to extend the directed forgetting paradigm to paragraphs and to ascertain whether the forget instruction effects memory for relevant and irrelevant information differently. Forty-eight subjects from introductory psychology courses participated in the study for extra credit. Subjects were randomly assigned to three groups: (a) remember, (b) forget, and (c) control. Groups were differentiated by the number of paragraphs presented for study and the type of instructions following each paragraph. Paragraphs were of two types: relevant and irrelevant. The relevant paragraphs consisted of a story which depicted details of a fictitious robbery where a man accused of robbing a jewelry store was on trial. Because the details were presented in trial format, subjects were asked to assume the role of a juror. The irrelevant paragraphs contained information which was unrelated to the trial. It included information on winemaking and the psychological effects of colors. Following each paragraph, an instruction indicating whether the information was to be remembered (TBR) or to be forgotten (Inadmissible Evidence) was presented.

It was predicted that the control and forget groups' performance would be equal if the forget instruction was effective in reducing the amount of TBR information in the forget condition. However, if the instruction was not effective, the control group would perform far better than

the forget and remember groups whose performance would be virtually equal. Moreover, a prediction was made that a directed forgetting effect would be found for the general material but not the relevant, attributable to the amount of interest paid to the latter. Also, there were expectations that subjects presented the most details would render a guilty verdict more often than those presented lesser amounts.

Results revealed no directed forgetting effect. The forget group performed as poorly as the remember group. This was interpreted as being an indication that subjects found both the relevant and general information interesting, and as a result attempted to remember both types. In addition, post-experimental questioning revealed that subjects found it easier to remember the TBR information when they ignored the "Inadmissible Evidence" instruction and stored all information as TBR. Moreover, the analysis of the verdict statements revealed no differences across conditions; there were ten verdicts of guilty and six verdicts of innocent in each of the three groups.



To the Graduate Council:

I am submitting herewith a Thesis written by Tony Dewayne Cooperwood entitled "Directed Forgetting of Thematically Ordered Paragraphs." I recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Arts, with a major in General Psychology.

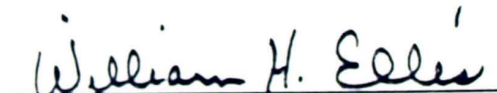
  
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Second Committee Member

  
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Accepted for the Graduate  
and Research Council:

  
Dean of the Graduate School

DIRECTED FORGETTING OF THEMATICALLY  
ORDERED PARAGRAPHS

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A Thesis  
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Graduate and Research Council of  
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## CHAPTER 1

### Introduction

In spite of evidence to the contrary, many laypeople still believe that their inability to remember certain information is a manifestation of an imperfect memory retention mechanism. But, those whose task is to investigate human memory and its processes argue that in many instances the lack of ability to recall older information is healthy. Three excellent illustrations highlighting the healthiness of upgrading the memory were provided by Ribot (1882), James (1890) and Bjork (1972). Ribot (1882) wrote, "Without the obliteration of an immense number of states of consciousness, and the momentary repression of more, recollection would be impossible. Forgetfulness, except in certain cases, is not a disease of memory, but a condition of its health and life" (p.61). Later, James wrote, "If we remembered everything, we should on most occasions be as ill off as if we remembered nothing" (p.680). And more recently, Bjork stated, "That we would degenerate to a proactive-interference-induced state of total confusion otherwise" (p. 218). Inherent in each is the notion that through the elimination or temporary repression of older information, the capability to store newly encoded materials is improved and as a result memory is facilitated.



This idea of memory facilitation has led some researchers to investigate a phenomenon termed "directed forgetting." Directed forgetting involves the act of presenting subjects with either sets or lists of information to remember and instructing them at some point after input but before output that a portion of the information no longer needs to be remembered and can be forgotten. This is accomplished by having the word "remember" follow all items that are to be remembered (TBR-items) and the word "forget" follow those items to be forgotten (TBF-items). The instructions serve to differentiate the items in memory.

In the past, investigators have used these instructions with generally uninteresting materials such as single letters (Muthers, 1965), words (Bjork & Woodward, 1973), and sentences (Geiselman, 1974, 1977) and found them to be effective. That is, researchers have shown that in instances where a forget instruction (cue) was introduced subjects remembered TBR items to a far greater extent than they did the TBF. Similar results have been found in atypical investigations employing electrophysiological correlates (Paller, 1990), and hypnosis (Coe, Basden, Basden, Fikes, Gargano, & Webb, 1989; Kihlstrom, 1983). Yet, there are some indications that these results may not be generalizable to settings where more naturalistic materials are used (Golding & Keenan, 1985).

Naturalistic material is simply material that is normally encountered in everyday living, such as directions to locations, details of events, and evidence ruled inadmissible in a court of law. The important difference between general and naturalistic materials and one that may be responsible for the directed forgetting effect is the relevancy of the information itself. In instances where single letters, words, and sentences are used as experimental material, no inferences can be drawn; therefore, the information has no relevancy outside the context in which it was presented. Because of this, the probability of subjects adhering to instructions to forget is very high, since to do so is to their advantage. The advantage being a reduction in the memory load.

Contrast this with naturalistic material where the material itself takes on meaning and the probability of forgetting is greatly reduced. This is because the material here is highly interesting and has relevancy far beyond the context in which it occurs. Consider, for example, a traffic accident; the victim needs to remember the most minute detail of the event for a number of reasons such as police reports, lawsuits, and insurance claims. Thus, the likelihood of forgetting these details will be very low. The present experiment is designed to ascertain whether subjects' responses to naturalistic materials differ from their responses to general materials. But,



before this comparison, an extensive review of the theoretical explanations of directed forgetting is provided in order to insure that the phenomenon is well understood.

## CHAPTER 2

### Theoretical Explanations of Directed Forgetting

Bjork (1970, 1972) argued that the directed forgetting effect is a result of two interrelated processes, set differentiation and selective rehearsal. He stated that these processes account for directed forgetting by (a) permitting opportunities for grouping TBR-items in such a way that functionally segregates them in memory from the TBF-items; and (b) allowing all subsequent rehearsal, mnemonic, and integrative activities to be devoted exclusively to the TBR-set. In other words, the introduction of the forget instruction allows for the differentiation of the TBR-items from the TBF; and after this differentiation, all rehearsal activities are devoted exclusively to the TBR-set. Collectively, they account for superior TBR-recall performances. Since these two processes are co-dependent, difficulties in differentiating the sets reduce the amount of time available for selective rehearsal of the TBR-set and consequently, the likelihood of a directed forgetting effect.

There has been some question as to whether the superior TBR performance is a result of subjects having remembered TBR-items better than the TBF, or whether it is simply because these items are normally recalled first. If



the latter statement is true, then the superior performance may be due to a conscious effort on the part of the subject to inhibit the intrusion of TBF-items (active suppression) during TBR-recall. Thus, in order to be certain that TBR superiority is a function of differential treatment, TBF-items must be tested, but tested in such a way as not to impair either recall performances. By employing a procedure designed by Reitman, Malin, Bjork, and Higman (1973), Bjork and Woodward (1973) were able to accomplish this task by using a prearranged signal to warn subjects when TBF-items were being tested.

The study was designed to assess both memory for TBF-items immediately after presentation and the effects of immediate recall of TBR-items on later recall of those items at the end of the experiment. These manipulations would in turn show whether directed forgetting is in fact due to differential treatment as Bjork (1970, 1972) had proposed or to active suppression of the TBF-items during TBR-recall. To accomplish this task, Bjork and Woodward (1973) presented subjects with seven lists of 24 four-letter common nouns. Subjects were told that even though TBF-words would be tested at some point during study, their best strategy was still to remember only the TBR-words, since a special signal would always precede TBF-testing. The fourth list was used for this purpose; here, subjects were instructed to recall all items

remembered regardless of cuing. Each list was preceded by a 3 second ready signal. Each word was presented for 2.3 seconds and then replaced by a cue slide. These slides instructed subjects either to forget or remember the preceding word. Following each list, subjects were given either a 30 second digit shadowing task (to delay recall) or a 30 second immediate recall test. For immediate recall, subjects were instructed to recall all the remember words from the preceding list. After the presentation of all lists, subjects were given a delayed final recall test where they were asked to recall all words remembered from the study.

Consistent with Bjork's two process theory (1970, 1972), Bjork and Woodward (1973) found that subjects recalled TBR-words to a greater extent than they did TBF-words on both the immediate recall and final recall tests. Even when instructions were given to recall all words remembered (fourth list), subjects recalled less than five percent of the TBF-words presented. Taken together, these findings suggest that the superior TBR-recall performance (directed forgetting) is a function of something other than the order of assessment and active suppression; because if it had been due to either of the two, the TBF-word recall performance would have shown a dramatic recovery. Since this was not the case, the researchers concluded that a plausible explanation is that

the two sets are processed differently. Woodward, Park, and Seebom (1974) and Horton and Petruk (1980) have reached similar conclusions.

An alternative theoretical explanation to the selective rehearsal and set differentiation theory was provided by Epstein and his colleagues (Epstein, Massaro, & Wilder, 1972; Epstein & Wilder 1972; Shebilske, Wilder, & Epstein, 1971). Contrary to Bjork's contention that directed forgetting is a function of mechanisms operating at the time of input, Epstein et al. (1972) argued that it is primarily a function of an output mechanism, namely, selective search.

One study in particular that was instrumental in the theoretical formulation of selective search was conducted by Shebilske, Wilder and Epstein (1971). In the study, they presented subjects with two consonant-vowel-consonant (CVC) word-pairs, an interval, two additional word-pairs, an instruction cue, and finally a probe test of memory for one of the four pairs. The instruction cue specified which of the four sets would be tested. The word "first" or "second" meant that the test pair would come from either the first or second set; the word "either" indicated that either one of the two sets might be tested. The former instruction implicitly informed subjects that the set not being tested could be forgotten. In contrast, the latter implied that both were to be retained.



Consistent with the directed forgetting paradigm, Shebilske, et al. (1971) found greater recall when subjects were responsible for only one of the two sets than when they were responsible for both. The critical finding was that selective rehearsal did not increase the magnitude of the difference between the "only" and "either" recall performance. This was critical because Bjork (1970) had stated that directed forgetting was a result of two interrelated processes, selective rehearsal and set differentiation. If this were the case, they argued, then there should have been an increase in the differences between the "only" and "either" recall performances in proportion to the amount of selective rehearsal permitted. However, the only significant finding was that recall performance increased when subjects were responsible for only one of the two sets. This was termed the "Only" effect. The mechanism which produced this effect is also believed to be responsible for directed forgetting.

Shebilske et al. (1971) contended that the most plausible explanation is that the forget cue serves to direct the search for the correct response to the TBR set only (selective search). Selective search implies that it is the size and composition of the set searched, and not selective rehearsal, that account for greater TBR recall and the "Only" effect. Thus, Shebilske et al. (1971) reasoned that when subjects were told that the probe word



pair would come from either the "first" or "second," set, they restricted their search to that particular set.

Epstein, Massoro, and Wilder (1972) designed an experiment to further assess the roles of selective rehearsal and selective search in obtaining the "Only" effect. They hypothesized that if selective rehearsal is the process responsible for the "Only" effect (directed forgetting), then the effect should be present only in instances where postcue rehearsal of TBR pairs is permitted. On the other hand, if selective search is responsible, the effect will be observed only when there are significant differences between the "only" and "either" trials (recall condition).

Epstein et al. (1972) employed two rehearsal conditions (unfilled and filled) and two testing conditions (recall and matched). In the unfilled condition, the postcue interval was left blank to allow time for selective rehearsal of the TBR word pairs. In the filled condition, the postcue interval was filled with a subtraction problem to prevent selective rehearsal. The two testing conditions were included to manipulate the size of the search set. The recall test insured that there were differences between the size and composition of the search-set on both "only" and "either" trials. The matching test, on the other hand, insured that the sizes and compositions were identical. Because successful performance on the matching test is

dependent upon memory for all word pairs, the search set remains the same on the matching test regardless of whether the trial is "only" or "either."

Epstein et al.'s (1972) methodology was rather straightforward. Experimental materials were 24 lists of consonant-vowel-consonant (CVC) nonsense syllables paired with common English nouns. Subjects were randomly assigned to either a filled or unfilled condition and were told that they would be given either a recall or matching test at the conclusion of the experiment. They were then presented three CVC-word pairs (one at a time), a simple subtraction problem, three additional word pairs, an instruction cue, a postcue interval (either filled or unfilled), and finally, a test slide. This order was continued until all lists had been presented. The instruction cue contained one of three words, "first," "second," or "either," The word indicated which pair would be tested. Following the presentation of all experimental materials, subjects were given either a recall or matching test. On the recall test, they were presented with the stimulus (CVC nonsense syllables) from the set identified by the instruction cue and asked to provide the correct word. On the matching test, they were presented with the stimulus and three words from the set indicated by the cue and asked to choose the correct word from among the three.

Epstein et al. (1972) found an "Only" effect only on the recall test, as would be expected if the selective search hypothesis was valid. Moreover, inhibiting selective rehearsal (filled condition) did not eliminate the "Only" effect. The effect was observed under both rehearsal conditions. Since the test conditions were the only manipulations which produced significant results, Epstein et al. (1972) concluded that the selective search explanation was more plausible.

Epstein et al.'s (1972) conclusion was challenged, however, in a later study by Jongeward, Woodward, and Bjork (1975) which was designed to further assess the relationship between selective rehearsal and the "Only" effect. Subjects were presented five 32-word lists where each was further divided into eight four-word blocks. Words were presented one at a time. At the end of each four-word block, subjects received one of four instructions: RRFF (remember the first two words in the block forget the last two), FFRR (forget the first two, remember the last two), RRRR (remember all four), or FFFF (forget all four). Selective rehearsal was manipulated by presenting recall instructions immediately following the last word in the block, or by delaying the cue until just prior to the presentation of the next block. At the end of each list, subjects were given a free recall test to assess retention of TBR-items only. Recall of TBF-items were



prohibited at this point. Later, subjects were asked to recall all words remembered regardless of how they were cued during the study.

Contrary to Epstein et al.'s (1972) findings, Jongeward et al. (1975) found an effect only when subjects were allowed to rehearse. Results showed that subjects assigned to the selective rehearsal group performed significantly better than those assigned to the nonselective rehearsal group. When rehearsal was prohibited, the effect was absent. Moreover, an "Only" effect was found even though the size of the search set was controlled throughout the experiment. The only manipulation that effected its occurrence was rehearsal.

Geiselman, Bjork, and Fishman (1983) speculated that there is a mechanism that has yet to be discovered which operates to inhibit access routes to episodic memory corresponding to TBF-information and which accounts for directed forgetting. In order to test their hypothesis, they presented subjects with a list of 48 four letter nouns containing two types of words, learn words and judge words. The learn words were preceded by a slide containing the word "learn" and were to be remembered; judge words were preceded by "judge" and were simply to be judged on subjective pleasantness. Midway through the list, half of the subjects were told to forget the learn words presented thus far because they were just for practice. The other



half was told to continue trying to remember. At the conclusion of the experiment, half of the subjects from each cue condition were given a free recall test; the other half was given a recognition test. The researchers hypothesized that if the disrupted retrieval hypothesis is correct then the forget cue will block access to both learn and judge words studied before the forget instruction was introduced.

In respect to the type of cue presented, results showed that learn words from the first half of the list were recalled better when subjects were told to continue to remember at midpoint. Just the opposite was true for words that followed the instructions. Here, recall was better when subjects were instructed to forget the first half of the list. Surprisingly, recall of judge words followed the same pattern as learn words but to a lesser degree. This suggests that there is an inhibitory mechanism operating at the time of output to suppress or inhibit the accessibility of TBF-items. Bjork (1989) concurred and provided two explanations as to how this inhibitory process might work: "(a) it could be that TBF-items are inhibited due to retroactive interference of TBR-items or (b) maybe the forget cue causes the inhibition." In either case, the information that is out-dated or no longer relevant is made inaccessible.

Although the selective rehearsal and selective search theoretical explanations have received considerable validation in the past, the more recent disrupted retrieval hypothesis appears to be the most plausible. Disrupted retrieval is the only mechanism that effectively accounts for numerous findings that TBF items continue to exist in memory even after the cue to forget. This continuous existence is apparent from the recall tests where subjects are asked to recall all words remembered regardless of how they were cued. Results show that subjects are able to recall some TBF items, although to a lesser extent than TBR. Nevertheless, these items are recalled. Geiselman et al. (1983) attributed the recall to the forget instruction serving to inhibit access to most, but not all, TBF items. Since access to some TBF items remained, subjects were able to recall them.

Bjork's (1972) explanations for the presence of TBF were that (a) in some instances TBF items are mistakenly encoded as TBR, and (b) periodically TBF items receive enough rehearsal for recall. Epstein and his colleagues gave no explicit reason for the intrusion, but one can deduce that they would attribute it to the cue serving to direct the search to both TBR and TBF sets. Thus far, the reader may be tempted to conclude that there is basically no critical difference that would suggest that one view is better than the others. But, plausibility of disrupted

when subjects' performance on recognition tests are considered.

Several studies have shown that TBF performance improves dramatically when recognition tests are substituted for or used in conjunction with recall tests (Geiselman & Bafheri, 1985; Macleod, 1975; Woodward, Bjork, & Jongeward, 1973; Wetzel, 1975; Wetzel & Hunt, 1977). Some have even shown equal TBR-TBF performance (Block, 1971; Geiselman, 1974, 1977). Taking into consideration the explanation given for TBF recall, the only mechanism that could possibly account for both recall and recognition is disrupted retrieval. This is possible because its theoretical framework is that the difference between TBR and TBF performance is a matter of loss of access routes to episodic traces. This suggests that when routes are restored TBF information recovers. It might be argued that recognition tests restore these routes. Here are two possible ways as to how this might be explained within the disrupted retrieval framework: (a) it might be that the improved TBF performance is due to recognition tests having a lower retrieval component (meaning less effort needs to be expended to retrieve information from memory) than recall tests, and this lower retrieval component makes it easier to access weak TBF items that would normally have remained inaccessible; or (b) the test itself may provide enough information to reactivate or restore access routes

in episodic memory. In either case, there is a restoration of access to TBF items.



## CHAPTER 3

### Extension of the Directed Forgetting Paradigm

Much of the earlier research on directed forgetting used nonsense materials or single words. More recently, researchers have been concerned with the generality of those findings when connected/prose materials are substituted. Geiselman (1974) speculated that it may not be possible to obtain the directed forgetting effect with complex interconnected sentences. He noted two factors which may effect the outcome; (a) the relatedness of the experimental material, and (b) the degree to which subjects find the material interesting. The connectedness of the material may have its effect by making it difficult for differentiation of the TBR-information; as a consequence, TBR-recall will be low. Furthermore, the degree of interest elicited by the material itself may make it extremely difficult for subjects to rehearse the TBR material as a distinct group even after being instructed to forget the TBF.

As a means of testing this hypothesis, Geiselman (1974) created ten sentence paragraphs and instructed selected individuals to determine the "best" rank-order (logical order) of the sentences. The most frequent order in turn served as a means of assessing whether

connectedness and differential interest elicited by sentences can decrease differential rehearsal of TBR sentences. Also, the ranking delineated the order in which the sentences would be presented for study. Moreover, judges were asked to underline key words and phrases within each sentence. The most frequently underlined words or phrases were removed; these words and phrases together with their sentences served as tests of recognition. It is important to note that there was no manipulation of connected versus unconnected prose materials. The significance of connectedness was determined solely on the magnitude of differences between TBR/TBF test performances.

Geiselman (1974) presented subjects with three separate passages (three trials). Each passage was composed of ten interconnected sentences presented one at a time. Subjects were informed of the passage's theme just prior to its presentation. Each sentence was cued separately as either TBR or TBF. A postcue interval designed to allow opportunities for rehearsal and differentiation of the TBF sentences followed the cue slide.

After the presentation of the experimental material, all subjects were tested for free recall of TBR-sentences from the first two trials. In addition, six groups were tested for overall (recall everything) free recall of sentences from the last trial (two groups per passage);

subjects were asked to recall all of the sentences remembered regardless of how they were cued in the study. Six others were given a surprise sentence completion test with crucial key words and phrases removed. Subjects were asked to provide the words or phrases that were presented during the study. This manipulation was included to ascertain whether TBF sentence accessibility could be enhanced by providing the sentence context. Six others were given a surprise recognition test with four alternatives from which to choose the correct response. Its purpose was to determine whether the forgetting phenomenon is due solely to an inability to recall the TBF material or to both an inability to recall and to store.

Results showed TBR-sentence recall to be significantly better than TBF on both the sentence completion and cued free recall (recall of TBR-sentences from the first two trials) tests. The opposite was true for TBF-sentences; here, TBF-recall was better than TBR-recall under the uncued recall condition where subjects were instructed to recall everything regardless of the cue.

In terms of sentence connectedness, it was found that TBR-cued sentences received less facilitation over their uncued equivalent with increased sentence connectedness within the passages, and TBF-cued sentences showed a smaller decrement as compared to their uncued equivalent. Taken together, these findings may be interpreted as being



an indication that not only does sentence connectedness make it difficult for subjects to differentiate sentences for rehearsal, but it also makes it difficult for them to determine the accessibility of the TBF.

In contrast to the directed forgetting studies mentioned thus far, there is some evidence that suggests that the directed forgetting phenomenon may be nothing more than a laboratory artifact and therefore will probably be ephemeral when naturalistic materials are substituted. Researchers concerned with a subject's ability to remember highly meaningful material presented in a naturalistic style argue that the relevance of the information determines subsequent responses. Specifically, they argue that if the information is meaningless or irrelevant, as is frequently the case in directed forgetting studies, the likelihood that the information will be discarded is great since its retention is not advantageous. If, however, the information is relevant for one reason or another it will be remembered in spite of the cue to forget (Golding and Keenan, 1985).

One situation where instructions to forget have been found to have little, if any, effect is in a court of law. In a court of law, judges frequently instruct recorders to strike inadmissible evidence from court records and jurors to disregard, but they have no way of ensuring that the jurors comply. As a result, jurors' reactions to such



instructions are unpredictable. A good example of this unpredictability was provided by Padawer, Singer, and Barton (1975) who found that jurors exposed to proconviction information prior to deliberation were more likely to render a verdict of guilty than those who were not exposed. The proconviction information biased responding in favor of a guilty verdict, in spite of instructions to ignore the inadmissible evidence. These findings led Thompson, Fong and Rosenhan (1981) to hypothesize that this biasing effect is a manifestation of jurors' unwillingness to ignore instructions to forget because they may reason that even though the information has been deemed inadmissible evidence, it does not necessarily mean that it is untrue.

As a means of investigation, Thompson et al. (1981) used two inadmissible evidence conviction manipulations, proacquittal and proconviction, and two types of predeliberation instructions as independent variables. For conviction manipulation, subjects were exposed to inadmissible evidence that if considered could lead to either a conviction or an acquittal. Under the predeliberation conditions, subjects were either given strict instructions to ignore the inadmissible evidence prior to deliberation, or given general guidelines to follow in determining a verdict.

Contrary to Padawer et al.'s (1975) findings, Thompson et al. (1981) found that the proacquittal information biased the subjects' decisions but the proconviction did not. It appeared as though jurors ignored inadmissible evidence when it would lead to a conviction, but retained the information when it would lead to an acquittal. Together, the two studies validate the notion that it is extremely difficult to predetermine reactions to information that is relevant and interesting.

In light of this possibility, Golding and Keenan (1985) conducted a study to assess the validity of the directed forgetting paradigm with naturalistic materials. They questioned whether an effect could be achieved when naturalistic materials (materials most likely to be encountered in everyday life) are substituted for the irrelevant ones used in earlier laboratory studies. They argued that because these materials are much more interesting than single letters, words and sentences, the effectiveness of the forget cue may change. Geiselman (1974) provided some evidence that this might happen. Recall that he found that the more interconnected the materials are the more difficult it is for subjects to separate the TBR from the TBF. Taken one step further, Golding and Keenan reasoned that the more meaningful or relevant the TBF-information is to the subject the less likely he or she is to forget it.

In testing their hypothesis, Golding and Keenan (1985) presented subjects with a set of fictitious directions to a fictitious destination. The directions were presented in the form of a taped conversation between two people to make them seem real. There were three levels of the independent variable used: remember, forget and control. Likewise, there were three levels of the dependent variable: (a) verbal recall, (b) verbal recognition, and (c) spatial test. The only difference between the groups was the presentation of an additional turn to the remember and forget groups. This turn was designated as the TBF-information because shortly after its presentation forget subjects were told that it was wrong and should be forgotten. The researchers hypothesized that if the forget instruction is effective, subjects assigned to the forget group will perform better than those assigned to the remember group but equal to the control group (who had less information to remember). Conversely, if it fails, subjects assigned to the forget group will perform as poorly as those assigned to the remember group.

Inconsistent with the typical directed forgetting results, they found that subjects assigned to the control condition performed significantly better than those assigned to either the forget or remember on both of the verbal tests, indicative of a lack of directed forgetting. This failure to replicate earlier findings was attributed

to perceived importance of the information. That is, they asserted that subjects rationalized that knowing where not to go was just as important as knowing where to go.



## CHAPTER 4

### Directed Forgetting of Thematically Ordered Paragraphs

The purpose of the present experiment was to further investigate directed forgetting and naturalistic materials and to extend the paradigm to include highly connected thematically ordered paragraphs. In order to accomplish this task, two types of paragraph material were used. The first was a story which depicted details of a fictitious robbery where a man accused of robbing a jewelry store was on trial. It should be noted that even though this material was organized in trial format and subjects were asked to assume the role of a juror, the study was not intended to be a full enactment of a trial. Instead, it was organized in this fashion for the sole purpose of investigating the effect an instruction to forget has on memory for material that might be encountered in a court of law. The only legal terminology employed was the term "inadmissible evidence" which was simply defined as information that should be forgotten so as not to bias the jurors' verdicts. The second type of material used was unrelated to the trial. It included information on winemaking (Geiselman, 1974) and the psychological effects of colors (Hepner, 1979).

Based on the assumption that a forget instruction serves to reduce the amount of information to be remembered, the following predictions were made: (1) the forget group will perform as well as the control group; (2) the remember group will perform poorer than either the forget or control group; (3) a directed forgetting effect will be observed with the general paragraphs but not with the fictitious robbery; (4) subjects assigned to the forget and remember condition will render a verdict of guilty more often than those assigned to the control condition.

### Method

#### Subjects

Forty-eight subjects from introductory psychology courses at Austin Peay State University participated in the study for extra credit.

#### Material and Design

A microcomputer was used to present the material. Subjects were seated in a standard office desk chair positioned in front of the computer. Experimental material was shown at the top of the screen and automatically controlled by a computer program. No computer skills were required of the subjects.

There were three types of screens presented for consideration: (a) ready, (b) paragraph, (c) instruction. The "ready" screen was presented to forewarn subjects that

a paragraph would soon follow and to allow time for selective rehearsal of preceding "remember" paragraphs. "Paragraph" screens contained information from one of three themes: (a) fictitious robbery, (b) psychological effects of colors, (c) winemaking. A total of sixteen paragraphs were presented (see Appendix A): twelve fictitious robbery (relevant); three psychological effects of colors (general); one winemaking process (general). Each paragraph was presented and cued separately. Instruction screens indicated whether the paragraph was TBR or "Inadmissible evidence" (see Appendix B).

### Procedures

Subjects participated individually. They were randomly and equally assigned to three experimental conditions: (a) remember, (b) control, and (c) forget. The conditions were differentiated by the number of paragraphs presented for study and the type of instructions given afterwards. The forget group was divided into those who were cued to remember the general information and those who were cued to forget it. Thus, for eight of the forget subjects, all four general paragraphs and six relevant paragraphs were cued as TBR. The remaining six were cued as "Inadmissible evidence." The cuing was reversed for the remaining eight subjects. Here, all four general paragraphs and six relevant paragraphs were cued as "Inadmissible evidence;" the remaining six were cued as



TBR. The subjects assigned to the remember group were told that all sixteen paragraphs were TBR. Thus, a "remember" instruction followed each. Control subjects were exposed to and instructed to remember only the ten paragraphs cued as TBR in the first forget manipulation.

All information, including instructions, were projected on the computer screen. After the initial briefing, subjects were shown instructions outlining the procedures to follow. Following the instructions, a 5 second "ready" screen was shown. Following the word "ready," a paragraph containing information from one of the three themes was presented. The paragraph was presented for 45 seconds and then replaced by a "cue," either "remember" or "inadmissible evidence." After 10 seconds of exposure, the cue was replaced by the word "ready." This order of succession remained the same throughout.

At the conclusion of the study, subjects were given a free recall test where they were asked to write down all information remembered regardless of how it was cued. No time limit was imposed; all subjects completed the requirement within 45 minutes (25 minutes was the average). After the recall test, subjects were asked whether they thought the accused was guilty or innocent. Specifically, they were told, "Based on the trial information presented, determine a verdict of guilt or innocence and support your verdict with details from the paragraphs." Again, there



was no time limit imposed. Average recall time was 20 minutes. Following the verdict test, a twenty-five question multiple choice test (see appendix C) was given. Subjects were asked to choose the correct answer from among the four alternatives. In addition, they were instructed to guess whenever they were uncertain of the correct answer and/or they could not recollect having been shown a paragraph containing the information.

The free recall test was scored on the basis of the number of propositions recalled rather than the number of sentences recalled verbatim. Each reconstructed sentence was compared to the proposition breakdown of the original and subsequently awarded a score of either 0, meaning no recognizable material was recalled, or 1, indicating the reconstruction paralleled the original. The multiple choice test (a test of recognition) was scored on the number of questions answered correctly. The verdict statement was assessed on frequency of response; that is, the number of guilty and innocent verdicts.

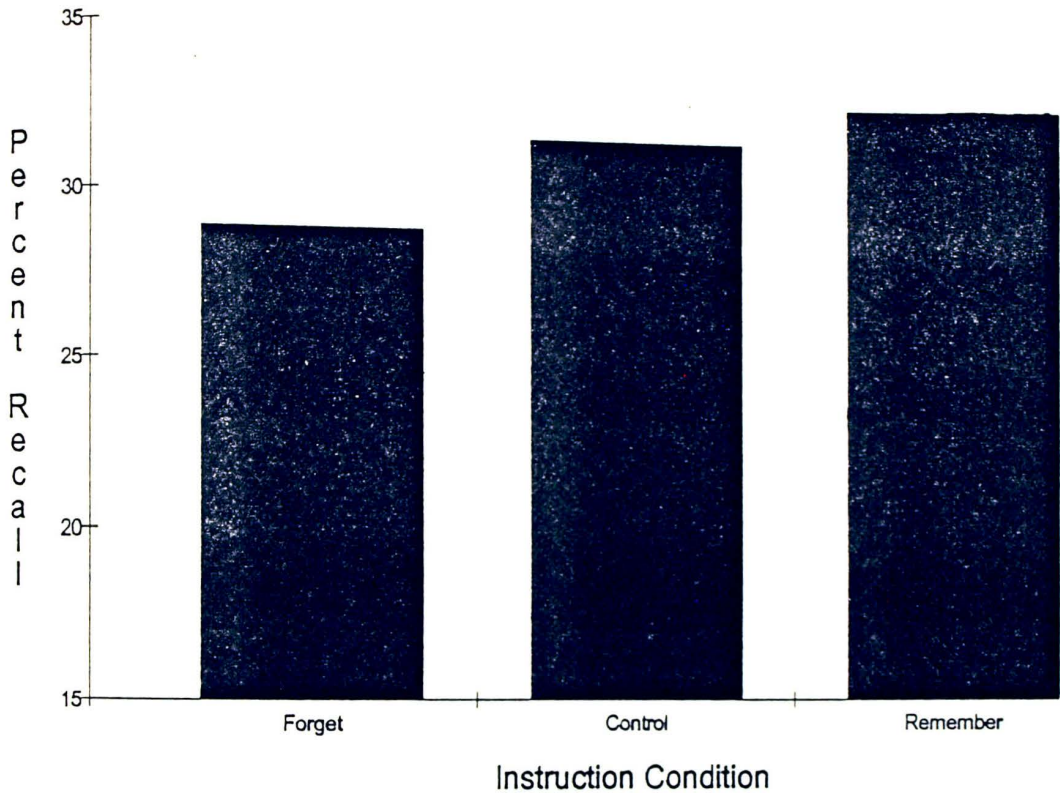
## Results

### Recall

The prediction that subjects assigned to the forget group would perform as well as the control group was not supported. An Analysis of Variance (ANOVA) failed to find significant differences in recall performance across the three conditions,  $F(2,45) = .31, p > .05$  (see Figure 1).

The forget instruction was not effective in facilitating memory for TBR information.

Figure 1. Mean percent correct for TBR-information on recall test as a function of instruction condition.



Moreover, an analysis comparing the forget subjects who were told to forget the irrelevant information with those from the remember and control conditions yielded no significant differences  $F(2,37) = .58, p > .05$ . A directed forgetting effect was expected here because these subjects had considerably less information to remember than the forget subjects who were told to remember the irrelevant information and those assigned to the remember

group. In addition, analyses assessing recall of general material and recall of inadmissible evidence (forget subjects only) were also failed to produce significant effects,  $F(1,14) = 2.51, p > .05$  and  $F(1,14) = .29, p > .05$ , respectively.

### Recognition

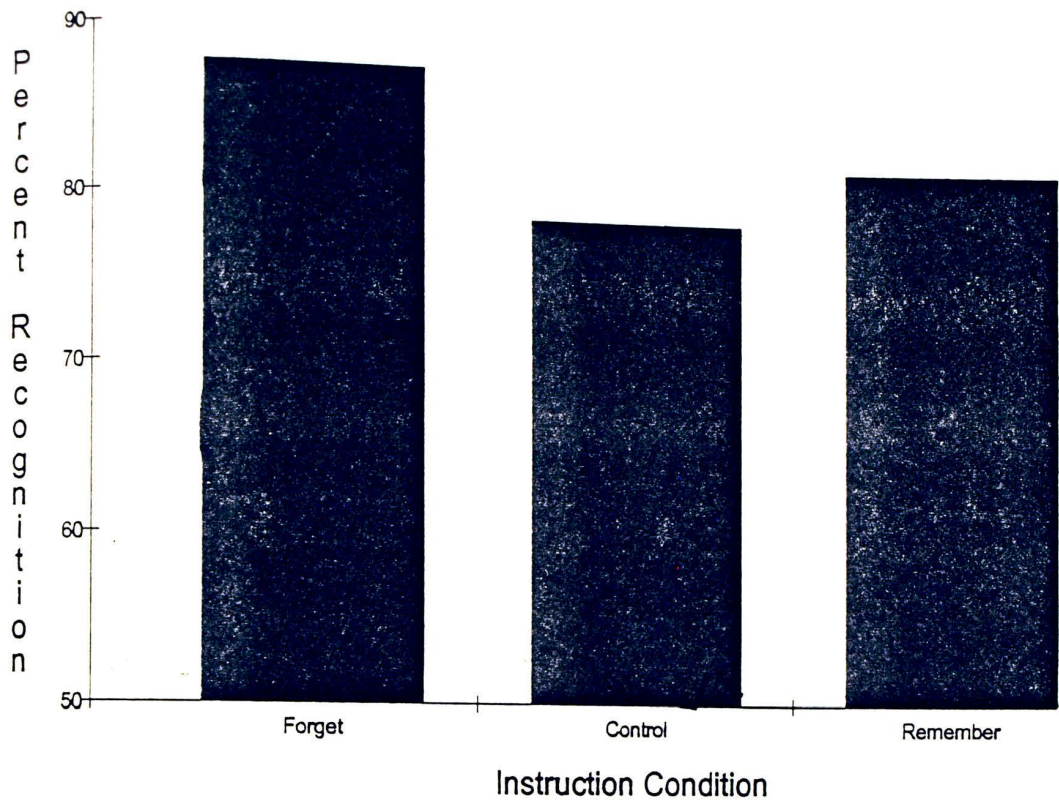
As with the recall data, an ANOVA comparing the performance across the three conditions failed to find significance,  $F(2,45) = 1.049, p > .05$ . Figure 2 shows the distribution of the recognition performance. Here, the forget group appears to perform better than the other two groups, but as before, the performance was not significant. Likewise, a comparison of performance of forget subjects who were permitted to forget the irrelevant information with those from the other conditions showed no indication of directed forgetting,  $F(2,37) = .198, p > .05$ .

### Verdict

The prediction that those subjects presented the most information about the robbery would render a verdict of guilty more often was not supported. Interestingly, a Chi-square Test for Differences revealed the same frequency of response,  $\chi^2(2, N = 48) = 0.00, p > .05$ , six verdicts of innocent and ten verdicts of guilty, for each of the three groups.



Figure 2. Mean percent correct for TBR-information on recognition test as a function of instruction condition.



### Discussion

The failure to find a directed forgetting effect for either the recall or recognition test led to some questioning of the assertion that perceived relevancy of materials invariably determines whether materials will be remembered or not. If this were the case, the general information should have been perceived as being less interesting than the relevant information and forgotten shortly after presentation. That is, subjects should have perceived the general paragraphs as of no value outside the experimental context and as a consequence forgotten them



shortly after input. Steps were taken to ensure that this would happen; forget subjects were told continuously that only those paragraphs cued as "remember" would be tested to prevent any mnemonic activities from being diverted to the "Inadmissible evidence." In spite of these efforts, analyses of the results suggested that this may have happened anyway. This finding led to the notion that some uncontrolled extraneous variable might have been allowed to operate.

The probable extraneous variable was interest. It is believed that subjects found both the general information and fictitious robbery paragraphs to be highly interesting and engaged in some type of mnemonic time-sharing activity. This possibility was predicted by investigators concerned with memory for naturalistic materials who contend that subjects' reactions are dictated by the perceived relevancy.

Moreover, had interest not been a factor, the differences in the amount of information presented for study alone should have been enough to ensure that control and forget subjects performed significantly better than those assigned to the remember condition (indicative of directed forgetting). Control subjects should have performed better because they were exposed to a little more than half of the amount of information used in the study, and forget subjects because they were instructed to forget

more than half of the information to which they were exposed. Since this was not the case and forget subjects did not perform as well as expected, the possibility of an extraneous interest variable is again implicated.

In addition, post-experimental questioning supports the notion that subjects found both kinds of material interesting. Seventeen subjects asked questions about the authenticity of the assertion that wine can be made with vegetables as well as grapes and whether colors could really effect the mind. Moreover, several others stated that they had discussed winemaking in class moments before the experiment. These statements seem to suggest that subjects found the general paragraphs of value. Thus, the present findings may be more supportive of Golding and Keenan's (1985) study than first perceived.

The possibility that subjects did not or could not comply with experimental demands must also be considered. The methodology used was very complex in that it required subjects to remember extremely large amounts of information. For the forget group, there was the extra burden of storing the information separately. This difficulty may have caused many subjects to reduce the paragraphs into chunks of key words. The chunking of prose materials has some support. Geiselman (1974) reported that subjects tend to reduce TBR information to the lowest form possible. If this happened, forget subjects may have

chunked not only TBR but also TBF information. Thus, the resulting performance may have been nothing more than a regurgitation of all information remembered without regard to cue.

The explanations given above are very tentative. More research needs to be conducted with naturalistic materials presented in paragraph form in order to find which ,if any, of these are plausible. It is important, however, for future researchers to limit the length of sentences, number of sentences per paragraph, and number of paragraphs per experiment. The present experiment did not consider any of the three.

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## APPENDIX A



Forget Instructions

This study is designed to test your ability to store large quantities of relevant and irrelevant information presented in paragraph form. The study contains three separate themes: (a) fictitious robbery information (b) psychological effects of colors (c) winemaking. Since the fictitious robbery information will be presented in trial format, from this point forward, you are asked to assume the role of a juror. You are to read all information presented very carefully because you will be tested.

Following this slide you will be shown a series of ready, paragraph, and cue slides; each of which will be explained momentarily. Some of the paragraph slides will contain details of a fictitious robbery; others will contain general information. The general paragraphs will be either about (a) the psychological effects of colors or (b) a winemaking process.

Your task is to remember all information that is cued as to be remembered. That is, you are to remember all information that precedes a slide containing the word "remember." You are to remember all this information because your memory for it will be tested immediately following the study. Some of the information presented can be forgotten. This information will be followed by an "Inadmissible Evidence" slide. It will not be tested. It is vitally important for you to adhere to these

instructions because the paragraphs are very lengthy. In order to maximize your performance, you must remember the information that precedes a "remember" slide and forget the information preceding the "Inadmissible Evidence" slide.

The experiment will begin with the presentation of a "ready" slide. It will contain only the word "ready." Its purpose is to forewarn you that a paragraph will soon follow. Following this slide, you will be shown a paragraph in which you are asked to read aloud. The purpose for having you read the paragraphs aloud is to ensure initial encoding of its material. You should read as quickly as possible because the paragraphs will be exposed for less than one minute. You should not have any trouble finishing in time. If you finish early, reread the paragraph or rehearse all the remember material presented thus far in the study. The important point is that you take advantage of this extra time. Again, all the information preceding a "remember" slide is to be remembered. That preceding an "Inadmissible Evidence" slide is to be forgotten and will not be tested. At the conclusion of the experiment, your memory for the remember information will be tested. Also, you will be asked to decide whether the accused is guilty or innocent. YOUR DECISION MUST BE SUPPORTED BY FACTS. DO YOU HAVE ANY QUESTIONS PERTAINING TO THESE INSTRUCTIONS? NOTE THE ORDER OF PRESENTATION: (1) READY (2) PARAGRAPH (3) CUE.

## Remember and Control Instructions

This study is designed to test your ability to store large quantities of relevant and irrelevant information presented in paragraph form. The study contains three separate themes: (a) fictitious robbery information (b) psychological effects of colors (c) winemaking. Since the fictitious robbery information will be presented in trial format, from this point forward, you are asked to assume the role of a juror. You are to read all information presented very carefully because you will be tested.

Following this slide, you will be shown a series of ready, paragraph, and cue slides: each of which will be explained momentarily. Some of the paragraph slides will contain details of a fictitious robbery; others will contain general information. The general paragraphs will be either about (a) the psychological effects of colors or (b) winemaking.

Your task is to remember all information presented. All paragraphs will be followed by a "remember" slide. The purpose of this slide is to remind you that you are to remember all information. It is vitally important for you to store this information properly because the paragraphs to follow are very lengthy.

The experiment will begin with the presentation of a "ready" slide. This slide will contain only the word "ready." Its purpose is to forewarn you that a paragraph



will soon follow. Following the "ready" slide, you will be shown a paragraph in which you are asked to read aloud. The purpose for having you read the paragraphs aloud is to ensure initial encoding of the material. You should read as quickly as possible because the paragraphs will be exposed for less than one minute. You should not have any trouble finishing in time. If you finish early, reread the paragraph or rehearse all materials presented thus far. It is important that you take advantage of this extra time. Again, all the information contained in the paragraphs is to be remembered.

At the conclusion of the experiment, your memory for this information will be tested. Also, you will be asked to decide whether the accused is guilty or innocent. YOUR DECISION MUST BE SUPPORTED BY FACTS. DO YOU HAVE ANY QUESTIONS PERTAINING TO THESE INSTRUCTIONS? NOTE THE ORDER OF PRESENTATION: (a) READY (b) PARAGRAPH (c) CUE. THIS WILL BE THE ORDER THE ENTIRE EXPERIMENT.

## APPENDIX B

### Paragraphs

On December 6, 1991, Byers Jewelers was robbed by a male about five feet eight inches tall. He weighed approximately 165 pounds. He was wearing blue, denim Levis jeans, a jacket with an Ole Miss Rebel emblem on the back, black converse tennis shoes, and a black ski mask. The man was armed with what appeared to be either a 12 or 16 gauge shotgun. Wallace Amber, the sales clerk on duty, gave this description. According to Wallace, the man escaped with over \$325,000 worth of jewelry and \$629 in cash.

### Remember

---

When police arrived on the scene, Charlie Anderson, a bystander, reported that the man escaped driving an early model brown Ford pickup truck with a Mississippi license plate number BVD 325. A few days later, Charlie came into the police station and reported that if he's not mistaken the robber appeared to favor his left leg. After hearing of the limp, police decided to run another computer check to further narrow the list of suspects. The suspect who best fit the description was a man named George Jones. It was discovered that George had served four years in Vietnam and had been injured in his left leg as a result of a grenade accident.



Remember

---

George had served 10 years in the state penitentiary for armed robbery when he was paroled a year ago after the parole board's interview. Herbert Walker, an inmate from the state prison, testified that he had talked to George two days before the robbery. The prosecutor asked Mr. Walker what was the nature of that conversation. Mr. Walker stated that George had told him that he was about to come into a large sum of money, and that he would be quitting his job in the next three months or so to live on "easy street" for the rest of his life. Mr. Walker also stated George laughed and told him not to worry because he was going to get what is rightfully his after spending ten years of his life in prison for a crime he did not commit. "At that point, I knew he was planning to rob a bank or something," said Mr. Walker. Cross-examination by the defense attorney revealed that Mr. Walker had been promised a reduction in sentence for his testimony. The defense attorney motioned for a mistrial, but the motion was denied.

Inadmissible Evidence

---

Jack Usher, a salesman at Walmart, testified that George had purchased a 12 gauge automatic shotgun about a

month before the robbery, and that after the sell, he discovered that the address George had given was false when he tried to contact him in reference to the warrant. Jack stated that George seemed very anxious when purchasing the gun. The prosecutor asked Jack what he meant by anxious. Jack stated that George looked like a man with a mission.

#### Inadmissible Evidence

---

"Generally speaking, the warm colors (yellow, orange, etc) are those that stimulate and promote efficiency. When properly used, they create a most pleasant environment. Of all colors, green apparently have the most relaxing effect on mind and body."

#### Inadmissible Evidence

---

After Mr. Walker finished testifying, Officer Scott, investigating officer, was called to the witness stand. Officer Scott stated that after about a week of questioning residents in a fifteen mile radius of the crime scene he discovered that George had been living with his girlfriend, Susan Miller, in an apartment about a mile from Byers Jeweler's.

#### Remember

---

During the questioning, he noticed that Miss Miller was wearing a beautiful engagement ring that appeared to be new and very expensive. He asked her where she had purchased the ring and could she show him a copy of the sales receipt. He told her his reasons for asking such questions and proceeded to ask whether or not George Jones had given it to her. But, before he could complete the sentence, she shouted, "where I purchase my jewelry is no concern of yours; I didn't steal it if that's what you are worried about." Moreover, he testified that after several unsuccessful attempts to get her to cooperate he arrested her under suspicions of receiving stolen property. A later investigation revealed that Byer's Jewelers was the original owner of the ring. It is still unclear whether the ring was bought or stolen from the store.

#### Inadmissible Evidence

---

The search for Mr. Jones continued for the next three months. While assisting with the case, Sergeant Sims discovered that the truck that was used by the robber to flee the scene was purchased from Sam's Auto Mart. Sergeant Sims uncovered this bit of information during her questioning of one of George's friends whose name will not be mentioned because of a lack of relevancy.

#### Remember

---

A few months later, Mary Sadler told police that she had seen George two days ago working at Big Boy's Supermarket in Planterville. The next day when they called the store to check out the lead they discovered that Mrs. Sadler was correct; George was an employee of Big Boy's, and from the comments made by the manager, he was doing a superb job. As a matter of fact, Joe Evans, the store's manager, hinted that he was planning to promote George once the district manager gave his approval. During the telephone conversation, police inquired as to what time George's shift started each day. Joe replied, "three o'clock sharp", you can time your watch by old George."

Remember

---

"An office manager changed a drab office color scheme to a cool, relaxing pattern featuring blue. The office was painted in August; when winter came, the girls complained of feeling too cool. The normal temperature was 70 degrees Fahrenheit; this was raised to 75. The girls still felt cool. After much discussion and study the color scheme was changed to warm yellows and restful greens. The temperature was left at 75 degrees. Soon the girls protested it was too warm; it was dropped to normal and complaints ceased. This is just one of many instances showing the psychological effect of color."



Inadmissible Evidence

---

A few days later, police went to the supermarket to question George as to his whereabouts the night of the robbery. The police asked George where were you the night of December 6, 1991 at approximately 8:22 pm. George stated that he was at Sim's Bar having a few beers. The officers preceded by asking George whether he owned a brown Ford truck license plate number BVD 325? He stated that he did. Next, the police asked from whom did he purchase the vehicle. George stated that he had purchased the vehicle from Sam's Auto Mart.

Inadmissible Evidence

---

"Wine has long been known to benefit health by aiding in the digestion process. Grapes carry the greatest number of wine-yeast cells which are receptive to fermentation. Wine can be made from flowers as well as from fruits and vegetables. Dried fruit swells up and starts making alcohol for wine very rapidly. When the temperature of wine mash goes down, the rate of fermentation is slowed up."

Inadmissible Evidence

---

George was then asked where the truck was located at the present time. George stated that it was parked in

front of the rear entrance of the store. The police asked him to unlock the vehicle so that they could take a look inside. Inside the truck, police found a black ski mask and a pair of black converse tennis shoes.

Remember

---

When another plant worker lifting black metal boxes filled with rough-cut brier pipes complained that they strained their backs. One week-end the foreman had all the boxes painted a pale green. On Monday several men said to the boss: "Say, these new lightweight boxes make a real difference."

Inadmissible Evidence

---

During the trial, Officer Shaw testified that while questioning George the night of his arrest, he noticed that George was wearing a very expensive watch. He said that he knew it was expensive because he had seen one just like it in Byer's a few months before the robbery. He stated that after noticing the watch he made the comment that they must be paying him really well for him to afford such a expensive item. Officer Shaw stated that George replied, "I'm not starving"

Inadmissible Evidence

---

Sam testified that he had sold George the truck because he had recently purchased a new town car and that he wanted to quite his wife who was always on his back for having too many personal vehicles. When asked about the license plate, Sam stated, "oh, that, well that plate does not belong on that vehicle, as a matter of fact, it doesn't belong on any vehicle." The defense attorney asked him what he meant by that statement. Sam stated, "I made them for George; he seemed like a really nice guy and I wanted him to have that truck very badly." "Didn't you know that making plates is a crime," asked the attorney?

Inadmissible Evidence

---

## APPENDIX C



Choose one of the answers provided by circling either A, B, C, or D. You are asked to guess whenever uncertain and/or you cannot recall having been shown paragraphs containing the information. Answer all questions.

1. What was the name of the store that was robbed?
  - A. Big Boy's
  - B. Sam's
  - C. Byer's
  - D. Bill's
  
2. Herbert Walker had known the defendant prior to the robbery because they had been \_\_\_\_\_?
  - A. Stationed together in the Army
  - B. Roommates in college
  - C. Old cell mates in prison
  - D. Teammates in high school
  
3. Which of the following men was accused of having robbed the store?
  - A. Charlie
  - B. George
  - C. Scott
  - D. Jack
  
4. Of all the colors \_\_\_\_\_ apparently have the most \_\_\_\_\_ effect on mind and body, identify that color and its effect on the mind and body.
  - A. Red, destructive
  - B. Green, relaxing
  - C. Blue, soothing
  - D. Brown, revitalizing

5. The robber escaped with over \_\_\_\_\_ dollars in cash and \_\_\_\_\_ worth of jewelry.
- A. \$11, 422 in cash and \$325,000 worth of jewelry
  - B. \$629 in cash and \$325,000 worth of jewelry
  - C. \$422 in cash and \$325,000 worth of jewelry
  - D. \$699 in cash and \$325,000 worth of jewelry
6. The weapon that was used in the robbery was a \_\_\_\_\_.
- A. A single barrel shotgun
  - B. A 22 caliber automatic rifle
  - C. A M-16 machine gun
  - D. Either a 12 or 16 gauge shotgun
7. The vehicle that was used to flee the crime scene was a \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.
- A. Brown, Ford truck
  - B. Green, Chevy truck
  - C. Red, Ford truck
  - D. Brown, town car
8. How many years had the defendant spent in prison?
- A. 10 years
  - B. 8 years
  - C. 2 years
  - D. 6 years

9. What was the temperature of the office before the manager changed it?
- A. 60 degrees
  - B. 64 degrees
  - C. 70 degrees
  - D. 75 degrees
10. What was his reason for changing the temperature?
- A. The plants were dying
  - B. The girls felt too cool
  - C. Company policy stated that it should be changed
  - D. The boss wanted it changed
11. How much of a change in temperature was made?
- A. Changed from 70 to 75 degrees
  - B. Changed from 55 to 64 degrees
  - C. Changed from 75 to 70 degrees
  - D. Changed from 64 to 60 degrees
12. The office manager changed the \_\_\_\_\_ to a cool, relaxing pattern featuring blue.
- A. Color scheme
  - B. Furniture
  - C. Drapes
  - D. Carpeting
13. Wine has been known to aid in the \_\_\_\_\_ process.
- A. Healing
  - B. Fertilization
  - C. Transplantation
  - D. Digestion

14. Wine can be made from \_\_\_\_\_.
- A. Flowers
  - B. Grapes
  - C. Vegetables
  - D. All of the above
16. Of all the fruits, grapes have the highest number of \_\_\_\_\_.
- A. Calories
  - B. Wine-yeast cells
  - C. Vitamins
  - D. Starch
17. Which of the following is the date of the robbery?
- A. December 6, 1991
  - B. September 21, 1991
  - C. November 15, 1991
  - D. January 18, 1991
18. The police noticed that the defendant's \_\_\_\_\_ was wearing a beautiful, expensive \_\_\_\_\_.
- A. Wife, necklace
  - B. Girlfriend, ring
  - C. Mother, watch
  - D. Girlfriend, watch



19. The robber was identified as being \_\_\_\_\_?
- A. A black male 5' 8" tall weighing approximately 165 pounds
  - B. A white male 5' 8" tall weighing approximately 165 pounds
  - C. A black male 5' 8" tall weighing approximately 190 pounds
  - D. A man 5' 8" tall weighing approximately 165 pounds
20. The foreman ended the complaints by having the \_\_\_\_\_ painted a different color.
- A. Floors
  - B. Signs
  - C. Restrooms
  - D. Tool boxes
21. During his conversation with Mr. Walker, the defendant stated that he was going to \_\_\_\_\_.
- A. Rob a jewelry store
  - B. Rob a bank
  - C. Buy a new ring
  - D. Get his due
22. During the proceedings, it was discovered that Mr. Walker had been \_\_\_\_\_.
- A. An Alcoholic
  - B. Threaten by the defendant
  - C. Lying about the conversation
  - D. Promised a reduced sentence

23. A Walmart salesman stated that the defendant had \_\_\_\_\_.
- A. Moved in with his girlfriend
  - B. Appeared very anxious when he last saw him
  - C. Worked at the store for about three months before the robbery
  - D. Dated his ex-wife for about a year
24. The defendant's girlfriend's apartment was located?
- A. Next to the store
  - B. About a mile from the store
  - C. Two blocks from the store
  - D. A fifteen minutes walk from the store
25. While questioning the defendant, police noticed that he was wearing a very expensive \_\_\_\_\_.
- A. Ring
  - B. Tie pin
  - C. Watch
  - D. Tie