Idiosyncratic item selection effects: do they produce the incongruity effect?

1988

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IDIOSYNCRATIC ITEM SELECTION EFFECTS: DO THEY PRODUCE THE INCONGRUITY EFFECT?

BY

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B.A., George Washington University, 1976

THESIS

Submitted in partial fulfillment of the requirements for the Master of Science degree in Clinical Psychology in the Graduate Studies Program of the College of Arts and Sciences University of Central Florida Orlando, Florida

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ABSTRACT

This study examined the recall of subject-generated and experimenter-provided target words as a function of whether or not the encoding cue was congruous or incongruous. Previous research has established that, for experimenter-provided items, congruous targets are recalled better than incongruous targets. However, in the case of self-generated targets, some researchers have reported a reversal of this effect ("the incongruity effect") while others have not. The subjects were 55 undergraduate psychology students from the University of Central Florida. In the experimenter-provided condition, subjects received congruous and incongruous question stems with the target word written in directly below the question. In the subject-generated condition, subjects were provided with the question stem and the first letter of the word [i.e., "It is a type of metal? S____;" (congruous) and "It is not a type of metal? S____" (incongruous)]. With respect to experimenter-presented items, it was anticipated that the standard congruity effect would be obtained. The data supported this hypothesis. However, the more interesting question posed by the present experiment was whether an incongruity or a congruity effect would be obtained for subject-generated items. In fact, recall of congruous and
incongruous subject-generated items did not differ significantly. These results provide little support for the hypothesis that self-generated items yield an "incongruity effect." Instead, when superior recall of incongruous self-generated items is obtained, it is probably due to idiosyncratic item selection effects.
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me that I could succeed in those dark moments when I had lost my perspective and equilibrium. His greatest contribution to my life has been in the area of my growth as a human being. First, because he is an individual worthy of respect and admiration. Second, his continuing encouragement, reassurance, suggestions, and confrontations have taught me to respect and admire my own personhood. I am deeply inspired and grateful for his ongoing commitment to my success. Thank you, dear one.

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INTRODUCTION

Until recently, research in the area of information processing as related to human memory concerned itself primarily with the structural aspects of memory. Thus, the focus was on describing the nature of, and relations among, the successive stages through which information flows (e.g., sensory stores, short-term memory, long-term memory, etc.). However, in the last decade there has been a growing tendency for theorists to concentrate instead on the processes involved in human memory. Therefore current research is directed toward examining activities such as encoding, attention, rehearsal, and retrieval. The trend has been to study directly these processes and to formulate a description of the human memory system based on these operations instead of the structural elements.

Craik and Lockhart's "levels of processing" model of human memory was influential in prompting this change in emphasis (Craik & Lockhart, 1972). The basic tenet of this theory proposes that the memory trace may be viewed as an automatic by-product of operations carried out by the cognitive system while processing the stimulus input. The durability of the trace is a function of the "depth" to which the input was processed. Processing is conceived as
a continuum ranging from very superficial analyses such as that of physical or sensory features to "deep" levels involving semantic analyses.

Craik and Tulving (1975) conducted research to further explore the levels of processing framework. In their study, subjects were induced to process words to different depths by answering various questions about the words. For example, shallow encodings were achieved by asking questions about typescript (e.g., "Is the word printed in capital letters?"). Intermediate levels of encoding were accomplished by asking questions about rhymes (e.g., "Does the word rhyme with PAIN?"). Deep encodings were achieved by asking whether the word would fit into a given category (e.g., "Is the word an animal name?") or sentence questions (e.g., "Would the word fit the following sentence: 'The girl placed the ______ on the table'?"). At each level of analysis, half of the questions yielded "yes" responses and half "no" responses.

The results of the study showed that performance increased substantially from below 20% recognized for the shallow encodings, to 96% correct for the deep encodings that required "yes" decisions. Thus, it was concluded that deeper levels of processing yield superior retention and that words to which positive responses are made are better remembered. Another finding was that the recognition rates
for "yes" responses in all three encoding groups was higher than for "no" responses. The latter finding, that questions leading to positive responses were associated with higher retention levels than those leading to negative responses, has been called the "congruity effect".

Schulman (1974) also documented that subjects recall a target word presented in the context of an encoding cue that is related to the target (congruous condition) far better than when the target is studied in the context of an encoding cue that has no relationship to it (incongruous condition). In his study, congruous was defined as a keyword or descriptor being located in a query that requires a positive response. For example, in the query, "Is a BUBBLE a sphere?", bubble and sphere are considered congruous. In the incongruous condition, the descriptor or keyword is inappropriately used, and the question calls for a negative response (e.g., "Is a CHAPTER slippery?").

Schulman's experimental procedure was divided into two parts. The first required the subjects give "yes-no" responses to 100 queries concerning relations between pairs of words, e.g., "Is SPINACH a vegetable?" (congruous) or "Is a DESERT lucky?" (incongruous). The second part of the procedure was a previously unannounced recall test. Schulman's results reflected that congruous encoding cues greatly facilitated recall, but not incongruous ones. He
attributed the memorial advantages of the "congruity effect" to the difference in processing that the congruous query entails over the incongruous one. Specifically, answering congruous queries fosters the rediscovery of relations that are already known between the keyword and descriptor, whereas incongruous queries do not give rise to relational coding of keyword and descriptor. Essentially, Craik and Tulving's research on levels of processing variables utilizing the "yes/no" responses supports Schulman's conclusions. They too concluded that a congruous encoding yields memorial advantages to the degree that the encoding question forms an integrated unit with the word presented.

Is it possible, however, that under some conditions, the opposite result will be obtained? Specifically, it is the purpose of the present study to investigate the validity of a reversal of the aforementioned findings. This reversal has been dubbed the "incongruity effect." This phenomenon was first described by Roenker, Wenger, Thompson, and Watkins (1978), who conducted research similar to Craik and Tulving's. However, they examined levels of processing and congruity in an entirely new paradigm, one where the subject generated some of the to-be-remembered target items as well as being provided some of the target items by the experimenter. This extension
was nontrivial because the depth-of-processing hypothesis demands that the levels of processing effect hold whether the items are provided by the experimenter or produced by the subject. This research was also of interest because it would test whether or not the "principle of congruity" would hold up when the subjects generated their own responses.

Subjects were presented with a total of 60 question stems that were equally divided into three classes: structural (shallow processing), rhyming (intermediate processing), or categorical (deep processing). In the condition where the experimenter provided the target word, the subjects were instructed to judge the appropriateness of the answer by circling either Y or N (for yes or no, respectively) in the lower right-hand corner of the card. For example, in the shallow processing condition, the card would contain the question: "Contains P and K?", with the answer "Pancake" and the subject would have to circle Y or N. In the subject-generated response condition, the cards contained the question, a circled Y or N and a blank line located below the question. The subjects were to respond to the question by writing a word in the blank space, which
contained a P and K if Y was circled or a word which did not contain these letters if an N was circled.

The results of the study demonstrated that the depth-of-processing hypothesis held for both the experimenter-provided response condition and the subject-generated condition. That is, recall of words which had been encoded categorically was superior to that of words encoded in the context of rhymes or structure. However, in the subject-generated condition, an empirical anomaly was reported with regard to the standard congruity effect: Subjects recalled more words generated in the incongruous-encoding condition than in the congruous-encoding condition. Thus, it appears that the "law of congruity" fails for subject-generated responses. This reversal seems quite significant in that it was obtained under various levels of processing. This phenomenon has been dubbed the "incongruity effect."

Horton (1987) conducted research in order to examine further the incongruity effect and its possible source. He hypothesized that because subjects were free to generate any word that fit the limitations of the encoding cue, it was possible that the incongruity effect was merely the result of an item selection artifact. That is, there are virtually no limitations on the nature of the words generated in the incongruous condition and thus they simply may be easier to recall than items generated in the
congruous condition. This could occur for two different reasons. First, subject-generated incongruous items may differ from congruous items on a scaled dimension (e.g., frequency, imageability) known to be correlated with memory performance. However, evidence against this hypothesis was provided in McFarland, Frey, and Rhodes (1980), in Experiment 2. Subjects in the generate condition were free to generate the target word of their choice in response to each encoding cue. Subjects for whom the experimenter provided the target words were then yoked to the subjects in the generate condition and were given as target words the same words that had been generated by the other subjects. Although there was an incongruity effect among subjects who generated their own items, the yoked control subjects displayed the standard congruity advantage. Thus, it would appear that generated incongruous items are not inherently more memorable. However, a second possibility is that idiosyncratically-selected incongruous items are more memorable than congruous items for the individual who generated them. This difficulty was not addressed by McFarland's yoking procedure because the hypothesis is that the incongruous target words are more memorable only for the subject that generated them, not for any other individual.
Horton (1987) conducted research that controlled for this potential confound by constraining the nature of the generated items. That is, subjects in the generate condition were not free to generate a response entirely of their own choosing. Rather, they were given a word fragment that permitted only one possible completion. He hypothesized that if idiosyncratic item selection effects are in fact the source of the incongruity effect, then it will disappear when the to-be-generated item is predetermined.

An example of a congruous cue and target in the generate condition would include: "It is a type of musical instrument- TR_MP_T." An example of an incongruous cue and target word would include: "It is not a type of gardening tool- N_CKL_C_." In the read condition, the target words trumpet and necklace were presented in their entirety. Subjects in the generate condition were proceeded with 32 category cues, half congruous and half incongruous, along with the target word fragment. Their task was to write the complete target word beside the fragment. Subjects in the read condition were provided with the same category cues and the complete target. Upon completion of the study trial, all subjects engaged in approximately ten minutes of arithmetic problems. An unpaced free-recall test was then given for the targets.
Results revealed a marginally significant effect of congruity. Most importantly, there was no task by congruity interaction. Congruously encoded items were better recalled than incongruously encoded ones in both the read and in the generate conditions. Thus, Horton concluded that the incongruity effect was caused solely by idiosyncratic item selection effects, because the effect occurs only when subjects are free to generate a word of their own choice and not when the generated response is constrained.

The present experiment was designed to use a procedure midway between Horton's constraining task of identifying word fragments and Roenker, Wenger, Thompson, and Watkins (1978) experiment where subjects were free to generate the target word of their choice. A possible criticism of Horton's procedure is that the subjects were not actually generating target words, but rather they were involved in the somewhat effortless task of word recognition. Roenker et al. (1978) emphasized the importance of the amount of cognitive effort involved in generating an incongruous response as compared to a congruous one. They hypothesized that the incongruous question stem probably initially directs the search to an item designated by the positive form of the question. That is, both "Is a tree" and "Is not a tree" will tend to direct memory search toward the
subset of tree names. Therefore, it would be more difficult (i.e., effortful) for a subject to generate a nonmember of the set defined by the question stem and this additional cognitive effort could lead to increased memory retention. Thus, it would appear that Horton's conclusion that the incongruity effect is caused entirely by idiosyncratic item selection effects is a bit premature. It may not be valid to compare a word identification task to a task where a subject actually generates a word. The present study used a procedure which required the subject to engage in some cognitive effort to generate the target word but still restrained his/her choices.

In the present experiment, subjects were presented with items which were either experimenter-provided or subject-generated. Generation of responses was somewhat constrained by virtue of the fact that the first letter of the word was provided. Thus, the potential pool of generated items was greatly limited. Subjects in both groups were provided with congruous and incongruous encoding cues. In the experimenter-provided condition, subjects received the question stem with the target word written in directly below the question. In the subject-generated condition, subjects were provided with the question stem and the first letter of the word [i.e., "It
is a type of metal? S____"; (congruous) and "It is not a type of metal? S____" (incongruous).

With respect to experimenter-presented items, it was hypothesized that the standard congruity effect be obtained. However, the interesting question posed by the present experimenter where generation is highly constrained is whether an incongruity effect or a congruity effect will be obtained for subject-generated items. If a congruity effect for words in the constrained generation condition is found, it validates Horton's contention that the incongruity effect is caused solely by idiosyncratic item selection effects. However, if the opposite occurs, then surely the issue of incongruity effects with self-generated material must not be laid to rest. Given the constraints imposed on the generation task in this experiment, the argument that item selection effects cause the incongruity effect is more difficult to support and, in fact, requires further examination.
METHODS

Subjects

The subjects were 55 undergraduate psychology students enrolled at the University of Central Florida. The subjects were tested in small groups over a total of eight sessions.

Design

The experimental design was a 2 (congruous vs. incongruous item) x 2 (experimenter-provided vs. subject-generated item), completely within subjects factorial design.

Materials

A total of 40 question stems were constructed so that each had four variations: (1) congruous experimenter-provided stems, (2) congruous subject-generated stems, (3) incongruous experimenter-provided stems, and (4) incongruous subject-generated stems. Four complete sets of 40 items were made by selecting one variation of each question stem for each set. Each variation of the forty items was counterbalanced across each of the four tests such that each question stem appeared in a different form for each test. The order of items within each of the four tests was randomized twice. Each of the eight resulting
lists was used in one of the testing sessions. The number of subjects tested in a given session ranged from five to eleven. All experimenter-provided target items were selected from Battig and Montague's (1969) word frequency norms. The following selection criteria were used: (1) The word was among the top 10 in terms of frequency of occurrence in the category; and (2) the word length ranged from 4 to 7 letters. The complete set of question stems and experimenter-provided target items is in Appendix A.

Procedure

Subjects were informed that they were participating in a task that dealt with their ability to make decisions about the appropriateness of word usage in certain contexts. Each subject was asked to read and sign a consent form (Appendix B). Subjects were then given a description of the test questions and instructions for completing the test. For example, subjects were told that they might be given the question stem, "It is a type of insect?", followed by the word "Roach," or "It is a type of insect?", followed by the word "Roman." They were to write either "yes" or "no" on the answer sheet. They were also informed that some of the question stems would be followed by a letter and, in such instances, they were to make up a word that begins with that letter and write their response
on the answer sheet, for example, "It is a type of metal?", followed by "S___" or "It is not a type of metal?", "S___." The only restrictions placed upon the items to be generated was that they be common nouns, at least four letters in length, and that no item be used as a response to more than one cue. Each subject was given a sheet of blank lined paper. They were instructed to use this sheet to record their answers to the questions. Each subject was also given a cardboard mask and instructed to use it to cover their answers to previous questions. A practice test consisting of one example of each of the four conditions was administered. The 40 question stems were presented to the subjects on a slide projector at the rate of one cue per 15 seconds. A pilot study was conducted with 7 subjects in order to determine an adequate exposure interval. Pilot subjects were asked to generate incongruous and congruous responses to 20 question stems. The average length of time that it took to generate a response was 12 seconds. Based on this data, a 15-second interval was chosen in order to ensure that subjects would have an adequate amount of time in which to generate responses. The answer sheet for responses was collected immediately upon completion. Following a 5-minute filler task of unrelated questions and answers (e.g., "Does a cow use its front or rear legs when it is getting up from lying
down?"), an unanticipated free-recall test for the target words was administered. The questions and answers used in the filler task were taken from Wright and Hyton (1988). Subjects were given 5 minutes to recall the 40 target words.
RESULTS

The number of correctly recalled words served as the data for analysis. The overall median error rate in the generation task was only 2.8%. Each subject's score for each of the four conditions was computed by dividing the number of words correctly recalled by the number of correct responses originally produced. Table 1 shows the main recall findings.

TABLE 1

PROPORTION OF WORDS RECALLED AS A FUNCTION OF TARGET TASK AND ITEM TYPE

<table>
<thead>
<tr>
<th>ITEM TYPE</th>
<th>Target Task</th>
<th>Cong.</th>
<th>Incong.</th>
<th>M</th>
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<tr>
<td>Generate</td>
<td>.38</td>
<td>.39</td>
<td></td>
<td>.38</td>
</tr>
<tr>
<td>Read</td>
<td>.21</td>
<td>.12</td>
<td></td>
<td>.16</td>
</tr>
<tr>
<td>M</td>
<td>.29</td>
<td>.25</td>
<td></td>
<td></td>
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Note: Cong. = congruous encodings
Incong. = incongruous encodings

A 2 (Target Task) x 2 (Item Type) analysis of variance revealed a main effect of target task, \( F(1,54) = 10.36, \) \( MSE = .024, p<.001. \) This effect is due to the fact that subject-generated targets were recalled better than
experimenter-provided ones. The effect of item type was only marginally significant, \( F(1,54) = 3.33, \) MSE = 0.023, \( p = .07, \) but the Target Task x Item Source interaction was significant, \( F(1,54) = 4.7, \) MSE = 0.025, \( p = .03. \) An examination of Table 1 shows that subjects recalled congruous items better than incongruous items in the case of experimenter-provided targets. However, recall of subject-generated items was unaffected by item type. This interpretation was supported by univariate F-tests. Congruous experimenter-provided items were recalled significantly better than were incongruous experimenter-provided items, \( F(1,54) = 15.11, \) MSE = 0.013, \( p = .005. \) However, in the case of subject-generated items, there was no congruity effect, \( F<1. \)
DISCUSSION

In the present experiment, recall of subject-generated and experimenter-presented target words was examined as a function of whether or not the encoding cue was congruous or incongruous. In the case of experimenter-provided items, the standard congruity effect was observed. That is, congruously encoded target items were recalled better than were incongruously encoded items. This finding has been well documented previously [e.g., Craik & Tulving (1975), McFarland & Rhodes (1980), Roenker et al. (1978), Schulman (1974)] and is generally interpreted to be the result of the fact that a target item can be more richly and deeply encoded within a congruous context than within an incongruous one.

The major question posed by the present experiment was whether a congruity or an incongruity effect would be obtained for subject-generated items when generation was highly constrained but still required substantial cognitive effort. Roenker et al. (1978) reported an empirical anomaly in the subject-generated condition with regard to the standard congruity effect: Subjects recalled more words generated in the incongruous-encoding condition than in the congruous-encoding condition. These authors
attributed the greater memorial advantage for incongruous self-generated items to the greater amount of effort involved in generating an incongruous response as compared to a congruous one. They hypothesized that the incongruous question stem probably initially directs the search to an item designated by the positive form of the question. That is, both "Is a type of musical instrument" and "Is not a type of musical instrument" will tend to direct memory search toward the subset of names of musical instruments. Thus, it would be more effortful for a subject to generate a nonmember of the set defined by the question stem, and this additional cognitive effort could lead to greater memory retention. However, if greater cognitive effort is the source of the incongruity effect, the present experiment's constrained subject-generate condition should certainly have evidenced an incongruity effect as well. In the Roenker et al. study, subjects were free to generate any word that fit the limitations of the encoding cue. However, in the present study, subjects had to generate a word that both fit the limitations of the encoding cue and began with a certain letter. Thus, if the critical variable was increased cognitive effort, one would have expected the procedure of the present study to have produced an incongruity effect even more substantial than that of Roenker et al.
Horton (1987) addressed the potential confound of idiosyncratic item selection effects in the incongruity effect by giving subjects in the generate condition word fragments that permitted only one possible completion. An example of a congruous cue and target in the generate condition would include: "It is a type of musical instrument - TR_MP_T." An incongruous cue and target word would include: "It is not a type of gardening tool - N_CKL_C_." In the read condition, the target words trumpet and necklace were presented in their entirety. Horton found that congruously encoded items were better recalled in both the "read" and the "generate" conditions, although the effect of congruity was only marginally significant. Thus, he concluded that the incongruity effect obtained by Roenker et al. was caused solely by idiosyncratic selection effects, because the effect occurs only when subjects are free to generate a word of their own choice and not when the generated response is constrained. The results of the present study certainly did not replicate Horton's findings either, because no congruity effect was obtained for subject-generated items, although a congruity effect was evident for experimenter-provided items.

How might the present results be interpreted? Clearly there is no evidence for an incongruity effect with subject-generated words. But why was there no congruity
effect? The failure to find a congruity effect for these items might also be the result of idiosyncratic item selection bias. That is, the present procedure constrains generation, but not entirely. Therefore, perhaps some item selection effects are still present, which boosts the recall of subject-generated incongruous items somewhat. Although the subject is constrained by a first-letter cue, he/she still may select any word beginning with this letter. Again, it can be argued that the chosen word may be somewhat more memorable for them than are the experimenter-provided words. Item selection bias is not as apparent in the congruous condition because there really is not much latitude at all in what one can select as a target. After all, the first letter greatly narrows it down to where, in most instances, to where there is only one possible answer. It would seem, therefore, that the incongruity effect can be described more accurately in terms of idiosyncratic item selection effects because the effect disappeared when subjects were constrained in their generation of responses (Horton, 1987). One substantive test of this notion would be to conduct a study utilizing Roenker et al.'s unrestrained generation condition, the present experiment's first letter constraint condition, and Horton's word fragment identification condition. Based on previous research, one could clearly predict the recall
level for incongruous subject-generated items to be a direct reflection of the degree of constraint. Such an experiment would perhaps present a clearer picture of idiosyncratic item selection effects in relation to the incongruity effect for self-generated material.
APPENDIX A

TEST QUESTIONS
TEST QUESTIONS

Format: The encoding cues and target words are presented in the following sequence—1) congruous experimenter-provided, 2) congruous subject-generated, 3) incongruous experimenter-provided, 4) incongruous subject-generated.

Sample Questions

It is an animal found in the zoo? Zebra

It is an animal found in the zoo? Z___

It is an animal found in the zoo? Zombi

It is not an animal found in the zoo? Z___

1. It is a unit of distance? Foot

   It is a unit of distance F___

   It is a unit of distance Farm

   It is not a unit of distance F___

2. It is a metal? Steel

   It is a metal? S___

   It is a metal? Steam

   It is not a metal? S___
3. It is a type of reading material? Book
   It is a type of reading material? B____
   It is a type of reading material Bank
   It is not a type of reading material? B____

4. It is a military title? General
   It is a military title G____
   It is a military title Glacier
   It is not a military title G____

5. It is a four footed animal? Horse
   It is a four footed animal? H____
   It is a four footed animal? Human
   It is not a four footed animal? H____

6. It is a kind of cloth? Cotton
   It is a kind of cloth? C____
   It is a kind of cloth? Carton
   It is not a kind of cloth? C____
7. It is a color?  
   It is a color?  Green
   It is a color?  G___
   It is not a color?  G___

8. It is a kitchen utensil?  Spoon
   It is a kitchen utensil?  S___
   It is not a kitchen utensil?  S___

9. It is a building for religious services?  Chapel
   It is a building for religious services?  C___
   It is not a building for religious services?  C___

10. It is a part of speech?  Noun
    It is a part of speech?  N___
    It is not a part of speech?  N___
11. It is an article of furniture?
   It is an article of furniture? D___
   It is an article of furniture? Door
   It is not an article of furniture? D___

12. It is a part of the human body?
   It is a part of the human body? F___
   It is a part of the human body? Forest
   It is not a part of the human body? F___

13. It is a kind of fruit?
   It is a kind of fruit? A___
   It is a kind of fruit? Adult
   It is not a kind of fruit? A___

14. It is a type of weapon?
   It is a type of weapon? R___
   It is a type of weapon? Radio
   It is not a type of weapon? R___
15. It is an elective office? 
   It is an elective office?  
   It is an elective office?  
   It is not an elective office?  
   Mayor  
   M____  
   Miser  
   M____

16. It is a type of human dwelling?  
   It is a type of human dwelling?  
   It is a type of human dwelling?  
   It is not a type of human dwelling?  
   House  
   H____  
   Honey  
   H____

17. It is a type of alcoholic beverage?  
   It is a type of alcoholic beverage?  
   It is a type of alcoholic beverage?  
   It is not a type of alcoholic beverage?  
   Beer  
   B____  
   Belt  
   B____

18. It is a country?  
   It is a country?  
   It is a country?  
   It is not a country?  
   England  
   E____  
   Equator  
   E____
19. It is a type of crime?
   - It is a type of crime? Theft
   - It is a type of crime? Tiger
   - It is not a type of crime? T___

20. It is a carpenter's tool?
   - It is a carpenter's tool? Hammer
   - It is a carpenter's tool? Hunter
   - It is not a carpenter's tool? H___

21. It is a type of fuel?
   - It is a type of fuel? Wood
   - It is a type of fuel? West
   - It is not a type of fuel? W___

22. It is a sport?
   - It is a sport? Tennis
   - It is a sport? Treaty
   - It is not a sport? T___
23. It is a weather occurrence?  
   It is a weather occurrence?  
   It is a weather occurrence?  
   It is not a weather occurrence?  

   Rain  
   Rank  

24. It is an article of clothing?  
   It is an article of clothing?  
   It is an article of clothing?  
   It is not an article of clothing?  

   Pants  
   Photo  

25. It is a part of a building?  
   It is a part of a building?  
   It is a part of a building?  
   It is not a part of a building?  

   Window  
   Walnut  

26. It is a chemical element?  
   It is a chemical element?  
   It is a chemical element?  
   It is not a chemical element?  

   Oxygen  
   Omelet  

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27. It is a musical instrument? Piano
   It is a musical instrument? P____
   It is a musical instrument? Paper P____
   It is not a musical instrument? 

28. It is a denomination of money? Nickel
   It is a denomination of money? N____
   It is a denomination of money? Nature N____
   It is not a denomination of money? 

29. It is a type of bird? Robin
   It is a type of bird? R____
   It is a type of bird? River R____
   It is not a type of bird? 

30. It is a type of vehicle? Truck
   It is a type of vehicle? T____
   It is a type of vehicle? Tooth T____
   It is not a type of vehicle? 
31. It is a branch of science?
   It is a branch of science?
   It is a branch of science?
   It is not a branch of science?

32. It is a vegetable?
   It is a vegetable?
   It is a vegetable?
   It is not a vegetable?

33. It is a kind of insect?
   It is a kind of insect?
   It is a kind of insect?
   It is not a kind of insect?

34. It is a type of flower?
   It is a type of flower?
   It is a type of flower?
   It is not a type of flower?
35. It is a disease?
   It is a disease?
   It is a disease?
   It is not a disease?

36. It is a type of tree?
   It is a type of tree?
   It is a type of tree?
   It is not a type of tree?

37. It is a type of ship?
   It is a type of ship?
   It is a type of ship?
   It is not a type of ship?

38. It is a fish?
   It is a fish?
   It is a fish?
   It is not a fish?
39. It is a precious stone?
   It is a precious stone?
   It is a precious stone?
   It is not a precious stone?

   Diamond
   D___
   Divorce
   D___

40. It is a type of snake?
   It is a type of snake?
   It is a type of snake?
   It is not a type of snake?

   Black
   B___
   Blood
   B___
APPENDIX B

CONSENT FORM
CONSENT FORM

"I understand that I will be asked to read a list of questions and answers, such as: 1) It is a color? Purple. 2) It is an article of clothing? Microphone. I will be asked in some instances to judge the appropriateness of the answer following the question by writing yes or no on my answer sheet. Sometimes, only the first letter of a word will be given following the question and I will supply my own answer beginning with that letter. I understand that I am free to discontinue participation at any point during this experiment."
REFERENCES


