Who Really Sailed The Ark?
An Investigation Into The Generality Of The Moses Illusion

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ABSTRACT

This thesis explores the generlaity of the Moses Illusion, a phenomenon discovered by Erikson and Mattson (1981) wherein subjects [N=25] provided answers to inconsistent questions without taking the inconsistencies into account. An example of such a question is "How many animals of each kind did Moses take on the ark?" A significant number of subjects responded "two," not noticing that Noah, not Moses sailed the ark (i.e., these subjects did not notice the substitution of an inconsistent name in the question). Erikson and Mattson's work explains and demonstrates the Moses Illusion in terms of proper names only. The object of this research was to test for an extension of the generality of this phenomenon to common nouns. From the evidence provided in the Literature Review, and the data obtained through experimentation, it is clear that the Moses Illusion is an effect limited to proper nouns.

CHAPTER I

INTRODUCTION

This study investigates the generality of the Moses Illusion, a phenomenon discovered by Erikson and Mattson (1981). In the study "From Words to Meaning: A Semantic Illusion," Erikson and Mattson studied the process of sentence comprehension in terms of a semantic features model. The Moses Illusion, according to the authors, sheds some light on how the meanings of individual words in sentences are combined to form global descriptions of the meanings of sentences.

In their study, Erikson and Mattson found that they could ask subjects questions which were internally inconsistent, and obtain answers to them, even though the subjects had been warned that some of the questions they were going to encounter might contain such inconsistencies. Further, the subjects were instructed to answer "wrong" (or something similar), to such questions, and were presented with examples of such inconsistent questions before testing began. In their first experiment, the example question was "Why was President Gerlad Ford forced to resign his office?" This question contains an inconsistency: former President Gerlad Ford was not forced to resign his office, but, rather, it was former President Richard Nixon who was forced to resign. During the experiment, a significant number of subjects responded "two" to the question "How many animals of each kind did Moses take on the ark?" This question also contains an inconsistency: Moses did not sail the ark; it was Noah who did, according to the Biblical legend. Hence, the

authors arrived at the name of this phenomenon, The Moses Illusion.

In their study, Erikson and Mattson concluded that "the illusion has at least some generlaity" (Erikson & Mattson, 1981, p. 543). The generality of the Moses Illusion, according to their data, is limited to proper nouns. The authors state that the Moses Illusion "is resistent to a wide variety of manipulations of the context of the proper name" (Erikson & Mattson, 1981, p. 549).

In Erikson and Mattson's study, the inconsistent names used in target questions were always proper names. This gives rise to a question concerning the generality of the illusion. Would the illusion still be present if the subjects were presented with target questions containing no proper names, but rather only common names? The purpose of the current research is to investigate whether the Moses Illusion extends to non-proper names (i.e., to common names, or common nouns).

The fact that Erikson and Mattson's data limit the generality of the Moses Illusion to proper names is justification in itslef for this research. The goals of this research are (1) to investigate the possible extended generality of the Moses Illusion, and (2) to provide an explanation for the non-extention of the Moses Illusion, should it fail to extend beyond the context of proper names.

LITERATURE REVIEW

Central to the process of sentence comprehension is the

process of constructing global descriptions of the meanings of sentences from the meanings of the individual words that comprise them (Erikson & Mattson, 1981, p. 540). Erikson and Mattson made two assumptions regarding this construction process: (1) that it presumably involves discovering the relations that hold between words in a sentence, and (2) that words (or the concepts represented by words) are often very complex (Erikson & Mattson, 1981, p. 540). Hence, sentence comprehension is a complex holistic construction process in which "the semantic features of the individual words are combined with the semantic features of the other words to produce an overall description of the meaning of the sentence" (Erikson & Mattson, 1981, p. 540).

In order to define semantic features, it is necessary to first look at a further definition of words. Clark and Clark (1977) define words as bundles of components. These components are themselves propositions with predicates and one or more arguments, and are formally identical to those propositions used for the representation of sentence meaning (Clark & Clark, 1977). These components have been called "minimal units of content, semantic features (italics added), semantic components, semantic markers, semantic primitives, prelexical predicates, and semantic nodes" (Clark & Clark, 1977, p. 415). Propositions as used by Clark and Clark (1977) are analogous to algebraic propositions such as the proposition F[X], where F is the predicate and X is the argument (Clark & Clark, 1977, p. 46). The term "predicate" here is taken to mean "a term designating a

property or relation (Woolf, 1980, p. 898). The term "argument" is taken to mean "one of the independent variables upon whose value that of a function depends" (Woolf, 1980, p. 60). An illustrative example of a proposition as used by Clark and Clark (1977) is the following: "When X is handsome is written handsome[X], it is clear that being handsome is a proposition with one argument, X" (Clark & Clark, 1977, p. 46). A proposition proper becomes such once the arguments of a propositional function have been filled in (Clark & Clark, 1977, p. 46).

Semantic features, then, are the propositions that a word expresses. They are the attributes that seem necessary for a word to be what it is (Clark & Clark, 1977). For example, the word "boy" may be described as something human, male, and non-adult. These are the attributes that seem necessary for "boy" to be what "boy" is, and are also the propositions that "boy" expresses. The word "boy" proposes to express the ideas of human, male, and non-adult (Clark & Clark, 1977, p. 415).

Erikson and Mattson (1981) describe sentence comprehension as a process of combining the semantic features of the individual words in a sentence so as to produce a cogent and global description of the meaning of that sentence. This construction process should not be likened to a literal construction project wherein a foundation is laid (the sentence itself) and bricks are cemented into place on all sides (the semantic features) until the ediface is completed for all to see (the meaning of the sentence) (Note 1). Rather, this process should be likened to making a cake, wherein the ingredients (words,

with their semantic features) are mixed together and baked according to a recipe (the sentence itself) until the finished cake emerges (the meaning of the sentence) (Note 2). The model for sentence comprehension proposed by Erikson and Mattson (1981), then, seems to be a model based not simply on adding together the meanings of the individual words in a sentence, but rather one based on mixing the words in a sentence together in order to find its meaning.

Erikson and Mattson (1981) divide sentence comprehension into three parts or processes. Since Erikson and Mattson (1981) describe sentence comprehension itself as a process, these three divisions will be referred to as sub-processes, for the sake of clarity. During the encoding sub-process, the stimulus (sentence) is represented in the processing system (the brain), but is not identified (Erikson & Mattson, 1981, p. 549). Next, the lexical access sub-process produces a set of semantic features for each word in the sentence (Erikson & Mattson, 1981, p.549). Finally, the construction sub-process combines the semantic features of all the words in the sentence in such a way as to produce an overall description of its meaning (Erikson & Mattson, 1981, p. 549).

Erikson and Mattson (1981) assert that the occurence of the Moses Illusion is not due to a failure to encode the inconsistent name into memory. This is concluded by virtue of the fact that in their first experiment, the authors asked their subjects to read the questions aloud before answering them. This was done to ensure that the inconsistencies would be en-

coded. Erikson and Mattson (1981) further assert that the illusion does not occur as the result of some breakdown in the lexical access sub-process. This conclusion is based on their data. On the basis of their three-part (sub-process) theory of sentence comprehension, Erikson and Mattson (1981) conclude that the Moses Illusion must be the result of the way in which the semantic features of the individual words are combined so as to produce a description of the sentence meaning (Erikson & Mattson, 1981, p. 550).

According to Erikson and Mattson (1981) the Moses Illusion will occur when "...the inconsistent name shares some semantic features with the correct name, although there does not seem to be any particular semantic feature that must be shared" (Erikson & Mattson, 1981, p. 549). Thus, the authors contend that the Moses Illusion is the result of two factors: (1) that the two names (correct and inconsistent) share semantic features, and (2) that there exists some problem in the construction sub-process, during which the semantic features of the individual words are combined to produce a description of the meaning of the sentence. It seems to be the case that these two factors interact to produce the Moses Illusion.

Though the explanation provided by Erikson and Mattson for the occurence of the Moses Illusion appears to be reasonable, there is another that should be examined. This other explanation is the object of this research.

The Moses Illusion, as demonstrated by Erikson and Mattson, occurs under rather limited conditions. The Illusion so far,

has only been seen in terms of proper names. In their research, the authors substituted semantically similar proper nouns for the correct proper nouns in target questions (with each target question having only one inconsistent proper noun) and found that the subjects answered the target questions in terms of the correct proper nouns. The question now arises as to the role that common nouns play in the Moses Illusion. If, according to Erikson and Mattson (1981), the illusion occurs as a result of the construction sub-process, and is due to shared semantic features, then should not the illusion occur under similar conditions, as in when the subject of a target question is not a proper noun, but a common noun? This, in turn, gives rise to questions concerning the ways in which proper nouns and common nouns are treated by us as speakers and as listeners, and to questions concerning the difference(s) between proper nouns and common nouns.

Proper nouns and common nouns have at least one thing in common. Both are naming expressions, and their relationships with intended referents are determined through convention, not through any compositional meaning (Bhat, 1979, p. 83).

The referent of an expression (expression here meaning a proper noun, a common noun, or a noun phrase) is the "entity in the real world that the expression is meant to pick out" (Clark & Clark, 1977, p. 566). Thus, according to Clark and Clark (1977), the referent of an expression is the real entity that it describes.

This definition seems to need expanding, however, since it

appears to be the case that there are entities in the imaginary world, and entities that are not of the real world that are the referents of expressions. Consider the word "unicorn." This expression clearly represents a non-real entity. But "unicorn" does refer to some entity, namely an inaginary one-horned horse-like animal.

Also, there are entities that are not of the real world that are the referents of expressions. Consider Moses in Erikson and Mattson's (1981) research. Moses is clearly not of the real world, although he was at one time. Thus, unless it be the case that one cannot refer to dead persons, then there must be some way of referring to them. Therefore, at least for the scope of this research, the definition of "referent" will be expanded to include all entities that may be described by an expression. Olson (1970) describes referents as the objects and events that words correspond to (Olson, 1970, p. 257). This is also an appropriate definition of "referent" for this research.

Bhat (1979) goes on to say that the meanings of these naming expressions are obtained through an examination of their use in a given speech community (Bhat, 1979, p. 28). Thus, it can be the case (and indeed it is, as will be discussed later), that the same word can have more than one referent. The presence of speech communities implies that a word can have more than one referent. This suggests that it can be the case that a given word may not have a universal meaning. Its meaning can (and often does) differ from one location to another).

An interesting example of this concept proposed by Bhat is seen in this account from the author's own experience: To a person from Florida, the word "mango," when used properly, of course, refers to a reddish-green tropical fruit. However, to someone from Southern Indiana, the same word can also mean green bell pepper. When questioned, the Floridian had never heard of this other meaning of mango, and the Hoosier had never heard of a fruit with this name. To the Floridian, using the word "mango" in this fashion seemed strange indeed, until its other meaning was discovered; mangoes were offered to this author as a topping for pizza. This example is made even more interesting when one notes that Webster's New Collegiate Dictionary (1980) lists both meanings.

Bhat (1979) describes some important applicational differences between proper nouns and common nouns. Note that for the purposes of this study the words "noun(s)" and "name(s)" will be used interchangeably, and should be taken to mean the same thing(s). First, Bhat (1979) says that there are applicational differences between proper names and common names, and that these differences give rise to additional differences between the two types of naming expressions.

On the basis of applicational differences, Bhat (1979) says that common nouns in a language can be arranged into hierarchies on the basis of relationships that may exist between them. These include incompatibility and hyponymy. Incompatibility contends that something cannot possess mutually exclusive and exhaustive qualities at the same time. For example,

incompatibility would contend that something cannot be both good and bad at the same time (Clark & Clark, 1977, p. 563). Two words are hyponyms when one is a member of a group that the other names (Clark & Clark, 1977, p. 563). For example, dog is a hyponym of animal. Proper names cannot be arranged into hierarchies of this fashion, since they do not show any such relationships between them (Bhat, 1979, p. 83).

Also, common nouns are generally replaced when passages containing them are translated from one language to another, whereas proper nouns are retained intact (Bhat, 1979, p. 83). Thus, it seems that common nouns are more flexible than are proper nouns.

A lesser point that Bhat (1979) makes regarding the applicational differences between proper nouns and common nouns is that proper nouns are constrained (generally) by the countibility of objects, whereas common nouns are not (Bhat, 1979, pp. 83-84).

The most important applicational difference between proper names and common names is the way in which they are applied or assigned to their respective referents. Bhat (1979) says that in this respect, proper nouns and common nouns "differ from each other crucially" (Bhat, 1979, p. 85). Bhat describes this major difference between proper nouns and common nouns as a "clear-cut dichotomy, not a continuum" (Bhat, 1979, p. 85). This major difference is actually quite simple: "Common nouns, when created or established, get applied to all individuals that can be referred by them," whereas, for proper nouns, "the appli-

cation occurs individually, each such application being considered as a distinct act of 'naming' in the history of the speech community" (Bhat, 1979, p. 85). Simply stated, common nouns may (and usually do) have more than one referent, whereas proper nouns have only one referent in any given act of communicating. For example, in the sentence "The cat had no whiskers," the common noun "cat" can refer to any number of individual cats, or to any number of individual perceptions of cat. However, in the sentence "Ronald Reagan went to Camp David," the proper nouns "Ronald Reagan," and "Camp David" have only one referent each, namely the current president of the United States, and the famed presidential retreat in Maryland. It is worthy to note that although both "Ronald Reagan," and "Camp David" consist of two words, they are both considered to be single proper nouns (Note 3).

According to Bhat (1979) the major difference between proper nouns and common nouns is one of referents. Proper nouns have only one referent, whereas common nouns may (and usually do) have numerous referents. With regard to common nouns, the converse is also true. Common nouns may have numerous referents, and, according to Olson (1970), a single referent may be designated by many words (Olson, 1970, pp. 257-258). For example, a particular man may be called "a father, a psychologist, a god, an animal, a machine, or George" (Olson, 1970, pp. 257-258).

As stated, the purpose of this research is to investigate whether or not the Moses Illusion will generalize to common

nouns, i.e., whether or not common nouns will produce the manifestation of the Moses Illusion. If the illusion does indeed generalize beyond the context of proper nouns, then it would seem that the explanation provided by Erikson and Mattson (1981) for proper nouns would be sufficient for this generalization. However, if the illusion does not generalize to common nouns, then an alternate explanation is due.

It seems to be the case that the referents of common nouns are "held open," as it were, and do not demand resolution immediately in order to make sense of a sentence (Note 4). For example, one need not know which particular tree (if any) is referred to in the sentence "A tree will grow wherever there is good soil, providing there is enough sunlight and water" in order to understand it. Conversely, one need not know which particular tree is referred to (if any) in order to answer the question "Where will a tree grow?" Further, the speaker in both of these examples need not have any specific tree in mind in order to speak these two sentences and make sense.

Proper nouns, however, by their nature, demand that their referents be resolved in order to make sense out of the sentences that they are involved in. For example, in order to be able to answer the question "How many animals of each kind did Moses take on the ark?" correctly, one must have knowledge of who Moses was, and that it has not he who sailed the ark. The proper noun (in this case, Moses) demands that its referent be resolved before the sentence can be understood properly.

Now, if it be the case that the Moses Illusion does not

nored the inconsistent names while directing their attention towards answering questions. By changing the questions into statements, Erikson and Mattson hoped to eliminate this.

Their subjects were 25 undergraduate students from lower-division psychology courses at the University of California at San Diego who participated for course credit. Subjects were all native speakers of English.

The stimuli for this experiment were four target questions and 16 distractors, all in the form of true/false statements. The stimuli were presented to the subjects via test booklets, which contained directions and examples in addition to the test stimuli. The stimuli were presented one to a page, with the presentation order randomized for each subject. The only constraint placed upon randomization was that no two target questions could appear consecutively.

Subjects were tested in groups ranging in size from 2 to 6. Subjects were each given a test booklet and allowed to proceed at their own rates, although the directions emphasized that they were to try to work quickly. Generally, the subjects completed the booklets in five minutes.

A chi square analysis was performed on the data, and significance was found for each of the four target questions. (Complete lists of target and distractor questions for this experiment appear in Appendices A and B.)

On the basis of the information relative to proper and common nouns presented in this Literature Review, it should be clear to the reader that the Moses Illusion is not expected

to generalize to common nouns.

The modifications made to Erikson and Mattson's (1981) experimental design are as follows: (1) Subjects were all volunteers, receiving neither credit nor reward for participation; (2) While it is assumed that Erikson and Mattson's subject pool included females as well as males, this research used only males, since the subject pool (Saint Meinrad College) is an all-male institution; (3) The "Moby Dick" question was replaced. This was done since Melville's "Moby Dick" was performed at Saint Meinrad College just prior to the conductin of this research. It is believed that the Moby Dick question would have been invalidated because of this; (4) Four new target questions and 16 new distractors were randomly added to Erikson and Mattson's set of questions in order that the possibility of an extension in the generality of the Moses Illusion could be measured.

If the Moses Illusion extends to common nouns, then a significant number of subjects will have been found to have answered the target questions (for common nouns) in terms of the correct common noun, thus showing that they did not notice the inconsistencies. However, since it is hypothesized that the illusion will not generalize to common nouns, a significant number of subjects is expected to answer false (or don't know) to target questions, thereby showing that they noticed the inconsistencies in them. (Complete lists of target and distractor questions for this research appear in Appendices C and D).

The hypotheses for this experiment are as follows:

$$H_0: \quad \mu 1 \leq \mu 2$$

$$H_1: \quad \mu 1 > \mu 2$$

where $\mu 1$ = research data obtained through answers to Erikson and Mattson's target questions;

and $\mu 2$ = research data obtained through answers to the new target questions.

If the Moses Illusion fails to generalize to common nouns, then H_0 will be rejected. If the Illusion does generalize, then H_0 will be accepted.

CHAPTER II

SUBJECTS

Subjects were 25 undergraduate students from Saint Meinrad College, Saint Meinrad, Indiana. The fact that Erikson and Mattson (1981) used 25 subjects is the basis for this number. Subjects were all volunteers, with neither reward nor credit for participation. Subjects were all native speakers of English as in Erikson and Mattson's (1981) research. Subjects were all males, since Saint Meinrad College is an all-male institution.

INSTRUMENTATION

Erikson and Mattson (1981) used four target questions and 16 distractor questions as stimuli. In addition to Erikson and Mattson's set of questions, four new targets and 16 new distractors, which are completely free of proper noun inconsistencies, were added to Erikson and Mattson's questions to complete the list of stimulus questions. As in Erikson and Mattson's (1981) research, the stimuli were presented in the form of true/false statements. (The complete lists of stimulus questions appear in Appendices A, B, C, and D.)

PROCEDURE

The subjects were presented with a set of norms and guidelines pertaining to psychological research on human subjects and the ethics conerning this before testing began. This was done verbally. Subjects were given the opportunity to ask questions or to withdraw before testing began.

The stimulus questions were presented to the subjects in the form of a test booklet, which also contained directions and

an example. Subjects were tested in groups ranging in size from 2 to 10. One subject was tested individually, due to his availability.

The subjects were given these directions:

On each of the following pages you will find a statement. It will be your job to read each statement, and judge it to be either true or false. After you read a statement, circle either TRUE or FALSE. If you do not know whether a statement is true or false, then circle DON'T KNOW.

You will occasionally encounter a statement that has something wrong with it. For example, you might see the statement "Former President Gerald Ford was forced to resign his office." The thing that is wrong with this statement is that Ford wasn't forced to resign. When you read a statement like this one, circle FALSE.

You may work at your own pace, but try to work quickly. Once you have answered a question and turned the page, DO NOT go back to it. When you have finished the entire set of questions, turn the booklet over in front of you.

Two additional directions which were not printed in the booklet were given to the subjects as the result of questions asked during the first test session:

(1) If you make a mistake, and wish to change an answer BEFORE you have turned the page, then completely black out the answer you do not wish to have counted, and circle the answer you wish to count.

(2) If you are uncertain about whether a statement is

true or false, give it your best "educated guess" based on what you would preceive to be the answer that most people would give.

STATISTICAL ANALYSIS

There are two questions that the statistical analysis must answer. First, Is the Moses Illusion present to a significantly greater degree for the proper noun target questions than for the common noun target questions? This question will be answered through a paired t-test performed on the target questions. The independent variable here is the manifestation(s) of the Moses Illusion (i.e., the incorrect responses to target questions). The dependent variable here is the set of questions itself.

Next, the statistical analysis will answer the question Are the distractor questions operating as distractors in the same fashion under both conditions (proper noun condition and common noun condition)? Again, a paired t-test will answer this question. The independent variable here is the manifestation(s) of the Moses Illusion (or more precisely, the incorrect answer(s) to distractor questions). The dependent variable is again the set of questions itself (this time, however, it is the set of distractor questions.

CHAPTER III

RESULTS

For the proper noun target questions (those used by Erikson and Mattson (1981), with the one exception being the replacement of the "Moby Dick" question by the Goldilocks question,) raw score results are as follows: 12 subjects manifested the Moses Illusion for the Moses question; four manifested the illusion for the Joshua question; 17 manifested the illusion for the Edison question; and 12 manifested the illusion for the Goldilocks question. The total number of illusions here was 25. Complete raw score results (by subjects) appear in Table 1.

Insert Table 1 About Here

Raw score results for the common noun target questions (those designed to measure the possible extended generality of the Moses Illusion) are as follows: two subjects manifested the Moses Illusion for the dogs question; four subjects manifested for the Bible question; two subjects manifested for the cow gut question; and no subjects manifested for the quarterback question. There was a total of eight illusions seen here. Complete raw score results (by subjects) appear in Table 2.

Insert Table 2 About Here

For the proper noun distractor questions (those used by Erikson and Mattson (1981),) raw score results are as follows:

no subjects manifested the Moses Illusion for the Christopher Columbus question; none manifested for the Einstein question; none manifested for the Star Trek question; one manifested for the Ronald Reagan question; none for the Germany question; two for the Socrates question; 4 for the Newton question; one manifested for the Holmes question; two manifested for the Paul Revere question; one manifested for the Jimmy Carter question; one manifested for the Jerry Brown question; one manifested for the Millard Filmore question; four manifested for the Paul McCartney question; one manifested for the Hobbit question; two manifested for the General Custer question; and four manifested for the Alaksa question. The total number of illusions manifested for distractor questions here was 25. Complete raw score results (by subjects) appear in Table 3.

Insert Table 3 About Here

Raw score results for the common noun distractor questions are as follows: one manifestation for the H_2O question; one for the computers question; five for the primary colors question; two for the skiing question; none for the pickles question; one for the DWI question; 15 for the closest star question; one for the election question; seven for the earth's size (relative to the moon) question; two for the plastics question; none for the freezing temperature of water question; three for the television question; four for the marijuana question; one for the fireplace question; two for the dis-

tillation question; and three for the waltzes question. The total number of illusions here was 47. Complete raw score results appear in Table 4.

Insert Table 4 About Here

The results of a paried t-test performed on the data for target questions are as follows: $t = 6.416$, $p<.05$. These results indicate that while a significant number of subjects manifested the Moses Illusion for proper noun target questions, this was not the case for common noun target questions. The complete analysis (in five-step statistical form) appears in Table 5.

Insert Table 5 About Here

The results of a paired t-test performed on the distractor questions are as follows: $t = 4.56$, $p<.05$. These results indicate that while a significant number of subjects manifested the Moses Illusion for proper noun distractor questions, this was not the case for common noun distractor questions (i.e., the subjects were not answering the common noun distractor questions incorrectly (Note 5)). The complete analysis (in five-step statistical form) appears in Table 6.

Insert Table 6 About Here

DISCUSSION

The results of the paired t-test performed on the target questions ($t = 6.416$, $p < .05$) confirm the hypothesis stated at the end of Chapter I, namely that the Moses Illusion did not (as predicted) generalize to common nouns. The evidence presented in the Literature Review suggested that the illusion would not generalize, and now, the results of experimentation confirm this suggestion. These results answer the first question posed at the end of Chapter II (p. 19), namely Is the Moses Illusion present to a significantly greater degree for the proper noun target questions than for the common noun target questions? The answer to this question is obviously, yes.

The second question posed on page 19 was Are the distractor questions operating as distractors in the same fashion under both conditions? The results of the paired t-test performed on the distractor questions clearly answers no to this question. The significance found ($t = 4.56$, $p < .05$) shows that for proper nouns, there were more than four target questions operating (i.e., some of the distractor questions were operating as targets). Here it seems to be the case that the stimuli for proper nouns generalized beyond the target questions. This is to say that inconsistencies in the distractor questions for proper nouns produced the Moses Illusion just as the inconsistencies in the target questions for proper nouns did. This stimulus generalization (Note 6) gives more strength to the existence of the Moses Illusion in terms of proper nouns only.

The fact that there was no stimulus generalization seen in

the common noun distractor questions is a simple one to explain. These distractors were structured and designed to operate solely as distractor questions. There were no similarities between the common noun targets and the distractors in terms of inconsistencies. In other words, the common noun target questions were designed with a semantically similar common noun replacing a correct common noun in the sentence. The distractors were not designed in this manner. They were simply statements which could be judged to be either true or false. Hence, the answer to the question of whether the distractors (in both conditions) were operating as distractors in the same fashion is no. Only the distractors for common nouns were operating as distractors.

CONCLUSIONS

The fact that there was a generalization of stimuli seen in the proper noun condition immediately suggests that further research seek to eliminate this generalization. Choosing questions (both targets and distractors) from a standardized set of questions (Nelson & Narens, 1980, for example) would provide a basis for distinguishing between targets and distractors.

In addition to the possibility of confusion that could result from non-standardized questions, using such questions would also serve to ground stimulus questions more firmly in general, since none of the questions used herein (those taken from Erikson & Mattson, 1981, nor the new set) were compared to any norms (Note 7).

These conclusions, however, do not discount the results obtained. According to the data collected, the Moses Illusion

does occur under those conditions specified by Erikson and Mattson (1981), but it does not generalize to common nouns. Some of the reasons for this non-generalization are presented in this thesis.

NOTES

1. The author is indebted to Dr. Gary D. Shank, PhD. for this analogy.

2. The author is indebted to Dr. Gary D. Shank, PhD. for the idea for this analogy.

3. The author is indebted to Dr. Gary D. Shank, PhD. for this information.

4. The author is indebted to Dr. Gary D. Shank, PhD. for this information.

5. In most cases, the correct answers for the common noun distractor questions were uncontestedly the correct answers. For example, the only correct answer to the question "Water freezes at 32° F" is true. For those questions that involved opinons, the scoring was subjective. In these cases, the answer that seemed most plausible to the author were the correct answers. For example, false was judged to be the answer to "Eating pickles is a sure cause for cancer." This method of scoring was chosen because (1) there had to be some way to score opinion questions, and (2) in these questions, there was no clear-cut way to determine the correct answers (i.e., there were no illusion producing inconsistencies in them). In this light, it is incorrect to call wrong answers to the common noun distractor questions manifestations of the Moses Illusion.

6. The author is indebted to Mr. R. Scott Friend, B.A. for this information.

7. The author thanks Dr. Gary D. Shank, PhD. for this insight.

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TABLE 1

Raw Score Data For

Proper Noun Target Questions[a]

Ss	Moses[b]	Joshua	Edison	Goldilocks	Total (Ss)
1	1	0	1	0	2
2	0	0	1	1	2
3	1	1	1	1	4
4	1	0	1	1	3
5	1	0	0	0	1
6	1	0	0*	0	1
7	0	0	0	0	0
8	1	0	1	0	2
9	0	0	1	0	1
10	0	0	1	1	2
11	1	1	1	1	4
12	0	0	1	0	1
13	0	0	0	0	0
14	1	0	1	1	3
15	0	0	1	0	1
16	1	0	0	1	2
17	0	0	1	1	2
18	1	0	1	1	3
19	1	0	0	1	2
20	0	0	1	0	1
21	0	0	1	0	1
22	0	0	0	0	0
23	0	1	0	1	2
24	1	1	1	0	3
25	0	0	1	1	2
	TOTAL = 12	TOTAL = 4	TOTAL = 17	TOTAL = 12	TOTAL ILLUSIONS = 45

[a]Subjects manifesting the Moses Illusion were given a score of 1. Subjects not manifesting the illusion scored 0.

[b]The complete questions are found in Appendix A.

*Subjects answering DON'T KNOW were judged to not be manifesting the illusion, and scored 0.

TABLE 2

Raw Score Data

Common Noun Target Questions[a]

Ss	Dogs[b]	Bible	Cow Gut	Q-Back	Total (Ss)
1	0	0	0	0	0
2	0	0	0*	0	0
3	0	0	0*	0	0
4	0	0	0*	0	0
5	0	0	0*	0	0
6	1	1	0*	0*	2
7	0	0	0*	0	0
8	0	0	0*	0	0
9	0	0	0	0	0
10	0	0	0*	0	0
11	0	1	0	0	1
12	0	0	0*	0	0
13	0	0	1	0	1
14	0	0	0	0	0
15	0	0	0	0	0
16	0	1	0*	0	1
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	0	0	0	0	0
22	1	0	0*	0	1
23	0	0	1	0	1
24	0	1	0	0	1
25	0	0	0	0	0
	TOTAL = 2	TOTAL = 4	TOTAL = 2	TOTAL = 0	TOTAL ILLUSIONS = 8

[a]Subjects manifesting the Moses Illusion scored 1. Subjects not manifesting the illusion scored 0.

[b]The complete questions appear in Appendix C.

*Subjects answering DON'T KNOW were judged to not be manifesting the illusion, and scored 0.

TABLE 3

Raw Score Data For

Proper Noun Distractor Questions[a]

Ss	1492[b]	F = ma	Kirk	1969	Germany	Socrates	Newton	Holmes	Revere
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	0	0*	0	0	0	0	0	0	0
5	0	0	0	1	0	0*	0	0	1
6	0	0	0	0	0*	0*	1	0	0
7	0	0	0	0	0	0	0	0	0
8	0	0*	0	0	0	0	0	0	0
9	0	0*	0	0	0	0	0	1	0
10	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	1	1	0	0
12	0	0*	0	0	0*	0	0	0	0
13	0	0*	0	0	0*	0	0	0	0
14	0	0*	0	0	0	0	0	0	0
15	0	0*	0	0	0	0	0	0	0
16	0	0	0	0	0	1	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	1
19	0	0	0	0	0	0	1	0	0
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0*	0	0	0
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	1	0	0
	TOTAL = 0	TOTAL = 0	TOTAL = 0	TOTAL = 1	TOTAL = 0	TOTAL = 2	TOTAL = 4	TOTAL = 1	TOTAL = 2

[a]Subjects manifesting the Moses Illusion scored 1. Ss not manifesting the Illusion scored 0.

TABLE 3

Continued

Ss	Jimmy	Jerry	Filmore	Paul	Hobbit	Custer	Alaska	Total (Ss)
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0*	0	0
4	1	1	0	0	0*	0	1	3
5	0	0	0	0	0	1	0	3
6	0	0*	0	0	0	1	0	2
7	0	0	1	0	0	0	0*	1
8	0	0	0	0*	0	0	0*	0
9	0	0*	0	0*	0	0	0	1
10	0	0	0	0	1	0	0	1
11	0	0	0	0	0	0	0	2
12	0	0	0*	1	0	0	1	3
13	0	0*	0	1	0	0	0	1
14	0	0	0	0*	0	0	0	0
15	0	0	0	0*	0	0	0	0
16	0	0	0	0	0	0	0	1
17	0	0	0	0	0	0	1	1
18	0	0	0	0	0	0	1	2
19	0	0	0	1	0	0	0	2
20	0	0	0	0*	0	0	0	0
21	0	0*	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	1	2
	TOTAL = 1	TOTAL = 1	TOTAL = 1	TOTAL = 4	TOTAL = 1	TOTAL = 2	TOTAL = 5	TOTAL ILLUSIONS = 25

[b]The complete questions are found in Appendix B.

*Ss answering DON'T KNOW were judged to not be manifesting the illusion and scored 0.

TABLE 4

Raw Score Data For

Common Noun distractor Questions[a]

Ss	H_2O[b]	Computers	Colors	Skiing	Pickles	DWI	Star	1984	Earth
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	1	0	0
3	0	0	0	0	0	0	1	0	0
4	0	0	0	0	0	0	0	0	0
5	0	0	1	1	0	1	0	0	1
6	1	0	0	0	0	0	1	0	0
7	0	0	0	0*	0*	0	1	0	1
8	0	0	0	0*	0*	0	1	1	0
9	0	1	0	0	0*	0	1	0	1
10	0	0	0	0	0	0*	0*	0	0
11	0	0	1	0	0	0	0*	0	1
12	0	0	0	0*	0	0	0*	0	0
13	0	0	0	0*	0	0	0*	0	1
14	0	0	0	0	0	0	1	0	0
15	0	0	1	0	0	0*	1	0	1
16	0	0	1	0	0	0	1	0	0*
17	0	0	0	1	0*	0	1	0	1
18	0	0	0	0	0	0	1	0	0*
19	0	0	0	0	0	0	0	0	0*
20	0	0	0	0	0	0*	0	0	0*
21	0	0	0	0*	0	0*	1	0	0*
22	0	0	1	0	0*	0	1	0	0*
23	0	0	0	0	0	0	1	0	0
24	0	0	0*	0	0	0	1	0	0
25	0	0	0	0	0	0	0	0	0
	TOTAL = 1	TOTAL = 1	TOTAL = 5	TOTAL = 2	TOTAL = 0	TOTAL = 1	TOTAL = 15	TOTAL = 1	TOTAL = 7

[a]Subjects manifesting the Moses Illusion scored 1. Ss not manifesting the illusion scored 0.

TABLE 4

Continued

Ss	Plastics	32°F	TV	Marijuana	Fireplaces	Distill.	Waltzes	Total (Ss)
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	1
3	0	0	0	0	0	0	0	1
4	1	0	0	1	0	0	0	2
5	0	0	0	0	0	0	0*	4
6	0	0	1	0	1	0	0*	4
7	1	0	0*	0*	0	0	0*	3
8	0	0	0	0	0	0	0*	2
9	0	0	0	0	0	0*	0*	3
10	0	0	0*	1	0	1*	0	2
11	0	0	0	1	0	0	0	3
12	0	0	0*	0	0	0	1	1
13	0	0	1	0	0	0	1	3
14	0	0	1	0*	0	0	1	3
15	0	0	0	0	0	0	0	3
16	0	0	0	0	0	0	0	2
17	0	0	0	0	0	1	0	4
18	0	0	0	0*	0	0	0*	1
19	0	0	0	0	0	0	0*	0
20	0	0	0	0	0	0	0*	0
21	0	0	0	0	0	0	0*	1
22	0	0	0	0	0	0	0*	2
23	0	0	0	0	0	0	0*	1
24	0	0	0	0	0	0	0*	0
25	0	0	0	1	0	0	0*	1
	TOTAL = 2	TOTAL = 0	TOTAL = 3	TOTAL = 3	TOTAL= 1	TOTAL = 2	TOTAL = 3	TOTAL IN-CORRECT =47

[b]The complete questions are found in Appendix B.

*Ss answering DON'T KNOW were judged to not be manifesting the illusion and scored 0.

TABLE 5

Paired T-Test Results

For Target Questions

Step 1: H_0: $\mu_1 \leq \mu_2$

H_1: $\mu_1 > \mu_2$

Step 2: Paired T-Test: $$t = \frac{\frac{D}{N}}{\sqrt{\frac{N D^2 - (D)^2}{N^2}}\sqrt{N-1}} = \frac{\frac{37}{25}}{\sqrt{\frac{25(83) - (37)^2}{(25)^2}}\sqrt{25-1}} = 6.416$$

Step 3: N = 25; T distribution

Step 4: $\alpha = .05$; $t\alpha = 1.711$

Step 5: $t = 6.416$; reject H_0

TABLE 6

Paired T-Test Results

For Distractor Questions

Step 1: H_0: $\mu 1 \leq \mu 2$

H_1: $\mu 1 > \mu 2$

Step 2: Paired T-Test: $$t = \frac{D}{N} = \frac{39}{25} = 4.56$$

$$\frac{\sqrt{\frac{N D^2 - (D)^2}{N^2}}}{\sqrt{N - 1}} \qquad \frac{\sqrt{\frac{25(131) - (39)^2}{25^2}}}{\sqrt{25 - 1}}$$

Step 3: N = 25; T distribution

Step 4: $\alpha = .05$; $t_\alpha = 1.711$

Step 5: $t = 4.56$; reject H_0

APPENDIX A

Statements Used As Target Questions by Erikson and Mattson (1981)

1. Moses took two animals of each kind on the ark.
2. Joshua was swallowed by a whale in the Biblical story.
3. Thomas Edison, the inventor of the telephone, was an American.
4. In the novel Moby Dick, Captain Nemo was chasing the white whale.[a]

---

[a]In the current research, this question was changed to "Goldilocks was beaten to her grandmother's house by the wolf" (cf. p. 15).

APPENDIX B

Statements Used As

Distractor Questions

by

Erkison Mattson (1981)

1. Columbus discovered America in 1492. (True)

2. Albert Einstein's famous equation which relates mass and energy is f = ma. (False)

3. In the tv series "Star Trek," Captain Kirk was captain of the "Enterprise." (True)

4. In 1969 Ronald Reagan became the first man on the moon. (False)

5. Germany has the largest population of any country in the world. (False)

6. Socrates, the famous Greek philosopher, died as a result of drinking hemlock. (True).

7. An apple hitting him on the head was supposed to have caused Isaac Newton to start thinking about gravity. (True)

8. In the series of detective stories, Sherlock Holmes' side-kick was named Watson. (True)

9. On his famous midnight ride, Paul Revere shouted "The British are coming!" (True)

10. Jimmy Carter comes from a small town in Georgia called Plains. (True)

11. Jerry Brown, the governor of California, is associated with singer Linda Ronstadt. (True)

12. In 1776 Millard Filmore wrote the U.S. Constitution.

APPENDIX B

Continued

(False)

13. Paul McCartney, formerly of the Beatles, is now with the group Wings. (True)

14. The Hobbit was the book that preceeded William Shakespeare's The Lord of the Rings. (False)

15. The Indians defeated General Custer at the battle of Little Bighorn. (True)

16. In terms of size, Alaska is the largest state in the United States. (True)

APPENDIX C

Statements Used As Target Questions For Common Nouns

1. According to legend, dogs are born with nine lives.
2. The Bible commands to honor thy brother and thy sister.
3. Cow gut is the best and most costly racquet string.
4. The quarterback is usually the poorest hitter in the lineup and bats last.

APPENDIX D

Statements Used As

Distractor Questions

For Common Nouns.

1. The physical formula for water is H_2O. (True)
2. Computers are capable of performing complex mathematical problems much faster than humans. (True)
3. The primary colors are red, yellow, and blue. (True)
4. Eating pickles is a sure cause for cancer. (False)
5. Snow skiing is believed to be a dangerous sport.
6. Driving while intoxicated is an offense in every state. (True)
7. The closest star to this planet is over ten light-years away. (True)
8. The next president will be elected in 1984. (True)
9. The earth is about four times the size of the moon. (True)
10. Plastics were common household items during the 1700's. (False).
11. Water freezes at 32 degrees F. (True)
12. Before television was invented, all there was for home entertainment was stereophonic music. (False).
13. Many people believe that marijuana should be legalized. (True).
14. Fireplaces, drive-in movies, and candlelight are all considered to be romantic. (True)
15. Distillation removes the impurities from water. (True)
16. Waltzes are all written in 3/4 time. (True)