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Falling for Moses: The Role of Stroop Inhibition and Language Expertise

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by

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Abstract

When presented with the question, “How many animals of each kind did Moses take on the Ark?”, people often respond “2”, despite knowing that Noah is the Biblical figure who is said to have taken animals on the ark. This phenomenon where people fail to detect inaccuracies in text has come to be known as the Moses Illusion (Erickson & Mattson, 1981). The current study was designed to investigate Moses illusion rates in a multiple-choice format. Further, participants were assessed on two cognitive constructs: language experience and cognitive inhibition. Results showed robust rates of the Moses illusion using the multiple-choice format, replicating previous work. Additionally, variability in Moses illusion rates was explained in part by taking into account individual differences in language experience. That is, individuals with greater exposure to printed language (as measured by the Author Recognition Task) were more likely to detect errors. There was no evidence that individual differences in inhibition (as measured by the Stroop Task) explained variability in Moses illusion rates.

Every day we are constantly bombarded with an excess of information. We rely on our brain to process information, and more importantly, to process that information accurately. These processes are often unconsciously occurring. As a result, we often aren't aware when we have missed an inaccuracy, and will even proceed as if we have read the correct information. For example, given the question, "how many animals of each kind did Moses take on the Ark," most people answer "two." People fail to recognize the error of Moses, when it should be Noah. This failure to recognize an inconsistency in text has been coined as the "Moses Illusion."

The first researchers to note this phenomenon were Erickson and Mattson (1981), who wanted to document the effect systematically and investigate possible reasons for its occurrence. They began by testing whether participants were failing to encode the incorrect name. They hypothesized that readers might be reading the sentence too quickly and skipping over the distortion. In the first experiment, participants read a target question aloud ensuring that the question would be encoded on some level. Each question was followed by its correct answer and justification or incorrect answer if the name in the question was distorted. Following this section, the participants were tested for memory of the question previously seen. The participants were presented with the first part of each question, up to the distorted or undistorted name, and were asked to write the rest of it, or to write "can't recall." Lastly, participants were given a knowledge check on all the Moses illusion items. Erickson and Mattson found that the Moses illusion occurs when the participants read the questions aloud. Furthermore, they expanded their target question from just the classic Moses question to three other additional questions. The finding that participants still fell for this illusion across multiple questions shows that this failure to notice inconsistencies in text could be generalized more broadly.

Erickson and Mattson's second experiment addressed whether the focus of the question was influencing rates of the Moses illusion. They changed the target questions to statements, where the inaccuracy was in the focus of the statement: "Moses took two animals of each kind on the Ark." In this experiment, participants were now asked to respond "true," "false," or "don't know" to the statements and had unlimited time to answer the statements. The frequency of the Moses illusion was reduced, but not eliminated, suggesting that the Moses illusion is not solely an effect of the focus of the question.

Erickson and Mattson's third experiment tested the effects of including inconsistent names that were phonologically or semantically similar to the correct name. Similar to experiment 1, participants were asked to respond to questions. The results of the experiment yielded no support for the phonological similarity hypothesis, given that there were no significant differences in Moses illusion rates across inconsistent names that shared phonological features with the correct name. In contrast, the results did support the semantic similarity hypothesis in that there were significant differences in frequency of illusion for semantically related names, and non-biblical names. However, it's important to note there were few items across their experiments and that other possibilities for the Moses illusion should be investigated.

Perhaps the most intuitive explanation for why individuals fall for the Moses Illusion is that it's possible they didn't know the answers to begin with. This lack of knowledge was explored in depth by Reder & Kusbit (1991). Participants were asked to memorize facts that the questions would be asking. Even when the information was memorized and studied beforehand, readers still fell for the Moses Illusion. While the magnitude of the illusion was reduced for facts that were studied versus unstudied, rates of the illusion were still significantly higher than zero.

Out of many theories, two competing arguments for the Moses Illusion emerged: partial-processing theory and node structure theory. The partial-processing theory is based on the idea of good-enough language processing, according to which language comprehenders often do not process language carefully but rather routinely derive an interpretation of a sentence that is inaccurate or incomplete (Ferreira, Bailey & Ferraro, 2002). More specifically, this theory is based on the assumption that information in the sentence that is presented as given is only partially processed, whereas processing resources are devoted toward new information to make a prediction about the sentence material. Evidence for this theory is based on the idea that a good-enough approach should lead the comprehender to an appropriate derived meaning, rather than processing the sentence fully which would come at more of a cost to the individual (Ferreira & Lowder, 2016).

Another explanation for why the Moses illusion occurs is node structure theory. This theory, first proposed by Shafto & MacKay (2000) suggests that the semantic system and phonological system are simultaneously processing information. The greater the semantic and phonological similarity between the undistorted term and distorted term, the more likely a reader will fall for the Moses Illusion.

Another classic demonstration of the Moses illusion comes from Bredart & Modolo (1988), who manipulated which part of the sentence was in linguistic focus. When the distorted word was focused in a cleft construction (e.g., “It was Moses…”) participants were more likely to detect the incorrect information. Additionally, focus could be shifted by adjusting the presentation of the distorted term. Capitalizing the distorted term reduces the Moses Illusion (Kamas et al., 1996). The more focus that is directed towards the distorted term, the more likely the reader is to properly recognize the inaccuracy in the statement. Song and Schwarz (2008)

manipulated focus by forcing the reader to put more effort into reading the sentence. This manipulation was done by changing the sentence to a difficult-to-read font. This difficult-to-read font improved performance on the distorted questions, but impaired performance on undistorted questions indicating some shallow processing. The failure to encode questions, which was manipulated by level of emphasis or focus on the target areas of the question, did not account for the still high rate that individuals fell for the Moses Illusion.

Perhaps participants did encode the error, but understood what the author meant, so proceeded to answer as if the undistorted term was present. This idea, the cooperation principle, argues that people notice the distortion, but respond as if the question was correct. Cooperative communication was studied by Reder and Kusbit (1991), who primed participants with a gist condition or a literal condition. Participants given the literal condition were told to treat each question literally and to not give an answer if the question was distorted. Participants given the gist condition were told to ignore distorted words in the question and give answers to these questions as if the appropriate word had been in place. Results showed that rates of the Moses illusion were reduced but not eliminated in the literal condition versus the gist condition, suggesting that the Moses illusion cannot be explained by the cooperation principle. Speckmann & Unkelbach (2021) provided further evidence against the cooperative communication hypothesis by presenting the items in a multiple-choice format. This ensured that the correct answer was always presented to the participant, giving the reader the option to correctly answer the question (Speckmann & Unkelbach, 2021). As a result, if the illusion was a result of cooperative communication, there would be a reduction in the illusion with a multiple-choice format since “can’t say” is available in each question.

The results of Speckmann & Unkelbach's (2021) first experiment showed higher rates of the illusion in a multiple-choice format, in comparison to Reder and Kusbit (1991). Their second experiment aimed to address some concerns, such as the previous fixed order of answers and that the phrase of the correct response could influence the results, in that "can't say" isn't completely encompassing the fact that the error is in the question. To address these concerns, experiment 2 used the same items as experiment 1, however, the order of question and answers was shuffled, and the correct answer was changed from "can't say" to "This question can't be answered in this form." Even with these changes, Speckmann & Unkelbach (2021) replicated their same rate of Moses Illusion from the first experiment (about 50%). Based on these two experiments, it's unlikely that the cooperation hypothesis is a factor in the rates participants fall for the Moses Illusion.

Speckmann & Unkelbach's (2021) next two experiments addressed the influence of motivation on the Moses Illusion as a function of monetary incentive. If partial processing is responsible for the illusion, then incentives should decrease the rate of Moses Illusion, especially as incentive increases. In experiment 3, they used three incentive conditions: no incentives, low incentives, and high incentives. All items in this experiment were replicated from experiment 1. While there was an effect of incentives, in that the higher incentive condition resulted in lower Moses Illusion rates, this difference was weak and not significant. To correct for the possible confusion of the "Can't say" answer, they conducted experiment 4, with the response changed to "this question can't be answered in this form." This experiment was a replication of the third experiment. This fourth experiment confirmed a main effect of incentives on Moses Illusion rates. While motivation and incentive had an effect on the Moses Illusion, this effect was small and does not account for a majority of the reason participants fall for the illusion. The

Speckmann & Unkelbach (2021) experiments support the partial matching hypothesis in that it was evidence that there was some cognitive failure at place, rather than a participant's motivation, incentive, or effort.

Regardless of the underlying theory that explains why the Moses Illusion occurs, individuals vary tremendously in their ability to detect errors in a sentence, such that some almost always catch the errors and some miss almost all of them. Hannon and Daneman (2004) explored individual differences in participants in relation to the ability to detect anomalies in sentences as a measure of shallow semantic processing of text. "Good comprehenders," or more skilled readers, were able to detect the anomaly at a significantly higher rate than less skilled readers (Hannon & Daneman, 2004), suggesting that less skilled readers are using more shallow language processing and perhaps assuming coherence as a default.

Cantor & Marsh (2017) explored individual differences in relation to expertise of the subject in the sentence. Cantor & Marsh (2017) looked at graduate biology and history students as experts in their fields, and non-experts in the opposing field. Illusion rates were higher in non-experts than in experts, however, experts showed illusion rates significantly different from 0 in questions from their own field. Cantor & Marsh took this experiment one step further and either bolded or left the target word unchanged. The questions that had the bolded distorted item had lower proportions of individuals falling for the Moses illusion in both their expert domain and non-expert domain. Ultimately, expertise helped reduce illusion rates, especially when the distortions were bolded, but did not eliminate them.

Umanath and colleagues (2014) explored whether age has an influence on vulnerability to the Moses Illusion. Undergraduate students from Duke and community members that were at least 65 were recruited. Older participants were more likely to miss the error in the sentence than

younger participants, but were more able to produce the correct answer when asked again whereas the younger participants were more likely to produce the incorrect answer when asked again (Umanath et al., 2014). As a result, it could be argued that a consequence of the exposure to incorrect information is that it is also briefly carried over into later tasks, regardless of previous knowledge. Consequently, older adults did not suffer consequences later from the exposure to incorrect information, whereas younger participants were more likely to suffer from the exposure of incorrect information, even though both groups had sufficient knowledge on the critical term. Prior knowledge was more likely to help the group not fall for the illusion when asked later to recall through memory tests.

Hannon & Daneman (2001) explored individual differences across participants in relation to the Moses illusion and found that the ability to not fall for a semantically related word is related to accessing not only long-term memory, but also an individual's working memory. Readers were less likely to detect the anomaly in sentences with high contextual overlap with the distorted word than sentences with low contextual overlap with the distorted word. However, even in low contextual overlap sentences, the more semantically related the distorted word was to the undistorted word, the less likely readers were to detect the error (Hannon & Daneman, 2001).

Working memory is one of many cognitive constructs that might explain variability in rates of the Moses illusion or language comprehension more generally. Freed and colleague (2017) conducted a large-scale individual differences study to examine which constructs are most useful in explaining variability in language comprehension ability. They examined a large number of tasks including measures assessing decoding, working memory capacity, inhibition, language experience, reasoning, perceptual speed, and fluency. Their results showed that only

reasoning and language experience had direct effects on comprehension, whereas the other variables indirectly affected comprehension ability. However, more research is needed with inhibition and comprehension given that many large-scale studies investigating comprehension don't typically look at inhibition ability.

Based on these findings, the focus of the current research is to first replicate Speckmann & Unkelbach (2021) using updated items more appropriate for American participants. Additionally, the current research aims to investigate the source of individual variability in Moses illusion rates by looking at two promising constructs: language experience and inhibition (Freed et al., 2017). Language experience was assessed using standardized measures of vocabulary and exposure to printed language. Inhibition ability was assessed using a Stroop task. Additionally, this research analyze individual differences on a continuum instead of using an extreme groups design.

Methods

Materials

Forty-eight multiple choice questions were constructed in a within-subjects design with two versions each: an undistorted version ("How many animals of each kind did Moses take on the ark?") and a distorted version ("How many animals of each kind did Noah take on the ark?"). For the undistorted version, the multiple-choice answers consisted of the correct answer, a plausible second answer, a "don't know" option and a "the question can't be answered in this form" option. The possible multiple-choice answers were maintained in the distorted version, except the now correct answer would be "the question can't be answered in this form."

Nineteen questions were adapted from Speckmann & Unkelbach (2021). Seven questions from Cantor & Marsh (2017) were used, but answers were generated to fit the multiple-choice

format. Eleven questions from Umanath and colleagues (2014) were used, but answers were generated to fit the multiple-choice format. Eleven questions from Reder and Kusbit (1991) were used, but answers were generated to fit the multiple-choice format. Additionally, one of these questions was changed from using Ronald Reagan as a subject to Joe Biden, in an attempt to use more recent events that the public likely has more knowledge about. The Appendix provides a full list of distorted and undistorted questions and their respective answers.

The Stroop task consisted of 84 trials. There were three possible conditions: congruent, incongruent or control. For congruent trials, the word that was presented matched the font the word was presented in (e.g.., the word "BLUE" printed in blue font.) For incongruent trials, the word that was presented did not match the font the word was presented in (e.g.., the word "BLUE" printed in green font.) The control trials consisted of colored rectangles. There were four possible colors: red, green, blue, and black. For each condition (congruent, incongruent and control) there were seven repetitions. The trials were randomly sampled. The stimuli remained on screen until a response was given, and latencies were measured from onset of stimuli. The intertrial interval was 200 ms. If participants made an error, feedback was presented for 400 ms.

Measures of language experience included the Shipley Vocabulary task and the Author Recognition Test. The Shipley Vocabulary test (Shipley, 1940) is a standardized measure of vocabulary knowledge consisting of 40 items. For each item, participants are instructed to circle one out of four words that are most similar to the prompted word in bold.

The Author Recognition Task (ART), originally developed by Stanovich and West (1989), is a checklist of names that is designed to estimate an individual's degree of exposure to printed language. An updated version of the test was used (Acheson et al., 2008), which consisted of 130 names—65 authors and 65 non-authors. Participants were instructed to indicate

whether they recognized a name as an author. Scores were calculated as the number of authors correctly identified minus any non-authors that were marked as authors.

Participants and Design

Participants were recruited via Amazon's Mechanical Turk for a study on "Trivia Questions." Eligible participants were those 18 years of age or older, who listed their nationality and current residence in the United States, and whose dominant language was English. Each participant completed one of the two lists of 48 questions, the Stroop Task, the Shipley Vocabulary test, the ART, and a demographics questionnaire.

Sample size was determined by the amount of funding available to offer participants an appropriate level of monetary compensation for a study of this nature and set in advance at approximately 100 participants. This study was approved by the University of Richmond Institutional Review Board (IRB). All participants provided informed consent before completing the study.

Data were gathered from 100 participants who were paid $4 for their time. Eleven participants were excluded due to not completing the task or failing to follow instructions, leaving a final sample size of 89. The 89 participants were not racially diverse with eight participants identifying as Asian, nine as Black or African American, five as Hispanic or Latino, and 80 as White. The age of the participants ranged from 21 to 73, with the mean age being 41. The participants were more gender diverse with 43 participants identifying as female, 55 as male and one as non-binary.

Procedure

Participants first completed the Stroop task, which was administered through the Inquisit web platform. Participants were then redirected to a Qualtrics survey, which contained the remaining tasks.

In the Stroop task, participants were instructed that they would be presented with words in different colors and that their task was to indicate the color each word was printed in, while ignoring the word itself. In order to indicate the color of the word, participants pressed the following keys: d for red, f for green, j for blue, and k for black. Participants were given an example that if they saw the word red printed in the color green, to press "f" regardless of the meaning of the word. Participants were instructed to respond as quickly and accurately as possible and that in the event of an incorrect response, a red "X" would be flashed on the screen. Throughout the Stroop test the key for each corresponding key was presented at the top of the screen in the following manner: "d = red, f = green, j = blue, and k = black."

In the remaining part of the survey, participants were first asked to complete a set of demographic questions. Following this, the 48 questions were given in a randomized order. There were two lists with 48 questions each, and each list contained an equal number of undistorted and distorted questions. The multiple-choice options for the questions were presented in a randomized order. Participants were informed that some of the questions would contain errors, making them unanswerable. Participants were given the example that in the case of the following question: "In what mythology was Venus known as the Goddess of War?" Venus was the goddess of Love, and therefore the question is unanswerable. Participants were told that when they detected a question like this, the option "This question can't be answered in this form." should be chosen. Additionally, participants were told that for questions that do not

contain errors, they should click the best answer, or if they didn't know the answer, to select "I don't know."

After answering 48 questions, participants completed the Shipley Vocabulary test. Participants were instructed to "indicate which of the four choices means the same thing or is most similar in meaning."

Following the Shipley vocabulary test, participants completed the ART. Participants were instructed that out of the list of names provided, "some of them are authors of books, and some of them are not. Please select the ones that you know for sure are authors. Your score on this task will be penalized for guessing, so you should check only those names about which you are absolutely certain." Finally, the participants were thanked for their time.

Results

Table 1 presents participants' mean percentages to distorted questions (i.e. How many animals of each kind did Moses take on the ark?) and to undistorted questions (i.e. How many animals of each kind did Noah take on the ark?). As shown in Table 1, the mean percentage of Moses responses was slightly under 50% of the time. Given that they were also able to answer the correct answer for distorted questions (44.48%) it can be assumed that participants understood the task.

Table 1. Descriptive Statistics. Mean percentages of the four different response options across 48 questions as a function of question type (distorted vs. undistorted).

Question Type	Response			
	1	2	3	4
Undistorted	89.73%	2.86%	3.11%	4.29%
Distorted	45.07%	3.66%	44.48%	6.77%

Note. Response 1 represents the correct response for undistorted questions and "Moses" response for distorted questions. Response 2 represents the alternative foil. Response 3 represents the "this question can't be answered in this form" option (correct for distorted questions). Response 4 represents the "I don't know" option.

To check the replicability of the multiple-choice format illusion rates, the percentages were compared to Speckmann & Unkelbach's (2021) mean frequencies across their questions. In order to do so, their reported frequencies were divided by 20 to get their percentages. Participants in Speckmann & Unkelbach (2021) had 75.85% accuracy in undistorted questions (compared to 89.73% in the current study), and a Moses illusion rate of 48.70% (compared to 45.07%). Their participants were also able to correctly identify the distortion 39.40% of the time (compared to 44.48% in the current study). It's important to note that the present data and Speckmann & Unkelbach's (2021) data differ in participant sample and stimuli, with this current data representing a greater number of participants and a more Americanized pool and stimuli. The rates were similar enough to provide evidence of replicability, as well as further support that the Moses Illusion is still present in the multiple-choice format.

Figure 1 shows a scatterplot of the participants' Moses rates as a function of their ART scores, with a higher Moses rate indicating that a participant was more likely to fall for the distorted Moses illusion items. The highest possible ART score a participant could receive was 65. Moses illusion rates and ART scores were found to be negatively correlated $r = -.37$, $p < .001$. This pattern indicates that greater language experience, as measured with the ART, is associated with a greater ability to detect distortions that are often missed by individuals who have lower language experience. The second language experience measure, the Shipley Vocabulary test, was not significantly correlated with Moses illusion rates $r = -.15$, $p = .147$.

Figure 1. Scatterplot of correlation of participant's Moses Illusion rate and author recognition test score. r = -.374

** $p < .001$

Figure 2 shows a scatterplot of the participants' Moses rates as a function of their Stroop Effect scores, with a higher Moses rate indicating that a participant was more likely to fall for the distorted Moses illusion items. A higher Stroop effect would indicate that participants had a harder time inhibiting reading the word itself in the Stroop task, when the task was to say the color of the font of the word. Figure 2 shows that inhibition ability was not significantly correlated with Moses illusion rates r = -.06, p = .559.

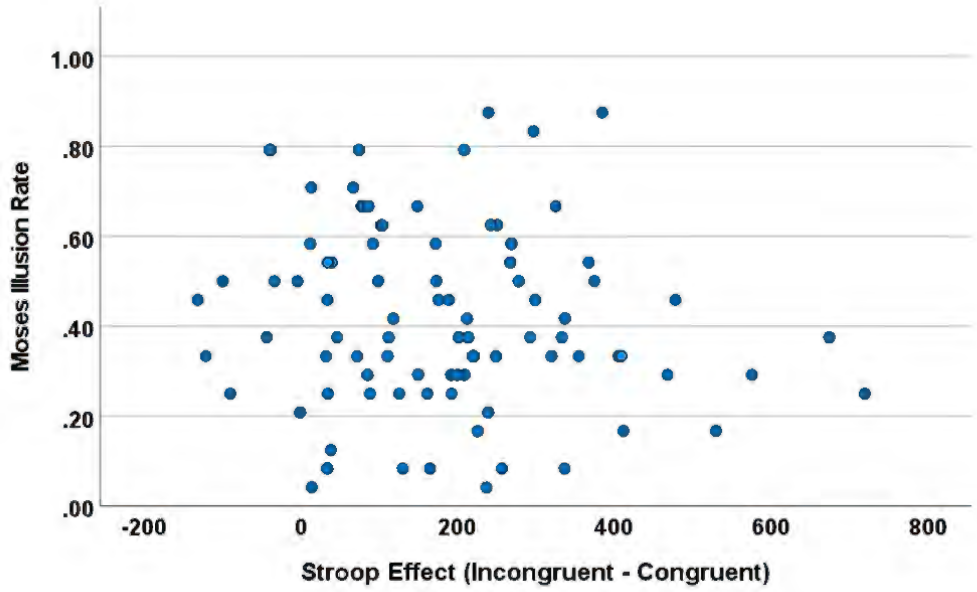

Figure 2. Scatterplot of correlation of participant's Moses Illusion rate and Stroop effect score. *Note*. The Stroop effect was calculated by participants' incongruent reaction times minus congruent reaction times. r = -.063, p = .559

Given these unexpected results, a correlation was run to check that the language experience measures were in fact related to one another and that the Stroop test was assessing a separate variable, namely cognitive inhibition. The Shipley and ART scores were significantly positively correlated r = .483, p <.001 and both the ART and Shipley scores were not significantly correlated with participants' Stroop effect r = .00 and r =.06, p = .998 and p = .55.

Discussion

This study had two main goals. The first goal was to replicate Speckmann & Unkelbach's (2021) recent work on the Moses illusion using a multiple choice test format. The second goal was to determine whether individual variability in Moses illusion rates could be explained by the cognitive constructs of language experience or inhibition. Notably, individual differences were analyzed on a continuum rather than two extreme groups.

Regarding the first goal, results of this study replicated Speckmann and Unkelbach's (2021) findings of robust Moses illusion rates in a multiple-choice format. Specifically, the present study found a mean Moses illusion rate of 45.07%. In comparison, Speckmann & Unkelbach (2021) reported a mean Moses illusion rate of 48.70%. Taken together, these findings argue against the cooperation principle as well as participants' lack of knowledge as explanations for the Moses illusion. In addition, the high rates of Moses illusion in the present study, with more Americanized items compared to Speckmann & Unkelbach's (2021) European items, suggests that the Moses illusion rates are also present across cultures.

Regarding the second goal, there was evidence using the ART that language experience is negatively correlated with rates of the Moses illusion, as seen in Figure 1. However, there was no evidence of a similar correlation with the Shipley Vocabulary Test, a test intended to also measure language experience. While the tests were correlated with one another, indicating that they both did measure language experience, it's possible there are multiple subcomponents under this one construct. It's possible that while the ART is measuring print exposure, there are differences in education between the participants that could explain this difference between the tests. For example, it could be argued that individuals in a more privileged environment and education system are more likely to perform better on the ART than those who don't have access to that type of education. It's possible that these differences in education did not influence scores on the vocabulary test in the same way. In other words, it's possible that it could be easier to build a wider vocabulary, but lack a privileged education system that enforces reading more classic authors, that is captured in the ART. Unfortunately, questions about educational background were not assessed in the current study. Further research should be focused on exploring this prediction, as well as examining the various subcomponents underlying the

language experience construct. A related question involves more fully understanding the battery of measures that best capture the cognitive construct of language experience.

There were also unexpected results under the inhibition construct, measured by the Stroop Test. As shown in Figure 2, Stroop effects were negative for some of the participants, which is unusual for the Stroop task because that would indicate that participants were able to more quickly inhibit the word itself and say the color of the font that did not match the written word, compared to a word where the written form and color of the font are the same. It's possible that there is a different language processing mechanism that is activated in this inhibition task compared to a different measure intending to assess inhibition ability. A semantic Stroop task might have more relation to the process behind an individual's ability to inhibit their desire to continue reading the question and recognition of the distortion in a Moses illusion question. Further research should explore different inhibition mechanisms based on the scenario the participant is engaging in, such as a semantic or lexical task.

This study is important for future research in that it expands reliability and validity of multiple-choice format with the Moses illusion. Additionally, it provides support for research designs that facilitate easier data collection, allowing more time to be directed towards the analysis aspect of research. It also allows easier access to participants and a wider range of participants can be involved that might otherwise be limited with working hours or transportation to come to in-lab experiments.

Possible limitations of the current study could be lack of experimental control in measures that are distributed across the internet. While the study eliminated participants that had data suggesting lack of attention or understanding of the experiment, it's possible there were

outside variables influencing reaction time and attention to the task at hand. Future research should examine other cognitive constructs that could reduce Moses illusion rates.

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Appendix

Moses Illusion Questions

Undistorted / *Distorted*

1. In which movie does Arnold Schwarzenegger/ *Sylvester Stallone* travel back in time to save Sarah Connor?

a. Terminator 2
b. Rocky 2
c. Don't know
d. The question can't be answered in this form.

2. Which object does Julie Andrews/ *Audrey Hepburn* use to fly at the beginning of the movie "Mary Poppins"?

a. Umbrella
b. Broom
c. Don't know
d. The question can't be answered in this form.

3. Which season do we associate with the start of football season, the beginning of school and the trees' leaves turning brown / *green* ?

a. Autumn
b. Winter
c. Don't know
d. The question can't be answered in this form.

4. What musician won multiple Grammys / *Emmys* for their Album "Thriller"?

a. Michael Jackson
b. Elton John
c. Don't know
d. The question can't be answered in this form.

5. Who is the video game character and Italian plumber who is Nintendo's / *Sony's* mascot?

a. Mario
b. Sonic
c. Don't know
d. The question can't be answered in this form.

6. What is the name of Leonardo da Vinci's famous painting of a woman that is displayed in the Louvre / *Pompidou* in Paris?

a. Mona Lisa
b. The Scream
c. Don't know
d. The question can't be answered in this form.

7. Who found the Glass Slipper lost by Cinderella / *Snow White?*

a. The Prince
b. The Stepmother
c. Don't know
d. The question can't be answered in this form.

8. Who is the cartoon character known for eating spinach to get stronger / *smarter*?

a. Popeye
b. Mickey Mouse
c. Don't know
d. The question can't be answered in this form.

9. What is the name of the comic about Charlie Brown and his dog Snoopy / *Odie* ?

a. Peanuts
b. Cashews
c. Don't know
d. The question can't be answered in this form.

10. Who is the dictator of North / *South* Korea?

a. Kim Jong-Un
b. Fidel Castro
c. Don't know
d. The question can't be answered in this form.

11. What is the name of the molten rock that travels down mountains after an eruption / *earthquake*?

a. Lava
b. Mud
c. Don't know

d. The question can’t be answered in this form.

12. Who is the white-bearded man in a red suit who distributes Christmas / *birthday* presents out of his sleigh?

a. Santa Claus
b. Rumpelstiltskin
c. Don’t know
d. The question can’t be answered in this form.

13. What is the name of the Mexican dip made from avocados / *artichokes* ?

a. Guacamole
b. Salsa
c. Don’t know
d. The question can’t be answered in this form.

14. What is the name of the New Year festival celebrated on the 31st of December / *January* ?

a. New Year’s Eve
b. Carnival
c. Don’t know
d. The question can’t be answered in this form.

15. How many animals of each kind did Noah / *Moses* take on the Ark?

a. Two
b. Three
c. Don’t know
d. The question can’t be answered in this form.

16. What did Goldie-Locks eat at the Three Bears' / *Little Pigs*’ house?

a. Porridge
b. Corn Flakes
c. Don’t know
d. The question can’t be answered in this form.

17. What is the name of the hit in baseball that allows the batter to run around all the bases and get a run / *an out*?

a. Homerun
b. Touchdown

c. Don’t know

d. The question can’t be answered in this form.

18. What is the name of the carved pumpkin displayed on Halloween / *Thanksgiving*?

a. Jack-o’-lantern

b. Soul cake

c. Don’t know

d. The question can’t be answered in this form.

19. What is the name of the man who rode horseback in 1775 to warn that the British / *French* were coming?

a. Paul Revere

b. Thomas Jefferson

c. Don’t know

d. The question can’t be answered in this form.

20. With which instrument did Louis / *Lance* Armstrong become famous?

a. Trumpet

b. Violin

c. Don’t know

d. The question can’t be answered in this form.

21. Water contains two atoms of hydrogen / *helium* and how many atoms of oxygen?

a. One

b. Two

c. Don’t know

d. The question can’t be answered in this form.

22. Plants use the green chemical chlorophyll / *chlorine* and sunlight to make what?

a. Food

b. Water

c. Don’t know

d. The question can’t be answered in this form.

23. A gill is a respiratory / *digestive* organ found in what type of animal?

a. Aquatic

b. Mammal
c. Don’t know
d. The question can’t be answered in this form.

24. Who was the leader of the Nazi party which was responsible for the deaths of about 6 million European / *American* Jews?
a. Adolf Hitler
b. Theodor Eicke
c. Don’t know
d. The question can’t be answered in this form.

25. What soft, fluffy, white plant was a major cash crop in the Pre-civil war South / *North*?
a. Cotton
b. Wool
c. Don’t know
d. The question can’t be answered in this form.

26. Who was the female African-American civil rights activist who refused to give up her Bus/*Train* seat to a white passenger?
a. Rosa Parks
b. Harriet Tubman
c. Don’t know
d. The question can’t be answered in this form.

27. When did Japan / *Germany* bomb the American naval base Pearl Harbor?
a. 1941
b. 1952
c. Don’t know
d. The question can’t be answered in this form.

28. What mythical kingdom includes Arthur, Lancelot, and knights / *princes* of the round table?
a. Camelot
b. Hogwarts
c. Don’t know
d. The question can’t be answered in this form.

29. Clark Kent becomes what blue-tighted hero when he changes in a phone / *toll* booth?

a. Superman
b. Spiderman
c. Don't know
d. The question can't be answered in this form.

30. What country includes the Nile / *Congo* River, sphinxes, pyramids, mummies, pharaohs and Cleopatra?
a. Egypt
b. Chad
c. Don't know
d. The question can't be answered in this form.

31. What vital, "beating" organ pumps blood and has four / *three* chambers?
a. Heart
b. Lungs
c. Don't know
d. The question can't be answered in this form.

32. What portion of his body did the famous artist Van Gogh / *Gaugin* supposedly cut off?
a. Ear
b. Finger
c. Don't know
d. The question can't be answered in this form.

33. What kind of meat is in the Burger King / *McDonald's* sandwich known as the Whopper?
a. Beef
b. Chicken
c. Don't know
d. The question can't be answered in this form.

34. What is the name of the ferocious striped feline found in India / *Africa*?
a. Tiger
b. Lion
c. Don't know
d. The question can't be answered in this form.

35. How many digits are there in the area / *zip* code required to call another state long distance?

a. Three
b. Four
c. Don't know
d. The question can't be answered in this form.

36. At what Fahrenheit temperature on the thermometer / *thermostat* does water freeze?
a. 32
b. 20
c. Don't know
d. The question can't be answered in this form.

37. What sport uses a black, three / *five* holed ball for knocking down ten white pins?
a. Bowling
b. Cricket
c. Don't know
d. The question can't be answered in this form.

38. In the novel "Moby Dick," what color was the whale Captain Ahab / *Nemo* was after?
a. White
b. Blue
c. Don't know
d. The question can't be answered in this form.

39. From what state was Joe Biden a senator / *governor*?
a. Delaware
b. California
c. Don't know
d. The question can't be answered in this form.

40. What is the name of the object whose area / *circumference* is "pi-r-squared"?
a. Circle
b. Square
c. Don't know
d. The question can't be answered in this form.

41. Which month is associated with Mother's Day, Memorial Day / *Veterans* Day and spring flowers?
a. May

b. February

c. Don't know

d. The question can't be answered in this form.

42. In a criminal trial when a man pleads the 5th / *4th* Amendment, who is he refusing to incriminate?

a. Himself

b. His lawyer

c. Don't know

d. The question can't be answered in this form.

43. What English rock group did the late John Lennon / *Jimmy Page* sing with?

a. Beatles

b. Pink Floyd

c. Don't know

d. The question can't be answered in this form.

44. What is the name of the gooey substance many children like to spread on bread along with grape jelly / *juice*?

a. Peanut butter

b. Cream cheese

c. Don't know

d. The question can't be answered in this form.

45. Snoopy is a dog / *cat* in what famous comic strip?

a. Peanuts

b. Garfield

c. Don't know

d. The question can't be answered in this form.

46. Who was the first man to walk on the moon / *sun*?

a. Neil Armstrong

b. Dave Kunst

c. Don't know

d. The question can't be answered in this form.

47. How many letters / *numbers* are there in the alphabet?

a. 26

b. 22

c. Don’t know

d. The question can’t be answered in this form.

48. What did Rudolph’s / *Dasher’s* nose do to help guide Santa’s sleigh?

a. Lit up red

b. Grew bigger

c. Don’t know

d. The question can’t be answered in this form.