The Effects of Working Memory Capacity on the Isolation Effect

by
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Abstract

The isolation effect occurs when an unexpected item is remembered better than an item that blends into its surroundings. Conversely, inattentional blindness is the failure to notice unexpected items. Currently, there is no concrete explanation for why people sometimes remember unexpected items clearly, while other times they are inattentionally blind. This is because many different factors (such as, encoding, distractions, etc.) influence whether the isolation effect or inattentional blindness will be observed. This study proposed that under distracting conditions, participants with high working memory capacity would show an isolation effect, while low working memory capacity participants would not. An automated operation span task was used to measure working memory capacity. Word lists viewed under distracting conditions were used to evaluate the isolation effect. As predicted, high working memory capacity participants demonstrated the isolation effect, and low working memory capacity participants fell victim to inattentional blindness.

The Effects of Working Memory Capacity on the Isolation Effect

The isolation effect was first established by the work of Hedwig von Restorff in 1933. This classic study is often described "as the mother of all distinctiveness effects" (Hunt & Lamb, 2001, p. 1359). The isolation effect, also known as the von Restorff effect, "is known to most psychologists as the generic label for the effects of distinctiveness on memory" (Hunt, 1995, p. 105). In 1933, von Restorff conducted a study that consisted of showing word lists to participants and then asking them to recall as many words as possible. One set of word lists simply contained random items. The other two sets contained a list of similar items with one different item. Her results indicated that people have "better memory for the isolated items compared to the average recall of the remaining list items" (Kelley & Nairne, 2001, p. 54). This phenomenon has since become known as the isolation effect. The isolation effect occurs when "an event that is incongruent with the prevailing context draws one's attention and is better remembered than events consistent with the context" (Hunt & Lamb, 2001, p. 1359). In other words, people tend to remember items and events that stand out from their surroundings.

This "standing out" is known as distinctiveness. Reed (2010) defines distinctiveness as "an item different in appearance or meaning from other items" (p. 142). An item can be distinctive in several different ways. Schmidt (1991) narrowed the broad definition of distinctiveness into four main categories—emotional, primary, secondary, and processing. However, this paper will only focus on primary distinctiveness. Schmidt (1991) defines primary distinctiveness as being "relative to

the immediately surrounding context, and presumably to the contents of working memory" (p. 529). In other words, a red apple in a line of green apples will immediately strike the viewer as being different; however, that same red apple would be indistinguishable in a line of other red apples. Furthermore, primary distinctiveness focuses on the "overall conceptual organization or framework" (Schmidt, 1991, p. 529) of the items. This indicates that primary distinctiveness also encompasses semantic differences. For example, the word *photograph* in a list of plants would strike the viewer as being unique due to its difference in meaning rather than any differing physical characteristics. However, the simple fact that people notice distinctive items as being different does not provide an adequate explanation for the isolation effect. Although primary distinctiveness clearly plays a role in improved recall of isolated items, it cannot be the only factor at work,

Encoding also appears to be a component in the isolation effect. Encoding is "to create a visual or verbal code for a test item so it can be compared with the memory codes of items stored in short-term memory" (Reed, 2010, p. 89). This indicates that encoding an item essentially means to put a mental picture or a verbal reminder of the item in short-term memory where it can be accessed later. For example, when people are trying to remember a telephone number they have just heard, they may repeat the number in their head constantly (verbal code) or visualize a written phone number (visual code) until they reach the phone and dial. Geraci and Manzano (2009) suggested that encoding is often thought to play a role in the isolation effect because "the isolated item attracts additional processing at encoding that leads to superior memory performance for that item" (p. 50). That is,

people notice the distinctiveness of an isolated item and spend more time paying attention to, or encoding, that item, which leads to better recall. However, Geraci and Manzano (2009) also noted, "Existing encoding theories generally propose that the unusual items are remembered well because they receive differential processing at the time they are presented" (p. 60). Yet, the isolation effect cannot be completely explained by these theories. For example, "von Restorff's results clearly show an isolation effect when the isolate occurred early in the list—in either the second or the third serial position" (Hunt, 1995, p. 109). In this scenario, no extra time could have been spent on encoding because the participant had no way of knowing that the item was going to be distinct. Furthermore, von Restorff concluded that "perceptual salience [distinctiveness] was not a necessary condition for the isolation effect" (Hunt, 1995, p. 109). Therefore, neither distinctiveness nor encoding can completely explain the isolation effect.

Whereas some research has demonstrated good memory for the "unexpected," others have focused on "inattentional blindness." Inattentional blindness can be defined as "a failure to detect unexpected stimuli, even when these stimuli are conspicuous" (Näsholm, Rohlfing, & Sauer, 2014, p. 1). A classic example of inattentional blindness is a study by Simons and Chabris (1999). They set up four basic conditions. In each condition, they asked participants to watch a video of two teams of people (one team in black and the other in white) and to count how many times each team passed a basketball. After approximately 40 seconds, either a person in a gorilla suit or a woman with an umbrella walked through the middle of the two teams. Some participants saw the video like normal—this was called the

Opaque condition. Others saw a more edited version where the players and the gorilla/woman were transparent—the Transparent condition. Simons and Chabris (1999) noted that "out of all 192 observers across all conditions, 54% noticed the unexpected event and 46% failed to notice the unexpected event" (p. 1068). This was due to the fact that some participants were too busy trying to count the basketball passes. In this study, inattentional blindness appears to conflict with the isolation effect because the gorilla (or the woman with the umbrella) was different than the ball players and should have easily stood out as distinctive—but did not. Even though the isolation effect suggests that a majority should have seen the distinctive person, only a little more than half of the participants noticed the gorilla/woman. However, Simons and Chabris (1999) explain this apparent contradiction by noting that the participants failed to notice the distinctive event "while they are engaged in a primary monitoring task." In other words, the isolation effect becomes a bit fuzzier when the participant is not merely focusing on remembering a list of words.

Furthermore, Näsholm, et al. (2014) corroborated these findings. They performed an experiment that involved participants watching one of two videos and pretending to be a CCTV operator on the lookout for any potential security risks. The first video showed a drug deal where a female entered the background, placed a package down, and walked off camera. The second video had the same drug deal in the front, but this time, the female merely walked on camera dressed as a pirate and left. After the video, the participants filled out a survey in order to measure what they had observed. The results indicated that "inattentional blindness rates were

lower (detection rates were higher) when the unexpected stimulus was relevant to the primary monitoring task than when the unexpected stimulus was irrelevant to the primary monitoring task" (Näsholm, et al., 2014, p. 5). In other words, the distinctive stimulus (the pirate) should have stood out more than the expected stimulus (the female with the package) but did not.

Furthermore, Schmidt and Schmidt (2015) achieved a similar effect by requiring participants to engage in a Stroop task while they were viewing word lists (similar to von Restorff). A Stroop task is when "participants respond to the ink color of a color word while ignoring its semantic meaning" (Soutschek, Müller, & Schubert, 2013). In other words, participants were asked to press a key on a keyboard that corresponded to an ink color (e.g., press "d" if the word was written in blue ink or "j" if the word was in red.) Schmidt and Schmidt (2015) employed the Stroop task in order to create two different conditions—easy (using only two colors of ink) and hard (using four colors.) These two conditions were then used to assess whether inattentional blindness would obscure the isolation effect. The results found that "an isolation effect was observed in the easy condition . . . However, this isolation effect disappeared in the hard task condition" (Schmidt & Schmidt, 2015, p. 158). Schmidt and Schmidt (2015) explained these results with the idea that "task difficulty [the hard Stroop task] prevented participants from processing a contrast between target and background items that was irrelevant to the orienting task" (p. 158). In other words, the Stroop task sufficiently distracted participants, and so they failed to notice the semantic differences in the words being presented— inattentional blindness. Simons and Chabris' (1999), Näsholm, et al.'s (2014), and

Schmidt and Schmidt's (2015) results indicate that inattentional blindness can indeed block the isolation effect. However, there may be additional components that enable some people to be better at managing a distracting task and simultaneously processing distinctive items than others.

One possible element is working memory capacity. Reed (2010) defines working memory capacity as "the amount of information that can be kept active in working memory" (p. 261). Working memory can be thought of as "the use of short-term memory as a temporary store for information needed to accomplish a particular task" (Reed, 2010, p. 74). However, working memory does not have unlimited storage capabilities. In fact, working memory "has a fixed capacity of about four chunks of information" (Shipstead & Engle, 2013, p. 277). However, it should be noted that "this estimate is assumed to vary among individuals" (Shipstead & Engle, 2013, p. 277). In other words, some people may have considerably higher working memory capacity than other people. This, in turn, may influence one's susceptibility to inattentional blindness. For example, "people with low working memory resources have been found to be more likely to be inattentionally blind" (Richards, Hellgren, & French, 2014, p. 1). Richards, Hannon, and Derakshan (2010) also reported that "low WMC [working memory capacity] is associated with IB [inattentional blindness] whereas higher WMC is associated with NIB [not inattentionally blind]" (p. 521).

These findings were also expressed by Seegmiller, Watson, & Strayer (2011), who replicated Simons and Chabris' (1999) classic study—but with a few modifications. They found that "individual differences in working memory

capacity . . . modulated susceptibility to inattentional blindness" (Seegmiller, et al., 2011, p. 789). They reported that "when participants had accurate pass counts [of the basketball], those with lower working memory capacity were more susceptible to inattentional blindness, failing to notice the gorilla, than those with higher working memory capacity" (Seegmiller, et al., 2011, p. 789). As a result, they suggested that "performance on many cognitive psychology tasks—including Stroop color naming . . . is dependent on individual differences in attentional control" (Seegmiller, et al., 2011, p. 789). In effect, it appears that people with a higher working memory capacity are less affected by inattentional blindness than those with low working memory capacities.

Research has shown that inattentional blindness can overshadow the isolation effect (Simons & Chabris, 1999; Näsholm, et al., 2014; Schmidt & Schmidt, 2015). Other studies have shown that people with higher working memories are less susceptible to inattentional blindness (Richards, et al., 2014; Richards, et al., 2010; Seegmiller, et al., 2011). However, there is little, if any, research regarding the effects of working memory capacity on the isolation effect. The hypothesis for this research is that individuals with higher working memory capacities should be less vulnerable to inattentional blindness and should therefore show an isolation effect during distracting conditions when individuals with lower working memory capacities do not.

Method

Participants

There were 141 participants in this study. Participants were from the Middle Tennessee State University Psychology Department Research Pool. These students received research credit for participation. Twenty-three results were not analyzed because they failed to meet the score requirements (85% or better) on the math section of the operation span task (see below). One result was lost due to computer error.

Materials

The Isolation Effect: Three lists of category words were selected from the Van Overschelde, Rawson, and Dunlosky (2004) category norms.[1] The categories were *vegetables, clothing,* and *fish.* One word from each of these categories (celery, jacket, and tuna) was selected to serve as a target word. There were multiple target words in order to remove potential biases that may be associated with a particular word for different participants. The target word was either shown in its own category (e.g., *tuna* in a list of fish) or in an "isolated" list (e.g., *tuna* in a list of clothing). These target words were divided among participants, so no participant saw the same target word in multiple lists. For example, a participant might see *tuna* in a list of clothing items and *celery* in a list of vegetables. E-prime software was used to present words individually on the screen. While viewing these words, participants

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[1] See Appendix A for the complete list of words.

were asked to engage in a Stroop task. As previously mentioned, a Stroop task is when participants must react to the font color of a word. Participants saw the aforementioned words in one of four colors (red, yellow, blue, or green) and were asked to press a given key on the keyboard (e.g., press "d" if the word is written in blue ink, press "j" if the word is in red, etc.) The Stroop task served as a distractor in order to induce inattentional blindness (similar to counting basketball passes). Before beginning the experiment, participants engaged in several practice trials. They saw the list of letter and color pairings in different colors and practiced responding to the color of the list by pressing the given letter. Participants were able to see if they answered correctly or not. They then proceeded to the actual experiment. The experiment was the same as the practice except that participants were shown words from the aforementioned categories instead of what key to press, and they did not see whether or not their responses were correct. At the end of each word list, participants were asked to recall as many words as they could (in any order) in one minute.

Working Memory Capacity: To measure working memory capacity, this study used a revised version of the operation span (OSPAN) task, originally created by Turner and Engle (1989). The original operation span task was done individually by participants and required them to read sections aloud. However, this study used an automated version of the task as revised by Redick, Broadway, Meier, and Kuriakose (2012).[2] Automated versions of this task have been shown to be both reliable and valid (Unsworth, Heitz, Schrock, & Engle, 2005; Redick, et al., 2012). Furthermore,

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[2] See Appendix B for a visual of the operation span task.

Seegmiller et al. (2011) utilized an automated operation span task and successfully found a difference in working memory capacity and susceptibility for inattentional blindness. This study used E-prime software to administer the task. This task involved solving arithmetic equations while remembering letters. Before taking the actual test, participants were given three practice trials in order to learn the three tasks (only recalling letters, only solving equations, and solving equations while remembering letters). Participants saw a simple arithmetic equation on the computer screen. Each equation had either a multiplication or division problem followed by either addition or subtraction (e.g., (2 * 7) + 4 = ?). The participant then viewed a screen with a possible answer and decided whether or not it was correct by clicking "true" or "false." Then, they saw a screen with a random letter that they would have to recall at a later point. After the presentation of all the equations and letters, participants were shown a grid with different letters and required to click on the letters that appeared with the equations in the order that they saw them.

For the OSPAN task, it was important that the participants' math was fairly accurate. Otherwise, it could be possible that the participant was focusing on remembering the letters instead of being distracted by the math. Consequently, the results of participants who scored lower than 85% were not used. The working memory capacity test produced two operation span scores for each participant— absolute and total. The absolute score only gave credit for a set of correctly recalled letters. For example, if all five letters in a set were correctly recalled, five points were added to the absolute score; however, if only four letters were correctly recalled, zero points were added. The total score, on the other hand, gave credit for

any letter recalled in the correct position. This study only analyzed the OSPAN total score because this score "is superior to absolute scoring, based on (1) higher test-retest correlations, (2) higher internal consistencies, and (3) higher correlations among the three CSTs [complex span tasks]" (Redick, et al., 2012).

Procedure

Participants first chose a computer, and then they read and signed a consent form.[3] Next, participants received instructions (both shown on the computer screen and read aloud) on how the Stroop task was to be done (i.e., which buttons to push and when). They then completed a practice trial (using color and letter instructions) at their own pace but were required to wait for everyone to finish before proceeding. The participants were then informed that they would now see word lists and instructed to recall as many words as possible at the end of each list.

Once all participants had completed this task, they moved to the OSPAN task. Once again, they received instructions (both aloud and on the computer) on how the task was to be done. Participants were also informed that the math score was important, and that they should be as accurate as possible. They engaged in the practice trial and, when all the participants were ready, they completed the experiment at their own pace.

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[3] See Appendix C for a copy of the consent form.

<center>**Results**</center>

Working Memory Capacity: In order to analyze working memory capacity (WMC), two groups were formed—high and low WMC. The OSPAN total scores were separated into quartiles. The top quartile was classified as high working memory capacity, and the bottom quartile was classified as low working memory capacity. Data from the middle quartiles were not included in subsequent analyses. The selected data was analyzed using an independent samples t test. There was a significant difference in the OSPAN scores for high WMC (M = 68.64, SD = 3.12) and low WMC (M = 34.52, SD = 12.74); t (33.95) = 14.45, p = .00. This result suggests that there were differences in these two groups' working memory capacity that was not due to chance.

Recall: Recall was analyzed in a 2 (item: background vs. target) by 2 (list type: category vs. isolated) by 2 (WMC: high vs. low) ANOVA. This ANOVA examined the isolation effect as a function of working memory capacity. Working memory capacity was analyzed as a between-participants factor, and both list type and item were analyzed as within-participants factors. The dependent variable was recall. The recall data are summarized in Table 1. There was not a significant main effect between the overall recall of the high WMC group and the low WMC group, F (1, 56) = 2.01, MSE = .164, p = .162. In other words, the number of recalled words (i.e., any word from any list) of the low WMC group (M = .48) was not significantly different than the mean recall of the high WMC group (M = .55). There was also not a significant main effect between the recall of the overall isolated word list and the

category list, $F(1, 56) = 1.44$, $MSE = .129$, $p = .236$. That is, the number of words

remembered from the category list ($M = .49$) was not significantly different than

recall of the isolated list ($M = .54$). There was a marginally significant main effect of

type of item (target versus background), $F(1, 56) = 3.77$, $MSE = .129$, $p = .057$. In

other words, the amount of recalled background words ($M = .559$) was slightly

higher than the number of recalled target words ($M = .467$).

Table 1
Recall for isolated and background targets based on list type and working memory
capacity level

	Item	
	Target Recall	Background Recall
High WMC*		
Category List	.39 (.095)**	.60 (.03)
Isolated List	.64 (.09)	.57 (.03)
Low WMC		
Category List	.43 (.09)	.52 (.03)
Isolated List	.40 (.09)	.55 (.03)

*WMC = working memory capacity

**Parenthetical values are the standard errors of the means

There was a marginally significant three-way interaction among working memory capacity, target, and list type, $F(1, 56) = 3.53$, $MSE = .120$, $p = .065$. In other words, all three dimensions worked together to achieve an effect. This effect was that high WMC participants recalled more target words in the isolated list type than the low WMC participants.

Furthermore, there was a significant difference between high WMC participants' recall of isolated target words in the isolated list type ($M = .64$, $SD = .488$) and recall of the low WMC participants [$M = .40$, $SD = .498$, $t(56) = 1.87$, $p = .033$]. In the low WMC group, recall for the isolated list ($M = .55$, $SD = .13$) was not significantly different than the category list [$M = .52$, $SD = .20$, $t(30) = 1.38$, $p = .18$]. There was also not a significant difference in recall between the isolated list ($M = .57$, $SD = .15$) and the category list ($M = .60$, $SD = .13$) for the high WMC group, $t(27) = .78$, $p = .44$. In the low WMC condition, recall of the isolated target word ($M = .40$, $SD = .50$) was not significantly different than the recall of the category target word [$M = .43$, $SD = .50$, $t(29) = .30$, $p = .769$]. In the high WMC group, however, there was a significant difference in the recall of the isolated target word ($M = .64$, $SD = .49$) and the recall of category target words [$M = .39$, $SD = .50$, $t(27) = 1.76$, $p = .045$]. In other words, high WMC participants were significantly better at recalling isolated target words than category target words.

Discussion

The main purpose of this study was to determine whether or not working memory capacity was a possible factor in the isolation effect. In particular, the hypothesis for this study was that, under distracting conditions, low WMC participants would demonstrate inattentional blindness, while high WMC participants would display the isolation effect.

This experiment tested the hypothesis by measuring participants' working memory capacity level and then analyzing the isolation effect as a function of working memory capacity. As a whole, high WMC participants did not have higher overall recall. However, this study did find that high WMC participants demonstrated significantly better recall for target words in an isolated list type than the low WMC participants. In other words, a high WMC participant was more likely to recall the word *tuna* in a list of vegetables than a low WMC participant. This result indicates that working memory capacity does indeed seem to be a factor of the isolation effect.

Furthermore, when recall of target words was analyzed separately for each WMC level, a significant result emerged. For the low WMC group, there was no significant difference in the average of recalled category target words (e.g., *tuna* in a list of fish) and the amount of recalled isolated target words (e.g., *tuna* in a list of vegetables). This outcome matched the findings of previous research, which indicated that inattentional blindness will repress the isolation effect (Simons & Chabris, 1999; Näsholm, et al., 2014, Schmidt & Schmidt, 2015). For the high WMC

group, on the other hand, the amount of recalled isolated target words was significantly higher than the average recall of category target words. This finding corroborated the results of research regarding working memory capacity and inattentional blindness, which suggested that people with high working memory capacity are less likely to be vulnerable to inattentional blindness (Richards, et al., 2014; Richards et al., 2010; Seegmiller, et al., 2011). Furthermore, this result matched the hypothesis of this study, which was that participants with high WMC levels would be able to overcome inattentional blindness and show the isolation effect, but low WMC participants would not.

This study indicated that high levels of working memory capacity could counteract the effects of inattentional blindness. However, this study did not assess working memory capacity's specific effects on other factors involved in the isolation effect. For example, it is possible that, since high WMC participants were less vulnerable to inattentional blindness, they had more time to spend on encoding. Future studies could examine the reaction time of participants pressing a key in response to the Stroop task in order to determine time spent on encoding.

There are some limitations of this study that should be noted. First, language plays a large role in the outcome of this study. If participants are not proficient English speakers, it is very difficult to notice a word that is distinct due to meaning. Also, this study only utilized two different list types (category and isolated) and one type of distinctiveness (primary). However, different results might be seen if different types of lists or distinctiveness were used. For example a list of unrelated items or words that are distinct due to emotional response could be included. There

might also be contamination in this study due to fatigue. The OSPAN task and the isolation effect task were administered back-to-back and took approximately 45 minutes to an hour. This long amount of time in deep concentration may have negatively impacted the results of the OSPAN task, which would allow participants to be placed in the incorrect WMC group.

In closing, this study demonstrated that working memory capacity does seem to have an effect on the isolation effect. The findings of this study correspond with similar research regarding working memory capacity, inattentional blindness, and the isolation effect. Additionally, the outcome of this study indicates that working memory capacity determines the effects of inattentional blindness, and, therefore, influences whether or not the isolation effect is demonstrated.

List of Tables

List of Appendices

Appendix A

Isolated	Category	Isolated	Category	Isolated	Category
coat	angelfish	flounder	peas	squash	scarf
sock	flounder	goldfish	broccoli	cabbage	pants
hat	blowfish	carp	squash	cauliflower	blouse
sweater	dolphin	blowfish	spinach	beans	gloves
jeans	cod	cod	corn	beans	shirt
shorts	herring	dolphin	onion	broccoli	hat
shirt	trout	trout	radish	tomato	shoe
*tuna**	*tuna*	*celery*	*celery*	*jacket*	*jacket*
dress	swordfish	bass	beans	potato	short
pants	catfish	herring	cabbage	onion	coat
shoe	bass	swordfish	tomato	lettuce	sock
blouse	shark	catfish	potato	radish	skirt
skirt	goldfish	salmon	lettuce	spinach	jeans
scarf	salmon	angelfish	cauliflower	corn	dress
gloves	carp	shark	cucumber	cucumber	sweater

*Target words are shown in italics.

$$(2 * 7) + 4 = ?$$

When you have solved the math
problem, click the mouse to
continue.

20

| TRUE | | FALSE |

P

Select the letters in order. Use the
blank button to fill in forgotten
letters.

P [1]   R [ ]   K [ ]   G [ ]

Q [ ]   L [2]   O [ ]   Z [ ]

B [ ]   C [ ]   J [3]   H [ ]

M [ ]   F [ ]   T [ ]   V [ ]

PLJ
| clear | | blank | | exit |

You recalled 3 letters out of 5.

You made a total of 3 or more
math errors during this trial.

Appendix C
Informed Consent

Middle Tennessee State University

Project Title: The Effects of Working Memory Capacity on the Isolation Effect

Purpose of Project: The purpose of this project is to examine the relationship between working memory capacity and the isolation effect.

Procedures: You will engage in two tests. The first will involve solving equations and remembering letters, the second will involve remembering words while under distracting conditions.

Risks/Benefits: There are no expected risks for this study. Participants will be able to experience a psychology experiment and may gain knowledge regarding memory and attention.

Confidentiality: All responses will be kept confidential. There will be no links between identity and data.

Principal Investigator/ Contact Information: Biven Alexander, bva2b@mtmail.mtsu.edu

Participating in this project is voluntary, and refusal to participate or withdrawing from participation at any time during the project will involve no penalty or loss of benefits to which the subject is otherwise entitled. All efforts, within reason, will be made to keep the personal information in your research record private but total privacy cannot be promised, for example, your information may be shared with the Middle Tennessee State University Institutional Review Board. In the event of questions or difficulties of any kind during or following participation, the subject may contact the Principal Investigator as indicated above. For additional information about giving consent or your rights as a participant in this study, please feel free to contact the MTSU Office of Compliance at (615) 494-8918.

Consent

I have read the above information and my questions have been answered satisfactorily by project staff. I believe I understand the purpose, benefits, and risks of the study and give my informed and free consent to be a participant.

_____   _____

SIGNATURE   DATE

_____

PRINT NAME

Appendix D

5/15/2014

Investigator(s): Eliza Alexander and Dr. Stephen Schmidt
Department: Psychology
Investigator(s) Email Address: ea2x@mtmail.mtsu.edu, Stephen.Schmidt@mtsu.edu

Protocol Title: The Effects of Working Memory Capacity on the Isolation Effect

Protocol Number: #14-365

Dear Investigator(s),

Your study has been designated to be exempt. The exemption is pursuant to 45 CFR 46.101(b)(2) Educational Tests, Surveys, Interviews, or Observations.

We will contact you annually on the status of your project. If it is complete, we will delete it out of our system. You do not need to complete a progress report and you will not need to complete a final report. It is important to note that your study is approved for the life of the project and does not have an expiration date.

The following changes must be reported to the Office of Compliance before they are initiated:
- Adding new subject population
- Adding a new investigator
- Adding any procedures (e.g. new survey, new questions to your survey)
- A change in funding source
- Any change that makes the study no longer eligible for exemption.

The following changes do not need to be reported to the Office of Compliance
- Editorial or administrative revisions to the consent or other study documents
- Increasing or decreasing the number of subjects from your approved population

If you encounter any serious unanticipated problems to participants, or if you have any questions as you conduct your research, please do not hesitate to contact us.

Sincerely,

Lauren K. Qualls, Graduate Assistant
Office of Compliance
615-494-8918

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