2022

THE MOTIVATIONAL ROLE OF FEEDBACK ON WORKING MEMORY

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THE MOTIVATIONAL ROLE OF FEEDBACK ON WORKING MEMORY

A thesis submitted in partial fulfillment

of the requirements for the degree of

MASTER OF ARTS

to the faculty of the

DEPARTMENT OF PSYCHOLOGY

of

ST. JOHN'S COLLEGE OF LIBERAL ARTS AND SCIENCES

at

ST. JOHN'S UNIVERSITY

New York

by

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ABSTRACT

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Previous research has shown that motivation plays a vital role in what we remember. Motivation can be either extrinsic (e.g., a reward for doing well) or intrinsic (e.g., wanting to do well). Here we test if intrinsic motivation improves Working Memory (WM) performance. In an online study, undergraduate students (N=358, 334 after excluding participants that did not complete at least 25% of the survey) completed reverse letter span tasks, recalling 42 sets of 4-9 letters that were shown for one second in reverse order. We manipulate intrinsic motivation via feedback. Participants were randomly assigned to feedback (FB) and no-feedback (NFB) conditions. The FB group was informed if their answers were right or wrong, while the NFB group received no feedback on their answers. Preliminary analysis found that the participants who received feedback answered more items perfectly (M = 15.8, SD = 7.6) than participants who did not receive feedback (M = 14.4, SD = 7.9) but this difference was not significant ($F(1,332) = 2.500$, $p = .115$, *hp 2* = 0.002). Our results call for further investigation regarding feedback, intrinsic motivation, and WM and demonstrate potential correlation(s) between these variables.

ACKNOWLEDGEMENTS

Many thanks to Dr. Dana Chesney for her assistance in conducting this study. This study would not have been possible without her guidance and input during the various stages of writing and statistical analysis. I would also like to thank Dr. Robin Wellington for her assistance in the editing process. And a thank you to Ariella Freedman for her technical support and software expertise while making and distributing the study survey.

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CHAPTER 1. INTRODUCTION

Remembering a phone number, address, someone's name, or even where you parked your car all rely on the same function- working memory. Working memory is the common denominator when a task requires immediate recall of information that would otherwise be forgotten and is forgotten once limited capacity is exceeded (Baddeley, 2009). This capacity usually ranges between 3 – 9 items (Baddeley, 2009). Decades of research has been conducted attempting to further understand, manipulate, and improve working memory processes (Baddeley 2012). These studies have proposed several factors that, to some degree, influence working memory capabilities (Baddeley 2012; Conway, et al., 2005). The current study uses immediate feedback in an attempt to manipulate intrinsic motivation. Motivation in general has been declared an imperative element when goal achievement is considered (Houwer, et al., 2012). Feedback, as commonly known, has proven to positively influence performance (Fyfe, et al., 2014). It is fair then to ask what effect, if any, a variable relating to goal achievement and another relating to performance improvement will have on working memory abilities when manipulated (Houwer, et al., 2012).

The current study aims to investigate how manipulating feedback effects intrinsic motivation on working memory ability using reverse letter span tasks. To provide rationale for the current study, the following covers several reviews of relevant literature and past conducted studies that investigated similar topics and variables. The review will be followed by a discussion on the current study and how these factors contribute to working memory recall abilities.

Working Memory

Working memory (WM) can be defined as the limited information that is readily recalled while executing cognitive tasks, such as understanding, reasoning, and comprehension (Houwer, et al., 2012). It temporarily stores information for short-term memory maintenance and is a steppingstone for retention and retrieval in long-term memory (Houwer, et al., 2012). Understanding WM is significant due to links recognized between WM and other cognitive functions, such as learning, problem solving, and planning (Cowan, 2013). Studies investigating WM processes provides researchers with insight to the underlying mechanisms of psychiatric and neurological disorders with the potential to recognize, assess, treat, and, hopefully, eradicate these disorders (Ku, 2019). WM function is implemented in several areas of our every-day-use, such as work, school, daily tasks, and so on (Cowan, 2013).

Previous research has investigated methods of enhancing WM abilities (Adam & Vogel, 2016). Of the methods assessed, WM training and interventions have been repeatedly used and debated (Jaeggi, et al., 2008). Literature regarding WM training is inconclusive as researchers continue to ascertain if the training is effective on WM abilities, fluid intelligence, or other cognitive functions (Ku, 2019). A study that tested the efficacy of WM training found a positive correlation amongst Parkinson's patients (Ophey, et al., 2020). Researchers asked participants diagnosed with Parkinson's to complete working memory training (WMT) for a 3-month period to determine if WMT would prevent cognitive decline amongst patients (Ophey, et al., 2020). Results revealed that not only did participants that trained show less decline in cognitive abilities but also claimed to have higher levels of motivation and satisfaction regarding WMT (Ophey, et al., 2020).

Another study compared how/if WMT effected young, ages 19-36, and older, ages 62-77, adults WM abilities (Von Bastian, et al., 2012). Participants underwent intense WMT and were then tested in 3 specific areas of WM, storage and processing, relational integration, and supervision (Von Bastian, et al., 2012). Results found that both young and older adults displayed improvement in task measuring, but the effects of WMT were not transferable to reasoning measures (Von Bastian, et al., 2012). Nevertheless, these outcomes attest the need to investigate further on how and what methods can be used to improve WM (Von Bastian, et al., 2012). This recognition is what motivated the current study to look beyond WMT methods and consider other variables, like motivation and feedback, effectiveness.

Motivation

Motivation is the process that initiates and maintains goal-orientated behaviors (Baddeley, 2012). Psychology describes motivation as the “urge” to fulfill goals and optimizes well-being, maximizes pleasure, and minimizes physical pain (Baddeley, 2012). WM aligns with motivational behavior(s) by prioritizing information processed for immediate recall to also assist in our short- and long-term goals (Yüvrük, et al., 2020).

In a study that examined the effect emotion has on WM abilities, researchers found that the emotional state measured was far more effective on WM than the valence dimension measured in contrast (Yüvrük, et al., 2020). This suggests that emotions can positively effect WM. A similar study specifically compared motivational effects vs valence effects on WM function (Yüvrük, et al., 2020). The results were not found significant, however, the effects from motivation-based dimensions were deemed more effective on WM recall speed than those measured in the valence-based dimension (Yüvrük, et al., 2020). These results, though inconclusive, demonstrate the influence motivation has on WM processes (Yüvrük, et al., 2020).

Whether motivation is relevant to WM performance, however, is not the question. The debate lies in which type, intrinsic or extrinsic motivation, is more effective (Mills & Blankstein, 2000). Intrinsic motivated behaviors are initiated via personal satisfaction(s), whereas extrinsically motivated behaviors are reward driven (Baddeley, 2012). Several studies have been conducted to solve the debate between the two, though the argument remains unsettled ((Mills & Blankstein, 2000; Boedecker, et al., 2013; Pascoe, et al., 2018; Wilhelm, et al., 2019; Liu, et al., 2019; Duan, et al., 2020). Regardless, the current study deemed intrinsic motivation as a more suitable form to enhance WM capabilities. This incentive was decided after reviewing relevant literature from the following studies that claim intrinsic motivation should be the default selection when learning and cognitive processes are involved (Boedecker, et al., 2013).

A study comparing extrinsic vs intrinsic motivation found that intrinsic motivation not only raised overall activity for participants but also proposed better performance in complex tasks where creative problem-solving is essential (Boedecker, et al., 2013). Referring to previously mentioned WMT methods as a form of enhancement, one study names intrinsic motivation as "achievement" motivation and explored whether it enhances WM performance post WMT and, if so, could these positive influences be transferred to other cognitive tasks (Zhao, et al., 2017). Participants were counted as having either high or low achievement motivation and underwent WMT modules that analyzed executive functions and fluid intelligence (Zhao, et al., 2017). The results of this study indicated that participants with high achievement motivation did perform better during WMT modules, but the effects were not transferable to other cognitive tasks (Zhao, et al., 2017).

Another study using WMT as a method of measuring enhancement looked at the mind-set of individuals completing training interventions (Appelgren, et al., 2015). The results indicated that those with higher-intrinsic motivation completed more sessions and were found to try harder after setbacks (Appelgren, et al., 2015). Those with high intrinsic motivation also associated with higher academic performance (Appelgren, et al., 2015). A similar study looking at intrinsic motivations influence on WMT effectiveness in cognitive endurance found that participants tried harder after "setbacks" during the training questionnaires and that high-intrinsic motivation relates to a higher academic performance (Miller-Cotto & Byrnes, 2020). Based on the results of these studies comparing intrinsic and extrinsic motivation effectiveness, the current study opted to use intrinsic motivation as a variable to influence WM capabilities (Appelgren, et al., 2015; Miller-Cotto & Byrnes, 2020).

Feedback

Feedback allows alterations in performance and/or behavior to be made to further the progression in the subject, skill, or task at hand (Tullo, et al., 2020). One study analyzed the impact feedback has on an individual's performance by analyzing the readiness, willingness, and ability to learn from the feedback provided (Garino, 2019). Results of this study revealed that successful participants, those that were able to learn from the feedback, possessed no negative emotion and knew how to handle criticism effectively (Garino, 2019).

Similar research has investigated whether feedback has any influence on WM performance (Wardlow & Heyman, 2016). A study conducted by Adam and Vogel (2018) examined how/if visual working memory abilities could be improved with feedback and training (Adam & Vogel, 2018). Results found that participants receiving feedback did, in fact, perform better than those with no feedback during training sessions (Adam & Vogel, 2018). However, these progressions were limited (Adam & Vogel, 2018). Participants that practiced with feedback did not perform better than those that practiced with no feedback when it came to the final test session, where no feedback was provided for either group (Adam & Vogel, 2018). This study also concluded that, while benefiting results on performance, immediate feedback is not an effective method in improving visual WM abilities (Adam & Vogel, 2018).

Alternatively, a study that analyzed the influence feedback has on reference production amongst children found a positive correlation between effectively using the provided feedback and WM abilities (Wardlow & Heyman, 2016). The study claimed that students who were able to produce more "informative referring expressions" by making better use of feedback also possessed higher WM capabilities than children who did not (Wardlow & Heyman, 2016). Researchers presumed that feedback enables learning in reference to referential communication and that it plays a beneficial role in learning processes (Wardlow & Heyman, 2016).

Current study

The goal of the current study is to answer the following question: does feedback influence intrinsic motivations' effect on working memory capabilities? The variables and outcome of the current study were hypothesized to produce similar findings in a related study conducted by DePasque and Tricomi (2015). DePasque and Tricomi (2015) investigated how intrinsic motivation and feedback effect learning processes in an educational context. Their measures involved fMRI imaging of the left medial temporal lobe while students completed feedback-based learning tasks (DePasque & Tricomi, 2015). These images were captured both before and after learning tasks that entailed motivational interviewing (DePasque & Tricomi, 2015). Their study concluded that both feedback and intrinsic motivation had a positive effect on students learning and memory processes (DePasque & Tricomi, 2015).

In the current study, participants were randomly divided into two groups. Group one (FB) received immediate feedback on their responses, while group two (NFB) received no feedback at all. Next, they were asked to complete 42 reverse letter span tasks. These span tasks consisted of random assortments of letters, the number of letters progressing from 4 – 9, displayed to participants for 1 second. After 1 second, the display of letters was replaced with a blank space asking participants to recall the letters with instructions to do so in reverse order. Those in the FB group were informed with immediate feedback whether their responses were "correct" or "incorrect". Each response, regardless of the group, was counted and later analyzed to calculate an average score for performance comparison.

Our prediction prior to conducting this study was that individuals who received feedback would score higher than individuals who received no feedback during the reverse letter span tasks. Which in turn would suggest that receiving feedback positively influences participants WM capabilities. The sample for the current study was drawn from a pool of undergraduate students at St. John's University in New York.

CHAPTER 2. STUDY

Method

A total of 334 undergraduate students (*M*age 19.37, *SD*age = 1.79) from a private university in the United States participated in this study in exchange for course extra credit. Of the enrolled participants, 225 (67.37%) identified as female, 85 (25.45%) identified as male, and 24 (7.19%) did not specify their gender identity. After giving informed consents, the participants completed an online survey at a location of their choosing.

The 334 participants were divided into either the feedback receiving group (FB), with a total of 171 participants, or the no feedback receiving group (NFB), with a total of 163 participants. The FB group was informed of their responses being correct or incorrect, while the NFB group received no feedback at all on their responses. The survey consisted of 42 reverse letter span tasks that progressed from 4 to 9 letters, displaying 7 assortments of each. The letters were displayed to participants for 1 second. After the 1 passed, the screen switched to a blank space with instructions asking participants to recall the letters in reverse order from which they were previously displayed. All participants were asked for demographic information upon finishing the survey and submission.

Measures

Reverse Letter Span Tasks

WM was measured using reverse letter span tasks (Conway, Andrew R., et al., 2005). The survey consisted of 42 reverse letter span task assortments that progressed from 4 to 9 letters for participants to recall. Samples of these reverse letter span task assortments are listed in the appendix.

Scoring

An all-or-nothing unit was used when scoring participants responses (Conway, et al., 2005). This form of scoring requires participants to not only recall the correct letters, but they must also be in the correct, reverse order. If participants answered perfectly, they received 1 point. Any variations, wrong order, missing/wrong letters, etc. resulted in 0 points.

Results

Descriptive Statistics

Table 1 shows the descriptive statistics for all variables. Figure 1 displays the variation of average scores between the FB and NFB group as the number of letters to recall increased. Figure 2 displays the average score for each number of letters with the standard error of means included. For no/blank responses, 0 was put in place for scoring purposes. Survey completion less than 25% were the cut-off for acceptability.

As hypothesized, preliminary analysis found that the participants who received feedback, labeled FB, answered more items perfectly (M = 15.8, SD = 7.6) than participants who did not receive feedback, labeled NFB, (M = 14.4, SD = 7.9). This trend was seen for span tasks containing 4, 5, 6, 7, and 9-letters. The NFB group did, however, have a higher average score (M = 0.82) for the 8-letter assortment.

Table 1. Means and SE for total letters correctly recalled

Letters	Condition	Mean	SE	N
4	FB	5.52	0.10002526	163
	NFB	5.294	0.12696652	171
5	FB	4.357	0.15554387	163
	NFB	4.061	0.17200399	171
6	FB	2.48	0.14682607	163
	NFB	2.35	0.15289244	171
7	FB	1.93	0.15172027	163
	NFB	1.479	0.14623473	171
8	FB	0.807	0.13512587	163
	NFB	0.816	0.12767145	171
9	FB	0.678	0.13023166	163
	NFB	0.429	0.089605	171

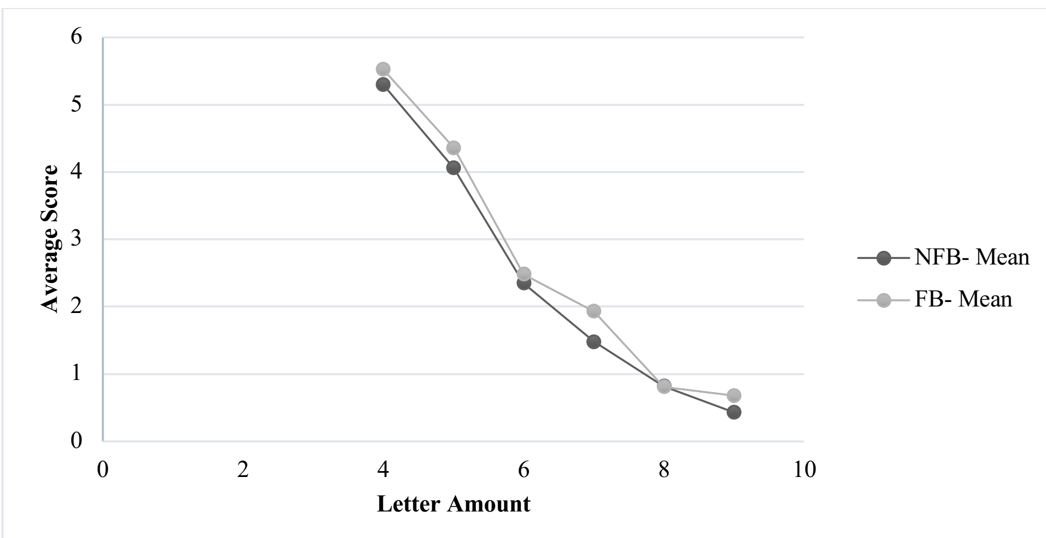

Figure 1. Mean scores of correct letters recalled

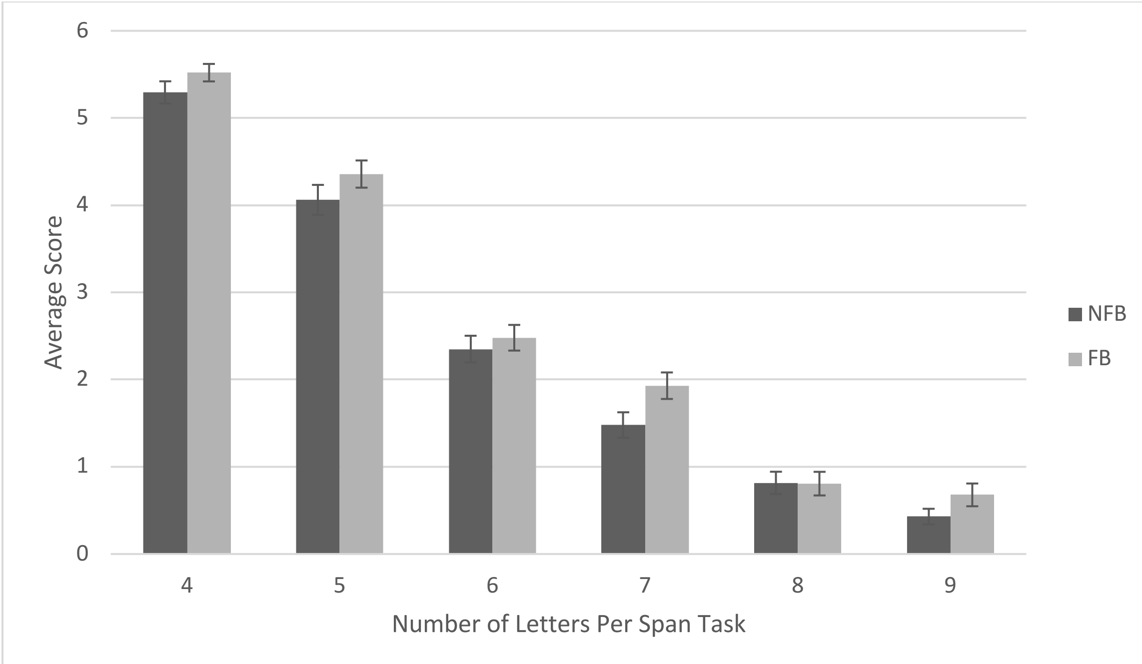

Figure 2. Average scores of each number of letters with SE of means

Main Analysis

This study was conducted to analyze how immediate feedback effects intrinsic motivations' influence on WM abilities. The following prediction was made prior to conducting this study: an individual that receives immediate feedback on her/his response will score higher than an individual that receives no feedback at all on her/his performance during reverse letter span tasks. A 2 by 6 mixed model Analysis of Variance (ANOVA) for total number of correct responses included the number of letters per span task as a within-groups factor and feedback or no feedback as a between-groups factor. The score earned was the dependent variable and feedback or no feedback were the independent variables on participant's performances. Participants did better with fewer letters, as would be expected ($F(5,1660) = 685.261$, $p < .001$ $\eta_p{}^2 = 0.494$). However, contrary to our hypothesis, the analysis did not show a significant effect of feedback on performance during reverse letter span tasks, $F(1,332) = 2.500$, $p = .115$, $\eta_p{}^2 = 0.002$), nor was there an interaction ($F(5,1660) = 1.107$, $p = .355$, $\eta_p{}^2 = 0.000$) with participants that received feedback (M = 15.8, SD = 7.6) scoring close to the average score of participants that did not receive feedback (M = 14.4, SD = 7.9).

CHAPTER 3. GENERAL DISCUSSION

Summary of Findings

This study expanded on the findings of previous literature suggesting that feedback positively influences intrinsic motivations' effect on WM capabilities. However, the null hypothesis of this study stating that participants who receive feedback during reverse letter span tasks will average higher scores than participants who received no feedback was rejected based on the 2 by 6 mixed model ANOVA analysis.

While the results indicate no statistically satisfying effect, there is a positive trend to be recognized amongst 5 of the 6 scores averaged. Participants receiving feedback did have a slightly higher average score for the 4, 5, 6, 7, and 9 letter span tasks. These findings, while modest, do align with similar studies conducted, such as the Adam & Vogel (2018) study previously mentioned. To recap, the Adam & Vogel (2018) found that participants who received feedback during WM training sessions had a higher performance score than those who did not receive feedback. Another demonstration of consistencies between the current study and previous research is the positive effect Wardlow & Heyman (2016) found during their study on how feedback influences WM abilities. Their study concluded that, so long as the feedback provided is applied (i.e., participants digest the feedback and make alterations), feedback did enhance WM performance (Wardlow & Heyman, 2016).

This study's results, and others like it, are applicable to multiple areas. In the learning and memory component(s) of education, for example, WM has been deemed crucial. To demonstrate this, one study found that deficiencies in WM abilities presented a negative effect on students' progression in several academic areas, such as art, music, language, technological learning, math, and reading as well as behavioral issues and inattentiveness in classroom settings (Prince & Gifford, 2016). WM has shown to influence performance by determining the level of focus provided in areas like instructions, problem-solving, organizing, and planning (Prince & Gifford, 2016). Prince and Gifford (2016) also found that WM plays a significant role in the development of phonological awareness and rapid automatic naming skills, both skills required when reading (Prince & Gifford, 2016). Motivation has been mentioned as a significant variable in academic settings as well (Yüvrük, et al., 2020). The current study attempted to manipulate intrinsic motivation to positively effect WM abilities. Though the results were limited, another study demonstrated this effectiveness by comparing the influence extrinsic and intrinsic motivation have on the academic performance of nearly 14,000 Chinese high school students (Liu, et al., 2019). The study's results supported the claim of intrinsic motivation having a positive effect on academic performance and found that students who were highly intrinsically motivated showed hindered academic performance when extrinsic incentives were used (Liu, et al., 2019). Another study comparing the two forms of motivation went as far as to investigate brain wave responses to each form (Wilhelm, et al., 2019). Based on EEG's examining the beta band in the motor cortex and Reward Positivity, this study found that intrinsic motivation enhanced by positive social comparisons stimulates similar cognitive and neural activity corresponding to highly motivated extrinsic incentives (Wilhelm, et al., 2019). Which can be interpreted as, while receiving extrinsic motives (rewards) is thought to be a more stimulating form of reinforcement, this study found that, if the intrinsically motivated reinforcement on performance is positive enough, it is as equally stimulating as an extrinsic based reinforcement is to the brain (Wilhelm, et al., 2019).

Studies have also claimed that various forms of feedback, specifically in classroom settings, are beneficial to students both excelling and struggling (Tullo, et al., 2020). One study found that students struggling, and have lower WM capacity, benefited more from outcome feedback (accuracy of answers provided) in comparison to strategy feedback (how answers are obtained) (Fyfe, et al., 2014). Another study compared how two forms of feedback, positive and informational, impacted students' intrinsic motivation pertaining to physical education (Koka & Hein, 2006). Over the course of two years, it was concluded that students receiving positive feedback reported higher intrinsic motivation than those who received informational feedback (Koka & Hein, 2006).

The influence feedback has on one's performance is believed to be determined by the impact the feedback has on an individual (Garino, 2019). A study that investigated this impact on performance analyzed the readiness, willingness, and ability to learn from the feedback that was provided and found that successful participants, those that were able to learn from the feedback, possessed no negative emotion and knew how to handle criticism effectively (Garino, 2019). The current study provided immediate feedback or none to emphasis the influence feedback has on intrinsic motivations' effect on WM. The results indicate little effectiveness, but did, as mentioned, display a positive trend demonstrated by the 5 out of 6 letter scores having higher averages when feedback was given than when not. This finding does align with the pervious literature claiming feedback does positively effect performance abilities, specifically WM abilities in this study.

Research exploring WM application outside of educational settings have revealed a correlation relationship between WM and complex motor routines (Prince & Gifford, 2016). WM acts as a physical adapter to changes required for more effective and meticulous movements (Prince & Gifford, 2016). Such motor routines contribute to complex movements, like kicking or throwing a ball, and even simple movements, like writing or typing (Prince & Gifford, 2016). Though the current study did not expand on nor measure WM's effectiveness on motor functions, the variables used are commonly mentioned in studies that have investigated the matter. This recognition strengthens the purpose of analyzing the relationship of these three variables, WM, feedback, and motivation, for the current study and future studies to come.

Limitations

One source of limitation in this study is the access to aide participants had while completing the span tasks. Participants were granted the freedom to complete the survey anywhere/with no supervision required. Thus, allowing a range of tools, writing the letters down, taking pictures, etc., that could have altered reliable data. Another source of limitation would be the lack of measuring motivation. This study did not require participants to report feeling of motivation, if any, or type, intrinsic or extrinsic. While this study intended for intrinsic motivation to be the applied form, participants could have used the extra credit applied upon survey completion as an extrinsic incentive. A final source of limitation noted in this study is the scoring procedure used. This study used an all-or-nothing format to score participants responses, which limits the recognition of any alternatives other than a perfect response. This limitation prevented analysis of letter recall per span task. For example, if the first 3 letters were typically recalled, and the remaining 1 – 6 letters were where mistakes occurred, this could provide alterations on how to analyze the data.

Future Direction

This is one of few studies that has examined the effects on WM by manipulating intrinsic motivation using feedback. This study concluded that, to a slight degree, receiving feedback had a positive effect on participant's WM performance. Similar studies suggest a positive effect of feedback and motivation on WM; however, the current study was unable to replicate these results. More research is needed to determine the relationships between these variables. Future studies can rectify the above limitations by requiring supervision during survey completion, add a motivational measure and/or participant reports on motivation, and include alternative or multiple scoring methods for reverse letter span task responses. Researchers should also consider some alternatives to the methods used to measure WM abilities. The current study relied on one single method, reverse letter span tasks, whereas similar studies have had participants complete multiple variations of methods regarding WM capabilities.

Conclusion

This study sought to further understand WM function by manipulating intrinsic motivation using feedback. The results of this study revealed no significant effect on participants' performance during the reverse letter span tasks survey. However, the positive trend of average scores ranking slightly higher for majority of the number of letters per span task suggests potential and should be an encouraging factor for future studies. The effects of feedback, intrinsic motivation, and WM have been found to coincide with one another as mentioned in previous literature, which supposes the need to acquire more information on the relationship and possible correlations between these variables.

APPENDIX

Stimuli used for each participant. Stimuli was presented in the order below.

T C G B

Write the previously displayed letters in reverse order (no spaces)

B S LZ

Write the previously displayed letters in reverse order (no spaces)

G T C A

Write the previously displayed letters in reverse order (no spaces)

A O X F

Write the previously displayed letters in reverse order (no spaces)

D E I H

Write the previously displayed letters in reverse order (no spaces)

J P L V

Write the previously displayed letters in reverse order (no spaces)

M Q S Y

Write the previously displayed letters in reverse order (no spaces)

S Q M T B

Write the previously displayed letters in reverse order (no spaces)

N R U X U

Write the previously displayed letters in reverse order (no spaces)

K R W Z N

Write the previously displayed letters in reverse order (no spaces)

U B I L I

Write the previously displayed letters in reverse order (no spaces)

S A E P Q

Write the previously displayed letters in reverse order (no spaces)

M V X H D

Write the previously displayed letters in reverse order (no spaces)

Z T F C E

Write the previously displayed letters in reverse order (no spaces)

A T T N E S

Write the previously displayed letters in reverse order (no spaces)

J O L K O F

Write the previously displayed letters in reverse order (no spaces)

D S E G B C

Write the previously displayed letters in reverse order (no spaces)

A N P K X Q

Write the previously displayed letters in reverse order (no spaces)

O Y R W S M

Write the previously displayed letters in reverse order (no spaces)

H V A T H L

Write the previously displayed letters in reverse order (no spaces)

P C X O U I

Write the previously displayed letters in reverse order (no spaces)

H V N C P Y I

Write the previously displayed letters in reverse order (no spaces)

D I J B N S E

Write the previously displayed letters in reverse order (no spaces)

V D A P X S R

Write the previously displayed letters in reverse order (no spaces)

U I M Y A T T

Write the previously displayed letters in reverse order (no spaces)

S G O B A N A

Write the previously displayed letters in reverse order (no spaces)

I M C W I B S

Write the previously displayed letters in reverse order (no spaces)

P H E O F Q Z

Write the previously displayed letters in reverse order (no spaces)

L N D A T O F R

Write the previously displayed letters in reverse order (no spaces)

I M E S G C P U

Write the previously displayed letters in reverse order (no spaces)

M S X B N U R N

Write the previously displayed letters in reverse order (no spaces)

F Q A C I L O T

Write the previously displayed letters in reverse order (no spaces)

D W P J X Z I M

Write the previously displayed letters in reverse order (no spaces)

L R H Y N E E C

Write the previously displayed letters in reverse order (no spaces)

N O O A U N S K

Write the previously displayed letters in reverse order (no spaces)

Q V T L H K I D F

Write the previously displayed letters in reverse order (no spaces)

G R H A W V P J R

Write the previously displayed letters in reverse order (no spaces)

M R X T H T A C E

Write the previously displayed letters in reverse order (no spaces)

R A B G A F B A H

Write the previously displayed letters in reverse order (no spaces)

B B H F S X F N T

Write the previously displayed letters in reverse order (no spaces)

H C Y S D T M E L

Write the previously displayed letters in reverse order (no spaces)

VI R K Z O K G W

Write the previously displayed letters in reverse order (no spaces)

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