Memory Retention From Mind Wandering & Meditation: Does Mind Wandering Help Individuals Remember Paired Associates Better Than Meditation?

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Abstract

This research investigates the effects of mind wandering on memory retention. Participants were given a list of 13 word pairs and were tested after. The participants then mind wandered or meditated for 10 minutes and were tested again on the word pairs. The participants were presented with another set of 13 word pairs, tested, and switched conditions. Participants were tested on the 26 word pairs two days later. Results displayed that there was a main effect of the time of the test. The other results were not statistically significant, displaying that in our study, meditation and mind wandering had the same impact on the participants' memory consolidation of the word pairs, exhibiting that our study could not properly support the proposed hypothesis.

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Recent research has been touching on the idea that the practice of mind-wandering could result in memory retention. It was supported that the availability of idle working memory resources is particularly important in the generation of future related cognition during mind-wandering (Baird et al. 2011). Mind wandering, in some sense, represents a cognitive insufficiency; however, prospective mind-wandering largely coinices with autobiographical planning. Through this discovery, mind-wandering can be viewed as a tool that's beneficial for future-focused thinking.

In prior studies, research on sleep in terms of memory retention is more common than mind-wandering. However, mind wandering and sleeping have been shown to engage with similar brain mechanisms. It was supported that even though the specific neural correlates of both daydreaming and dreaming remain somewhat elusive, these mental states, and their associated subjective content, are strongly correlated with the "resting state" and REM sleep, respectively (Christoff et al. 2009). This displays that because mind wandering is just a less intensified version of sleeping, mind wandering could also have an effect on memory retention. Following the idea that mind-wandering and sleep use some of the same brain mechanisms, studies also show that sleep also was proven beneficial to memory retention when recalling words. In this study, sleep was shown to be most beneficial to memory 24 hours later if it occurs shortly after learning and that sleep does in fact stabilize declarative memories, which diminished the negative impact of subsequent wakefulness (Payne et al. 2012). This displays the importance of the link between sleep and mind wandering due to the fact that research could be positioned to help support the hypothesis that mind-wandering could also lead to memory

retention. This study also includes word pairs to measure a participant's recalling memory, which helps support the present study and its hypothesis. Sleep has been shown to facilitate memory consolidation in individuals and it has been supported that after sleeping, memory performance improved and the sleep also protected against interference (Brawn et al., 2013). It was additionally shown that a brief period of resting one's eyes can enhance declarative memory and that this is associated with slow oscillatory EEG rhythms and increased mind wandering, thus exhibiting that a short rest period has the ability to facilitate memory retention (Brokaw et al., 2016).

More specifically, studies show that trait levels of mind wandering were correlated with task-unrelated thought measured by thought sampling during a test of reading comprehension (Dewar et al. 2012). This research thus proposes that wakeful resting after learning something new allows new memory traces to be consolidated better which allows the comprehension to be retained for much longer. Given the amount of attention problems that exist within students, new methods and studies used to research mind wandering may facilitate a larger, more comprehensive understanding of inattention amongst individuals. This finding also may help students who have attention issues come to the conclusion that mind wandering may help them consolidate information better. However, some research has shown that mind wandering can have unknown effects. While mind wandering hasn't been shown to lead to a lower quality of life, there could be other implications such as an impact on mood and worse memory performance amongst undergraduate students (Mrazek et al., 2013). Due to the modernity and newness of studying mind wandering, it's important to look at the different studies for future guidance and direction when enacting new studies.

The content of the mind wandering one is engaged in has also been studied. Research showed that more contextually distant daydreaming resulted in more forgetting of recently learned items and that the types of events involved in the default system in the brain during daydreaming are very similar to the kinds of events that lead to forgetting (Delaney et al., 2010). This displays how there are different severities and types of mind wandering and how certain types may lend themselves to forgetting content rather than remembering. It was also found that thoughts that are similar in content to various daydreams could inhibit memory when it comes to newly learned information – those who thought about diversionary thoughts (such as fantasies or being back in one's childhood home) forgot more items from the memory test than those who were instructed to not engage in diversionary thought (Sahakyan & Kelley, 2002).

The present study was designed to further explore the effects of mind wandering on memory retention. Past research has focused on the effect of sleep on memory, so this study was conducted to view how the practice of mind wandering could lead to memory consolidation. Due to mind wandering and sleep using similar brain mechanisms, this study sought out to support the idea that mind wandering could bolster memory. There hasn't been much research on mind wandering, especially with the measure of word pairs. The word pairs were designed to measure memory consolidation from the control condition of meditation and the manipulated condition of mind wandering.

The three measures being examined in the study are memory retention immediately after seeing the word pairs, after the task (either meditation or mind wandering), and two days after the original study. The primary hypothesis in the present study is that participants in the mind wandering condition will retain more word pairs than the meditation condition, thus attempting to support the claim that mind wandering leads to memory consolidation.

Method

Participants

The participants were 35 second year students around the age of 20 years old who participated in the study as part of enrollment in a Research Methods in Psychology class. The sample was mostly white and mostly female. The participants had unknown prior experiences with meditation and mind-wandering. Before meditation and mind-wandering, participants had around the same amount of memory retention.

Word Pairs

Two lists of 13 unassociated word pairs were used in this study to measure memory retention of the participants.

Response Sheets

After studying the words and the assigned manipulation, participants were given a sheet of paper that had the first word in the word pair that they viewed previously. Participants were assigned to come up with the second word in the pair.

Procedure

Participants were presented with a list of 13 paired associates (word pairs). Immediately after being presented with the pairs, a test was administered with the first word of each pair where participants were told to come up with the paired word. After this immediate test, half the class meditated for 10 minutes and half the class mind-wandered for 10 minutes. After the manipulation, a second test on the word pairs was administered.

Following this test, 13 different sets of word pairs were provided. Immediately after, a test was administered with the first word of each pair and participants were told to come up with the paired word. The participants then did the manipulation that they didn't participate in the first time and were tested on their memory of the word pairs. Two days later, a test was administered on the cumulative 26 word pairs.

All participants participated in both experiments which created a repeated measures and factorial 2 X 3 design. The order was also counterbalanced to deal with order effects from the repeated measures design.

Results

A 2 (Task: mind-wandering, meditation) x 3 (Time of test: immediately, after task, two days later) ANOVA on the percent correct of reporting the second word in the given word pair yielded no main effects of the task. There was also no statistically significant interaction between the task and time of test. However, there was a statistically significant main effect of the time of test, $F(2,48) = 38.82$, $p < 0.01$. The means of the data are presented in Figure 1.

Discussion

It was hypothesized that there would be a main effect of the time of the test due to the fact that individuals naturally remember things less as time passes, especially the measure that we used, arbitrary word pairs. However, the main hypothesis was that mind-wandering would increase memory retention when compared to meditation. Our results displayed that there was no statistically significant interaction between the task and time of test, which does not support our original hypothesis.

Our primary hypothesis could have not been supported due to a couple reasons. The first reason being that the original hypothesis is incorrect. While this could be the case, many other studies have supported the concept of mind wandering increasing memory retention, so it doesn't seem likely that this is the case. The other reason our hypothesis could have not been supported is that the hypothesis is actually correct, but that we were not able to find support for it. This displays that this study isn't "disproving" the hypothesis because other studies support the hypothesis we provided. While sample size and people not showing up for the third test could be

possible reasons for our hypothesis not matching our results, there is not much difference in the means.

The way the study was conducted could have been the reason why the hypothesis wasn't supported. Because meditation is near to impossible to perfect and is a practiced exercise, even if participants were attempting to meditate, they may have actually been mind-wandering. Participants were not required to have meditation experience, so the independent variables may not have been different enough to produce different results in memory retention.

Meditation acted as a control condition because the participants were actively trying to get their mind not to wander. However, a better control condition could have been an active cognitive test. This would be a better control condition because there would be a larger strength in manipulation between the two independent variables. This would then increase the chances that the independent variable will have a statistically significant effect on the dependent variable. Meditation also could not have been a solid control condition because meditation has also been seen to result in memory retention. A study showed that adults who practiced meditation found a significant improvement in cognitive flexibility (Hall, 1999). This displays that there is not a strong enough manipulation between the independent and control variables to determine whether the independent variable had a significant effect on the dependent variable.

Future directions of mind wandering research could thus look at adding a cognitive task to differentiate the control and manipulation. This would allow for the researcher to see the impact of mind-wandering in contrast with a completely different control condition. Because there would be a condition using an active-mind task, research could be conducted about if studying or mind-wandering is more conducive to retaining memory after a certain point. It

would also be interesting to compare mind-wandering with sleep in these conditions and see if mind-wandering is only beneficial during sleep or if it can be utilized during the daytime.

Instead of adding a cognitive task, the study could also utilize trained meditators to ensure that the participants are fully meditating. In our study, there was no known background of meditation within the participants so they could have actually been doing the manipulated task (mind-wandering) instead of focusing on the meditation practice. By using trained meditators, there would be higher face and content validity because the participants would have experience engaging in the meditative practice that the researcher intended. This could mildly address the problem of the strength of the manipulation because if the participants were trained meditators, they would genuinely know the difference between letting their mind wander and engaging in a meditation exercise.

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Figure 1

Effect of Mind Wandering and Meditation on Memory Retention