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How to Enhance Your Memory.

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ABSTRACT

This paper aims to learn how to increase the mind's ability to efficiently memorize and store knowledge. Previous research has demonstrated an enhanced memory based on increased consumption of antioxidants, curiosity-based memory, and decreased consumption of calories/tryptophan. In the present study, I tested the strength of these relationships by examining naturalistic daily changes in their variables longitudinally over a two-week period. I measured the amount of antioxidants, calories, and tryptophan consumed by using the "MyFitnessPal" app, tracked my interest in daily studies on a scale of 1-10, and assessed memory ability using the Match to Sample test. Based on the data produced in this study, memory showed a significant negative correlation with caloric intake, but no significant correlation with antioxidant intake, curiosity level, or tryptophan intake. To summarize the practical applications of my findings it was discovered my caloric intake played an important role in solving my original research problem of enhancing memory and being a more efficient student.

1. Introduction

1.1 Research Problem

As college students begin their semesters they will consistently begin to memorize and learn new concepts in a wide array of classes. If students were able to use memory techniques to enhance their ability to store information, they could accomplish more schoolwork efficiently. The potential benefits of an increased memory would allow students to succeed not only in class but in their personal lives as well. In this research paper, I hope to discover how to successfully enhance memory and become a more efficient student.

1.2 Literature Review

A possible answer to my research problem is increasing antioxidants in my diet. In a study conducted by Dong et al. (2019), mice exposed to antioxidant-containing fresh ginseng during testing showed an increase in spatial memory. While mice exposed to chronic restraint stress exhibited significantly longer escape latencies several days after initial training in the location recognition test, treatment with fresh ginseng significantly decreased the escape latencies, thus reversing these impairments. These effects of fresh ginseng can be interpreted as evidence that the mice exposed to increased antioxidants were able

to remember escape routes quicker than mice not exposed.

Another possible solution to enhanced memory is based on curiosity driven memory. In a study by Stare et al. (2018), 93 participants from Arizona University memorized trivia questions and faces, and were asked to rate how curious they were about each question. Their results showed evidence that answer recollection to trivia questions was higher based on topics that the subjects found most curious.

A decrease in caloric consumption of calories could be a plausible answer to my research problem. In a study conducted by Teng et al. (2019), memory ability in a group of mice introduced to a restricted diet (consumed 60% less of diet) was compared to another group of mice able to eat at free will. Memory was tested using the novel object recognition test which allowed the animal to explore a novel object or familiar one. Memory retention was interpreted when a higher object discrimination index was displayed. Both the dietary restricted mice and mice eating at free will showed an increase in memory retention after the first hour of training. However, after 24 hours of training the mice eating at free will demonstrated a significant decline in retention while the dietary restricted mice displayed stable retention of memory. Therefore, it is suggested that caloric intake and Tryptophan an amino acid in protein may be responsible for limiting memory from restricted dieting. This may play a significant role in memory enhancement and only requires a shift in dietary habits.

1.3 Hypotheses

Based on the above literature reviews, I have predicted the following:

- Hypothesis #1: If consumption of antioxidants increases then memory ability will increase
- Hypothesis #2: If curiosity increases then memory ability will increase.
- Hypothesis #3: If consumption of calories decreases then memory ability will increase.
- Hypothesis #4: If consumption of tryptophan decreases then memory ability will increase.

2. Methods

2.1 Participant

The author of this paper served as the participant in this study. At the time of this study, I was a 25 years old male undergraduate student at Camosun College. I completed the current study as an assignment for Psychology 110 (‘’Experimental Psychology”) and I chose the study based on an interest in personal memory enhancement.

2.2 Materials and Procedure

I performed a correlational study to test concurrently all four of my hypotheses by examining naturalistic daily changes in their variables longitudinally. I kept a study journal with me at all times for this study’s two-week period in order to record self-observations of the following four variables: (1) antioxidants (2) curiosity (3) calories (4) tryptophan, and (5) memory ability.

To measure antioxidants levels I downloaded “MyFitnessPal” app which tracks macro nutrient intake, including antioxidants. I logged all meals eaten during the days of testing and recorded the number of antioxidants. If I did not consume any antioxidants that day then the level of

antioxidants for that day was recorded as zero.

To measure curiosity I engaged in daily college studies and recorded on a scale of 1-10 how interested in the topic being studied he was. 1 being not curious at all and 10 being the most curious possible.

To measure caloric intake, the "MyFitnessPal'' app was used. The app tracked all meals consumed and measured total amount of calories for each day. The participant recorded total number of calories each night prior to going to sleep.

To measure tryptophan levels the "MyFitnessPal'' app was used. The app tracked all meals consumed and measured total amount of tryptophan for each day. The participant recorded total amount of tryptophan each night prior to going to sleep.

To measure memory enhancement the participant performed the Match to Sample test from the "Psych Lab 101" app. This test measures memory based on recognition of patterns. A brief image of a pattern was displayed onscreen and then disappear, seconds later an image of two patterns would appear one of the patterns would be the same and the other would not be. To awnser correctly the same pattern must be selected that was displayed moments before. During the test the time between images varied from 1-10 seconds between images.

To assess the strength and statistical significance of associations between variables predicted by my four hypotheses, I performed Pearson product moment correlations of their predictor variables (antioxidants, curiosity, calories, and tryptophan) with their outcome variable (memory). For testing Hypothesis #1, daily antioxidant intake was correlated with accuracy percentage on the Match to Sample test. For testing Hypothesis #2, levels of curiosity on a scale of of 1-10 were correlated with accuracy percentage on the Match to Sample test. For testing Hypothesis #3, daily caloric intake was correlated with accuracy percentage on the Match to Sample test. For testing Hypothesis #4, daily tryptophan level was correlated with accuracy percentage on the Match to Sample test. A correlation coefficient was considered statistically significant if the probability of its random occurrence (p) was < .05 (i.e., less than 5% of the time expected by chance alone).

3. Results

As shown in Table 1, the major finding of this study was that dietary restriction shows a significant correlation with memory enhancement. Caloric intake was significantly correlated with memory ability (r = -0.74, p = .001; see Figure 4). In contrast, no other variable was found to be significantly correlated with memory ability: tryptophan (r = -0.03, p = 0.925; see Figure 2), curiosity (r = -0.04, p = 0.88; see Figure 1), antioxidants (r = 0.28, p = 0.33; see Figure 3). Based on a comparison of the correlation coefficients using raw data, dietary restrictions showed the strongest correlation with memory enhancement.

4. Discussion

4.1 Summary of Results

Based on previous research, I hypothesized that an increase/decrease in four variables would improve memory: an increase in the consumption of antioxidants (Hypothesis #1), an increase in curiosity (Hypothesis #2), a decrease in the consumption of calories (Hypothesis #3), and a decrease in consumption of tryptophan (Hypothesis #4). The data in this study

supported the predicted relationship with memory enhancement and dietary restrictions (Hypothesis #3) but did not support a relationship of memory with antioxidants, curiosity, or tryptophan (Hypotheses #1,2,4).

4.2 Relation of Results to Past Research

The correlational study was not able to predict an increase in antioxidants and memory enhancement in line with the previous research. While Dong, et al. (2019) found that an increase in antioxidants (via ginseng) in mice undergoing constant restraint stress showed a significant improvement in memory, the participant in the current study did not undergo severe stress during its procedures. This could be a contributing factor to the result of the study. Future studies on unfortunate victims of stress should be examined to see if antioxidants may have an ameliorating effect upon their memory.

The lack of a relationship found between curiosity and memory in the current study was not consistent with past research. Stare et al. (2018) found that participants that were curious in trivia questions were more likely to remember them. In the current study, curiosity was rated about a topic (college studies) that was separate from the one used for assessing memory ability. Further studies should be done to assess the correlation of curiosity for and memorization of the same information.

In the current study, dietary restriction was able to predict memory enhancement in line with past study by Teng et al. (2019). In the study by Teng et al. (2019), experimental mice were restricted to consume 60% less calories while the control group of mice ate at free will. The participant in the current study ate free will but found an increase in memory performance on days with lower amounts of calories. The participant was not regularly restricting diet by 60% of caloric intake. This demonstrates the generalizability of the relationship between a decrease in caloric consumption and memory enhancement.

In the study by Teng et al. (2019) it was also suggesting that a reduction of protein and certain amino acids, including tryptophan, might improve stress resistance and rodent life. Their study also found that tryptophan played a significant role in limiting dietary restrictions on performance of memory enhancement. In the current study, I failed to find a significant relationship between tryptophan and memory enhancement. Future studies should re-examine this possible relationship with more accurate measuring devices of tryptophan than the app used in the current study.

4.3 Implications of Results

During my studies on memory enhancement I have learned the importance of how a healthy diet can increase my mind. By monitoring caloric consumption in the future, I can better optimize my studies and memory retention. I will be able to monitor caloric consumption in the future the same way as I did during my studies. Collecting and reviewing the data at the end of the day has become an integral part of my nightly routine and will continue to be into the future.

My original rationale for picking this research problem was to learn better ways to study and perhaps learn new study techniques and or habits. During my studies and reviews of other scientific literature on memory enhancement it became apparent that diet played the most important and critical part of enhancing ones memory. Another contributing factor that seemed

blatantly obvious but was also useful, was to be naturally interested in the topic being studied. This tactic supported the fact that it may be very hard to memorize certain topics for some people while others who show a natural curiosity in the topic may thrive.

References

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Table 1

Correlation coefficient (r) values, with number of daily trials (n) per correlation in brackets.

Variables correlated	*r*(*n*)
Tryptophan & Memory	-0.03(14)
Curiosity & Memory	-0.04(14)
Antioxidants & Memory	0.28(14)
Calories & Memory	-0.74(14)*

* $p < .05$.

Figure 1

Scatterplot of curiosity rating and memory ability.

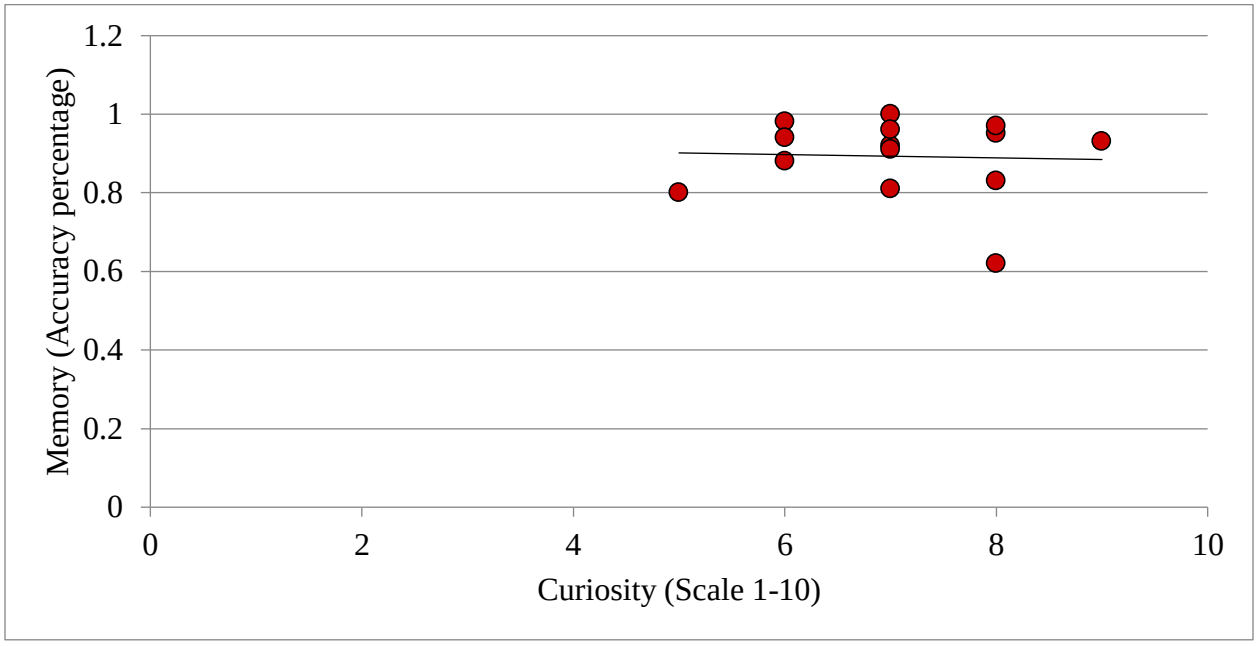

Figure 2

Scatterplot of tryptophan and memory ability.

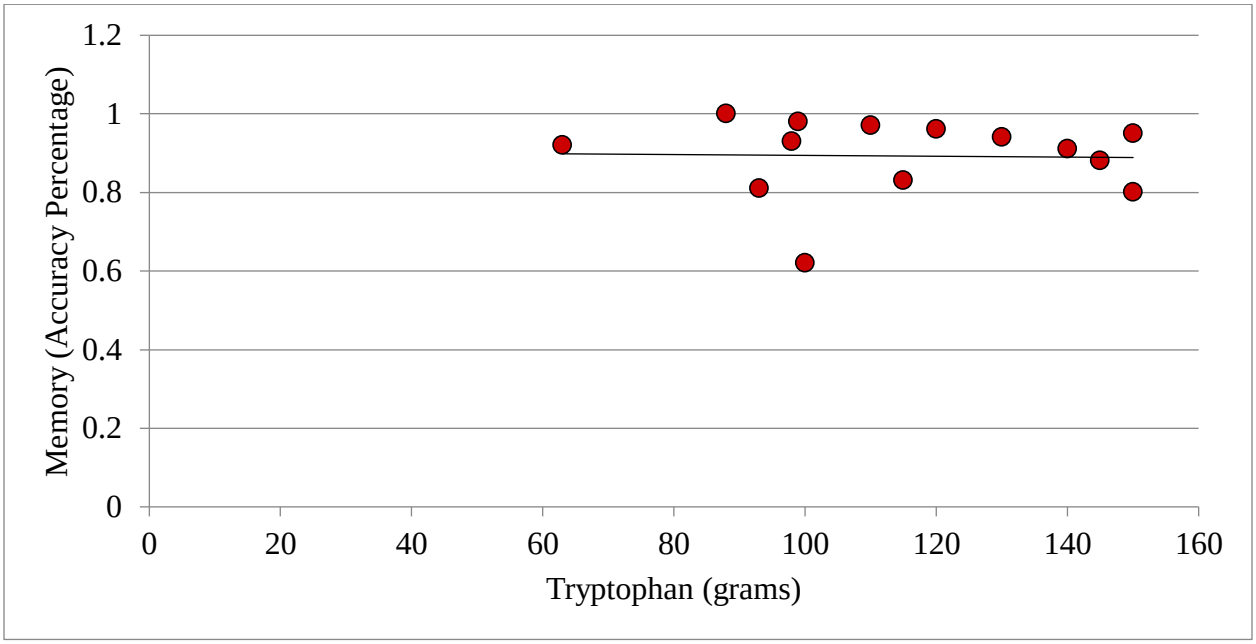

Figure 3

Scatterplot of antioxidants and memory ability.

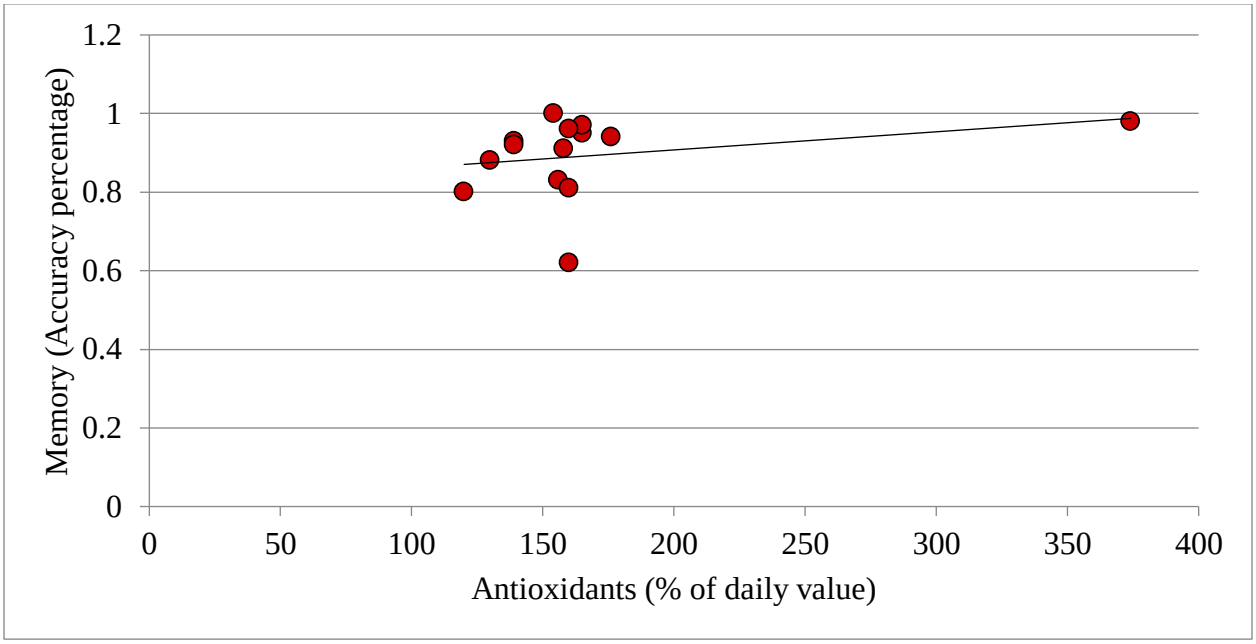

Figure 4

Scatterplot of calories and memory ability.