Liquids and Their Effect On Our Minds

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INTRODUCTION

The general topic of interest in this experiment is liquid and its effect on the way a person thinks while being tested on cognitive function. People know that the human mind and body can multi-task voluntarily and most importantly involuntarily. The question that seems to have been unanswered seems to be that does it affect the level at which humans function. For example, does ingesting a liquid, in general, have an impact on the mind the way coffee or caffeinated drinks do? Does the mind work better by not having another function to do at the same time or does drinking something for example help stimulate the mind and keep it working better? There's been many articles written about the effects of caffeinated drinks like coffee and energy drinks stimulating the mind, but there's still one aspect missing. The aspect left to explore whether the mind works better or worse in general, with or without an additional process to conquer. Adding the consumption of liquid to the mind's tasks may or may not help increase functionality. The work that has been done in the field suggests that energy drinks do indeed help stimulate cognitive performance. The main constant within these drinks is caffeine and "most researchers concur that caffeine seems to be the main compound that drives the stimulatory effects of these drinks" (Howard, 2010). What's missing from all these experiments is the lack of control within the subjects overall. The food ingested through the day was not the same. The environment and state in which the subjects were in were not the same. The way to really understand this question would be test and experiment. In one study, the experimenter had "thirty-five healthy volunteers (16 male, 19 female) participate in two experimental sessions in which they remained awake between 5 p.m. and 5 a.m. At 3:30 a.m. they consumed CAF or placebo in random order under double-blind conditions. Participants completed subjective effects questionnaires and performed computerized attention tasks before and after consuming capsules" (Childs, 2007). The goal was to see if whether capsulated caffeine had any effect on fatigued individuals. In another study, "twenty-four managers who normally consume between 400 and 1,000 mg of caffeine per day participated in all-day quasi-experimental simulations" (Streufert, 1997). What's important to observe via this study is the best way to experiment would be to set a control and have an experimental variable. It's important to keep the subjects health in mind as well, as there are certain side effects of caffeine for example that can really impact someone's health. A study suggests "borderline hypertensive men maintained response to the stressor in the face of an exaggerated BP response to caffeine, suggesting that use of caffeine during behavioral stress may elevate BP in BH individuals to a clinically meaningful degree" (Lovallo, 2006). It is predicted that the independent variable of consumption of liquid (water) versus the dependent variable of not having consumed a liquid (water) will help the subject score better when tested on cognitive function.

OBJECTIVES

- The game is trying to teach subjects to read specific letters and identify which words they are. The learning objective the game is trying to create for the subjects is to think faster and be more attentive.
- The dominant form of interaction the player has with the game is simply reading the flashcard, and thinking of the word that it could be. The player doesn't have any physical interaction with the game. This does not get in the way of the learning objective as it still stimulates the brain and achieves the learning objective.
- Cognitive processes are most affected by the game design. The design affects this system simply by not having any physical interaction with the game. It is solely all cognitive processes in action.
- Three people are engaged in the game. One person will be the player (subject), the other will be just someone to hold the index cards, and one person will be keeping tally of the score. They interact with one another by the person giving the answer, and the other person holding the index card responding if it was right or wrong. They interact with one another by the person giving the answer, and the other person holding the index card responding if it was right or wrong. One is simply helping facilitate the game. One is playing the game. One is keeping score of the game.
- The primary objective of the game is to get as many words right as possible, under the amount of time allotted per word. Time would be set as 10-seconds/per word, for example. The game objective does reinforce the learning objective, as the game objective is to score as many points as possible and the only way to score points is to complete the words, which will then reinforce the learning objective.
- The rules of the game are simple. Each word will have a 10-second timer. If the timer passes 10 seconds then the game is over and whatever points you collected will be your score. Each word is equivalent to one point. If you get all the words, you get all the points and you successfully beat the game. This compliments the learning objective, as it encourages players to try and beat the game each time they lose, which should help them get better and be more attentive over time.
- Items such as points are accrued during the game. No resources are spent during the game. Since there are no resources spent, nothing governs the exchange of resources.

MATERIALS & METHODS

Subjects

- There were ten subjects used for the game. The subjects were recruited in school, in the library. Students that were simply at the library for leisure were recruited. They volunteered at their will to participate. Inclusion and exclusion criteria didn't include factors such as age, sex, race, ethnicity, type and stage of disease, the subject's previous treatment history, but instead the presence of a healthy medical condition.

- The conditions included students had to ingest a liquid diet throughout the day, which included all the healthy nutrients needed for optimal health. All subjects were assigned to these conditions. The subject demographics were simple, and found 5 males and 5 females to make the study even. Race, weight, sex, etc. were not important, but it helped to coincidentally have 5 males and 5 females to even out the experiment.

Apparatus

- Materials used to collect data included a notepad, an iPhone for the timer-app and a pen.
- The game was presented in a simple fashion, with an instructions page first.
- Responses were measured by the points accrued by each subject, after each round.

Procedures

- A few conditions were created. One condition included the control group in which did not have anything to ingest at the start of each round. All subjects did have liquid diet before study though. The experimental group had a few conditions in which included the ingestion of water before the first round and a caffeinated drink before the second round.
- These instructions were explained to the subjects via an instruction sheet provided to them in the start of it all.
- Data was collected based on how many points they accrued through out their trials/rounds.

T= total number of S-F pairs in a level
P= number of pairs in a world
n represents a world in a level
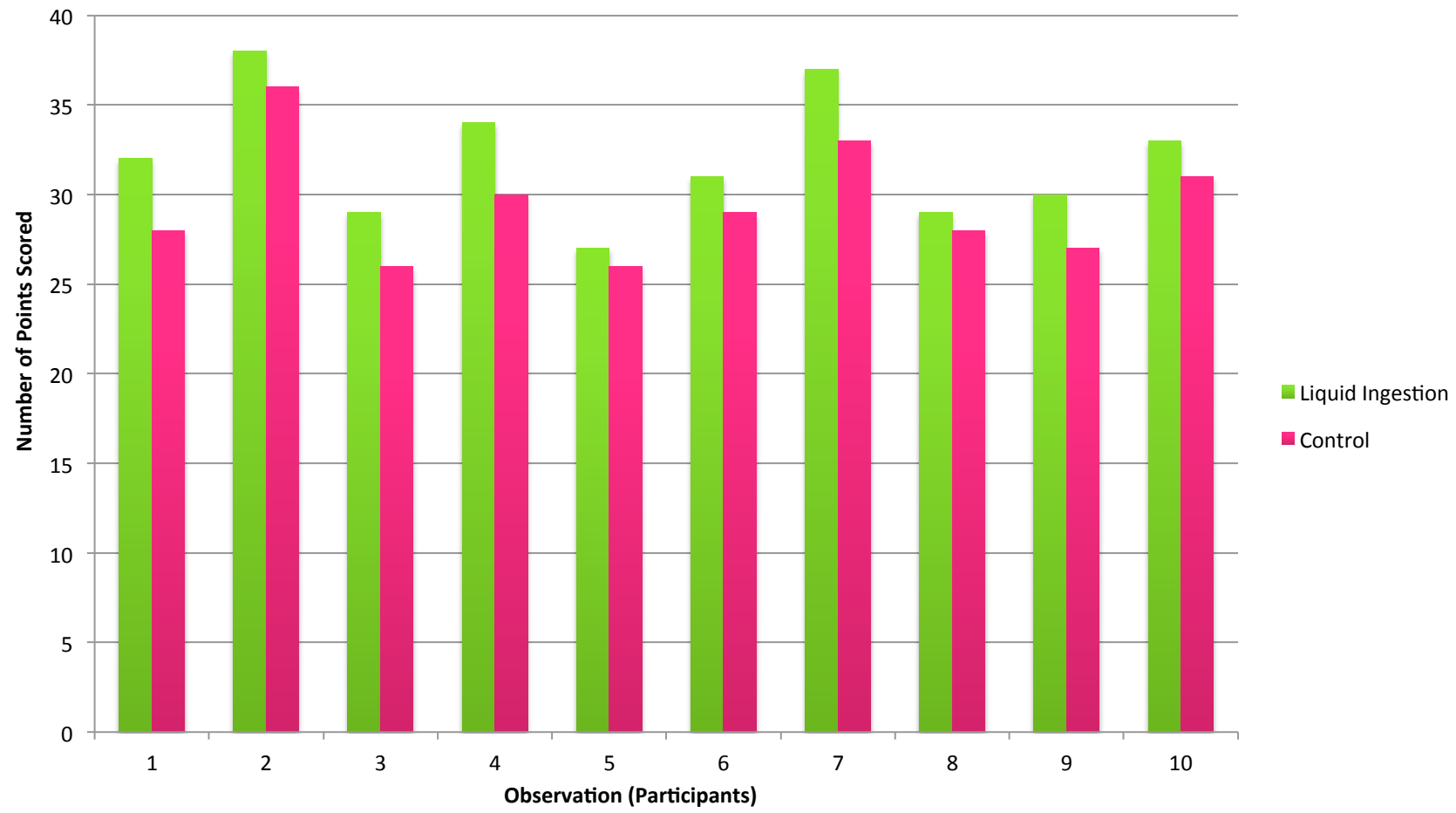x represents the world number (P/2)

$$A \text{ (familiar set)} = \frac{x(x+1)}{2} - (x+1)$$

$$B \text{ (novel set)} = T - A$$

$$nx = \begin{bmatrix} A \\ x \end{bmatrix} + \begin{bmatrix} B \\ x \end{bmatrix}$$

x S-F pairs will be randomly chosen from the familiar set, which includes the pairs encountered in previous battles.

x S-F pairs will be randomly chosen from the novel set, which includes the pairs NOT encountered in previous battles.

Observation	Liquid Ingestion	Control	
1	32	28	
2	38	36	
3	29	26	
4	34	30	
5	27	26	
6	31	29	
7	37	33	
8	29	28	
9	30	27	
10	33	31	
Mean	32	29.4	
Standard Deviation	3.56	3.20	
n (participants)	10	10	
Variance	12.67	10.27	
Mean - Mean			2.60
A	114	92.4	206.40
B			18.00
C			20.00
D			100.00
A divided B			11.47
C divided D			0.20
			2.29
			1.51
t test independent means			1.72

RESULTS

- The outcome of the experiment were ten tallied scores which ultimately displayed that the independent variable subjects, which ingested the clear liquid (water), did better in the game then the dependent subjects that did not ingest a liquid prior to the game.
- In the experimental group the mean was 32 points and in the control the mean was 29.4 points, as shown in Figure 1. The standard deviation was 3.56 in the experimental group and the control group was 3.20 (Figure 1). The number of participants was 10 in both the experimental and control group (Figure 1). The variance was 12.67 in the experimental group and the control group was 10.27 (Figure 1).
- The mean scores of points scored by the experimental group were 32 points (SD = 3.56), and the mean scores of points scored by the control group were 29.4 points (SD = 3.20) (Figure 1). The results indicate that participants that ingested liquid prior to the starting the game were better and more attentive at the game then participants that did not ingest the liquid, e.g., water. T-test indicates 1.72 as a result (Figure 1).

CONCLUSIONS

- In conclusion, the ingestion of a liquid or water before the start of any cognitive process indeed helps people function better and produces a better result, than someone that didn't.

- The results support the notion that the ingestion of a liquid, before any exercising of the mind, helps people function better when prompted. The results indicated that the average of people that ingested liquid were 2.6 points higher than the average of the control group (Figure 1).

- This experiment solves a major problem in the field of education, where it can be implemented into the aspects of "how to study" and "what might help you to study".

- Completing this missing piece of helping people to study further advances the field of education because as people get better at learning, the better it will be for us as human beings to find further parts of the world that are yet to be discovered.

- This experiment is different in a way that is solely tests the ingestion of a liquid, whereas there have been various studies and experiments on whether caffeine helps or doesn't help in learning and focus. Potential problems within the study include getting the same type of human beings together, to make the tests more reliable. Another potential problem includes having the subjects on the same well-balanced liquid diet through the day. Implications of the study on the field include opening doors to better education and better learning techniques. Future experiments include using salted liquids rather than clear water.

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