

Psychology IA

An investigation into how context can affect memory

Candidate code: Ish809

Co-Researchers: Ish348, Ish330, Irw285

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Introduction

Throughout our day-to-day interactions with our surroundings, the brain builds up and stores information on how different things are related to each other and it uses this pre-stored information to be able to more effectively interpret new information that it receives

Our IA aim is to investigate how contextual understanding can affect recall ability. This is relevant to students and teachers and educators in general because it allows us to understand how our brain recalls and stores information, it gives us an insight into what the brain would associate with each memory that it stores.

Our investigation was of schema theory, according to the Massachusetts Institute of Technology a schema is an organized unit of knowledge for a subject or event. It is based on past experience and is accessed to guide current understanding or action. This is linked to our IA as it investigates how giving a contextual image can alter the effectiveness of the brain in storing new information because when providing context the brain can create a schema of the information which it can use to process new information.

We hypothesize that the participants who view the contextual image for 3 minutes will have a higher score of correctly answered questions, while the participants who were not shown the contextual image will have a lower score of correctly answered questions.

The null hypothesis is that the contextual image would have no impact on the score of correctly answered questions.

Exploration

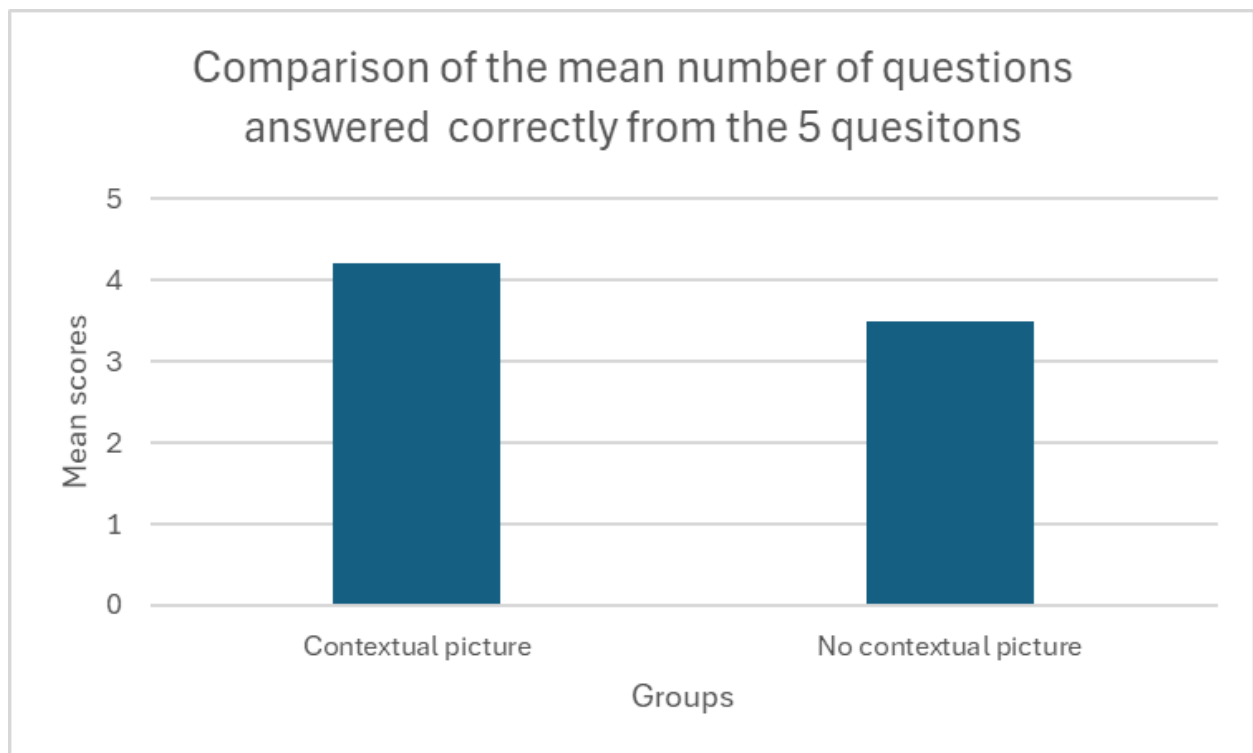
In this study, volunteer sampling will be used, meaning participants will sign up voluntarily after being informed about the experiment. This method ensures that participants are interested, although it can introduce self-selection bias. Participants will be randomly assigned to one of two groups using an online randomizer to ensure no researcher or participant bias will affect the results. The study follows an independent measures design, meaning different participants will be placed in either Group A, which receives a contextual image before reading a passage, or Group B, which reads the passage without the image. This design avoids order effects like practice or fatigue that could arise if the same participants experienced both conditions, it also allows us to view the effect of the independent variable on the dependent variable to be able to construct a relationship between them and see how they affect each other without confounding variables affecting the relationship.

Participants with prior knowledge of the passage or image, or those with reading impairments, like psychology students will be excluded from the sample to ensure the results are not biased by familiarity or cognitive challenges and to eliminate demand characteristics. Potential confounding variables include environmental distractions, differences in reading speed or comprehension, and variations in energy or attention due to the time of day. To eliminate these confounding variables, the experiment will be conducted in a quiet, controlled environment with consistent lighting. Both groups will participate at the same time of day, and participants will be instructed not to discuss the experiment to prevent contamination between groups.

Materials for the experiment include the contextual image for Group A, the passage that both groups will read, a recall test to measure memory, and a stopwatch to ensure both groups are given equal time. Consistent font size and formatting will be used across both groups to control for readability differences, while the contextual image will be the only variable that differs between the two groups, allowing the effect of context on recall to be isolated. Ethical considerations, such as informed consent and debriefing, will be carefully followed by using a consent form and debriefing script to protect participants' rights and ensure the integrity of the study.

Analysis

	Group with contextual picture	Group without contextual picture
Measure of central tendency Mean Score	4.2	3.5
Measure of dispersion Standard deviation	0.79	1.18



Our findings from the measure of the central tendency (mean) of the data and its dispersion (standard deviation) show that there is a small difference between the scores of both groups, in which the group that had a contextual picture that was accompanied with the passage of text where able to score higher on average (4.2 mean score), and the group without the contextual passage scored lower on average (3.5 mean score).

The group with the contextual picture had 2 outliers for the score as 2 of the 10 participants scored a 3 out of 5 on the test provided, while the rest had scores of 4 and 5. Looking over at the group that didn't have a contextual picture provided we see 3 outliers which got a 5 out of 5 and one participant got a 4 on the test whilst the rest of the group got 3 and 2 scores. This is shown in the standard deviation of both groups where the group with the contextual picture had a lower standard deviation (0.79), whilst the group without the contextual picture had a higher standard deviation (1.18), this variation in scores shows that participants in the no context group had to rely more on there memory, which would expectedly vary amongst participants thus the variation in score.

The U-value is 32. The critical value of U at $p < 0.05$ is 27. Therefore, the result is not significant

The z-score is 1.32288. The p-value is 0.09432. The result is not significant at $p < 0.05$

To determine whether we should reject our null hypothesis a one-tailed Mann-Whitney U test for inferential statistics was used, when the test was run the results showed that there was no significance at $p < 0.05$ and the critical value of U is 27, which means that we can't reject the null hypothesis as the test showed that there was no significant difference between the scores of the two groups, thus concluding that presence of context has no significant effect on the scores and subsequently on memory. When participants, were asked to rate the comprehensibility of the passage the contextual group on average, gave a rating of 6.88 whilst the group without the contextual image on average gave a rating of 6.21, which further emphasizes the lack of effect that the presence of context had on the score.

Evaluation

Our results showed that the participants who had the contextual image provided along with the passage, on average scored slightly higher than the group without the contextual image, with a 4.2 average score compared to a 3.5 average score. The descriptive statistics showed that the group with the contextual image had a standard deviation of 0.79 and the group without the contextual image had a standard deviation of 1.18, and the calculated inferential statistics gave a value for p of 0.09432, which indicates that there is no significant difference between the scores at $p < 0.05$, therefore this does not support the theory that context would improve the scores of participants.

This goes against what we expected, and the results supported the null hypothesis, this is because the data showed no significance at $p < 0.05$ meaning that the difference between the scores of both groups was not large enough to show the effect of context, this could be attributed to the small sample size of the experiment since there were 10 participants for each groups compared to the original experiment which had 104 total participants, additionally the setup of the experiment was simple. Therefore our results are not reliable within the constraints of our IA, and do not support the theory that context has an impact on recall ability and going against the findings of the original study.

Procedure

-participants were given a consent form to sign before partaking in the experiment

-Participants were allocated randomly into Group A (with contextual image) and B (without contextual image)

- Both groups were tested simultaneously in different rooms

- In group A the participants where given a document which contained both the passage and the contextual image and in group B the participants were given a document which just had the passage, they had 3 minutes of reading time before the paper was removed

-after the 3 minutes participants where given a test and had 5 minutes to answer

-after collecting the data participants were debriefed on the experiment

Volunteer

A strength of our procedure is that we controlled all possible extraneous variables that may have had an effect on the data: the experiments were conducted at 10am for both groups at the same time, this ensures that the participants are not fatigued by work which may have an effect on their ability to recall which will have an effect on the answers given, and since the experiments were conducted at the same time this eliminated the possibility of participants of different groups discussing the contents of the study which will also have an effect on the results, furthermore all the participants were in a similar age 16 to 17 years of age which ensures that the level of memory recall ability is similar throughout as when comparing the recall ability of older individuals and those who are younger there would be a noticeable difference which will have an effect on the results, also noise and stress were eliminated by conducting the experiment in a closed and calm classroom environment this because the level of noise and stress can act as a distraction from the main task at hand leading to participants being unable to focus and underperforming, lastly all participants had similar skills of English reading comprehension as well as the passage being presented in clear font and size that is standardized across both groups, due to the difference in those aspects possibly leading to an inability to properly read and comprehend the text. The control of these variables leads to ensuring that only the presence of context will affect the results.

A limitation of our study is that the sample size was small and biased, since we used volunteer sampling and had a limit of 20 people for the study due to IA constraints we only were able to gather participants who all came from similar backgrounds, thus the data can't be generalized to the wider population which contains people from different backgrounds, who have different recall ability and comprehension ability, furthermore the control of many factors led to our study being simplistic and none representative of a real world scenario, this is because in a real life scenario it is impossible to eliminate all those factors and since all of them have an effect on the results. This further decreases the likelihood of our data being generalizable on the wider population.

Some modifications that can be done to improve on the study is to increase the sample size as well as gather participants from different backgrounds and age groups, this would improve the data as it would give insight into how context may improve the recall ability across a variety of comprehension levels and memory recall ability levels, furthermore another group could be added in which the picture is provided separately and the passage separately and another group which would have the passage verbally read to them this would allow for the investigation of recall ability and the effect of context under different conditions further improving the results.

Appendix

Raw data

Group with contextual picture

Marks out of 5	Comprehensibility Rating
5	8
5	9
5	6
5	8
4	8
4	8
4	4
4	5
3	6
3	9

Group without contextual picture

Marks out of 5	Comprehensibility Rating
4	7
3	6
3	6'
5	8
3	6
2	4
5	7
5	7
3	6
2	6

Mann-Whitney U test Calculator

☐ Nominal

☐ Ordinal

☒ Interval/Ratio

Success! To perform another calculation hit reset.



Mean: 4.2

Median: 4

Mode: 5

Mann-Whitney U Test Calculator

The value of U is 32.

You'll notice below that we have calculated a critical value for U based on alpha level and whether your hypothesis is one or two tailed. We have also calculated a value for Z and its associated *p*-value. Results in blue reach significance. Results in red do not.

Sample 1	Sample 2
5	4
5	3
5	3
5	5
4	3
4	2
4	5
4	5
3	3
3	2

Significance Level:

☐ .01

☒ .05

1 or 2-tailed hypothesis?:

☒ One-tailed

☐ Two-tailed

The *U*-value is 32. The critical value of *U* at $p < .05$ is 27. Therefore, the result is *not* significant at $p < .05$.

The *z*-score is 1.32288. The *p*-value is .09342. The result is *not* significant at $p < .05$.

Scores	Deviation ($X - M$)	Squared Dev.
5	0.8	0.64
5	0.8	0.64
5	0.8	0.64
5	0.8	0.64
4	-0.2	0.04
4	-0.2	0.04
4	-0.2	0.04
4	-0.2	0.04
3	-1.2	1.44
3	-1.2	1.44
		SS: 5.6
M: 4.2		

Population or Sample

- ☐ Population
☒ Sample

Calculation Details

N : 10
 M : 4.2
 SS : 5.6
 $s^2 = SS / (N - 1) = 5.6 / (10 - 1) = 0.62$
 $s = \sqrt{s^2} = \sqrt{0.62} = 0.79$

Standard Deviation = 0.78881.

Consent form

Dear Participant,

Our names are _____

In order to complete the IB psychology course we need to conduct an experiment, we have chosen to specifically investigate the effect of context on recallability. To meet the ethical requirements, it is compulsory for you to fill out the form below if you would like to participate in our study. Please only complete the form if you are both fluent in english and over the age of 16. If you have any concerns or queries please ask the researcher.

I _____, confirm I have read and understood the participant

information and will receive a briefing and debrief about the investigation from a researcher. I have had the opportunity to ask and have all my questions answered. I understand that any participant information collected will remain confidential and all efforts will be made to prevent the release of my identity. I understand that any of my data gathered by the researchers will remain anonymous if published or used in the future. I am aware that participation is voluntary and that I am able to withdraw myself and any data produced from my results, with or without explanation.

I agree to partake in this study.

Participant Signature: _____

Participant Name: _____

Date: _____

Introducing the participant to experiment

Good morning,

We are conducting an experiment for our Psychology IA, which involves a reading comprehension test. The only material that you will need for this experiment is a pen. We will give you a consent form soon. Please fill in this form before proceeding.

You will initially be handed out an image which will give you context on the passage you will read you will have 2 minutes too look at the image (mention this for group a do not mention this to group b) after that you will be given the passage of text and will have 3 minutes to read the passage after that you will be given a small test that will have questions about the passage you read, if you cant answer a question leave an educated geuss. You also cannot communicate and collaborate with those around you. Thankyou.

Please note that you have the right to withdraw at any point of the experiment if you don't wishto continue.

Debriefing

The experiment that was just conducted was a version of brandsford jd and johnson mk 1972

Overall our aim was to look into the effect of context on recall ability

If you would like to receive the results of the study, please keep in contact with us at any of the following emails:

006472@arkis.edu.bh

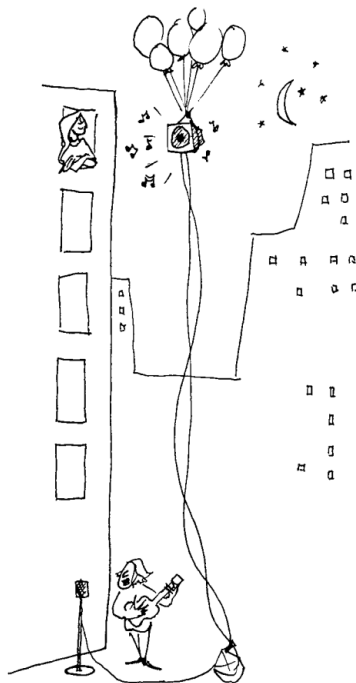
007116@arkis.edu.bh

006077@arkis.edu.bh

Passage used for the experiment

If the balloons popped, the sound wouldn't be able to carry since everything would be too far away from the correct floor. A closed window would also prevent the sound from carrying, since most buildings tend to be well insulated. Since the whole operation depends on a steady flow of electricity, a break in the middle of the wire would also cause problems. Of course, the fellow could shout, but the human voice is not loud enough to carry that far. An additional problem is that a string could break on the instrument. Then there could be no accompaniment to the message. It is clear that the best situation would involve less distance. Then there would be fewer potential problems. With face to face contact, the least number of things could go wrong.

Picture used



Test Questions

1. Why wouldn't the sound be able to carry if the balloons popped?

2. How does a closed window affect the transmission of sound in this scenario?

3. Why is a steady flow of electricity important for this operation?

4. What are some potential problems mentioned that could disrupt the message?

5. What is suggested as the ideal way to avoid these issues?

6. How would you rate the comprehensibility of this passage from 1 to

10
