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DISCUSSION

The Effect of the Change of Schemas on Recall

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Abstract: The aim of this study is to examine whether the change of schema would affect the process of encoding and retrieval. This experiment is a modification of Anderson and Pichert's study (1977). The independent variable (IV) in the experiment was the two different schemas used in the study (Geography student or tourist) and the dependent variable (DV) was the extent to which the participants could recall the story, specifically the number of words in this case. The results suggested that a change in schema of the same story would improve recall, as found by Anderson and Pichert. The Mann Whitney U test indicated that the null hypothesis was accepted.

Keywords: Schema, words recall and retrieval.

1. Introduction

The cognitive level of analysis explores and studies the mental processes of the mind and how the mind works. One of the important aspects of the cognitive level of analysis is memory. Memory, as it has been learnt, is reconstructive. In other words, we do not remember exact details of what our senses perceive from the world around us, but rather memories are formed on the basis of what we already know. This already-existing information that we obtain and have in our minds through time is organised into schemas.

Schema is the representation of knowledge. The concept of schema was first used and looked into by Bartlett in 1932. The schema theory states that the knowledge we obtain is organised in to different categories or units that in turn influence the new knowledge we receive from the world. In other words, simply put, the existing schemas in our cognition determines what we remember. It creates a basis for new incoming information to develop into what we can call our own memory and knowledge. It can be regarded as a gap-fill process in which the schemas are pre-given and they determine what are to fill in the missing places.

Much research has been carried out to obtain a deeper understanding of schemas and the influence they have on our cognitive processes and especially, memory. When schema comes to mind, Bartlett's study "War of the Ghost" is one of the very well know studies examining the schema theory. Loftus and Palmer's (1974) showed how the schema of the question posed towards the participants with

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different words of speed had an impact on their estimation of the cars' speed. Other studies that look into the influence of schema is the one by Bower, Black and Turner (1979) which uses 18 scripts, and Darley and Gross' experiment which looked at how people perceive a little girl when she was put in different circumstances, triggering different schemas.

Anderson and Pichert's study (1977) was one of the studies clearing demonstrating the effect of schema on what people remember. In the experiment, the researchers divided the participants into two groups and asked them to read a story "The House" with detailed description of this house. One group had to read it imagining they were house buyers while the other group imagined themselves as burglars then they had to recall what they remembered from the story. After 12 minutes of distraction and 5 minutes of delay, one of the groups had a change in schema and the other group remained with their initial schema and were asked to recall once again. The findings was that the one which had a change in schema got 7% more points than the group that did not. This clearly shows how reading the same information under a different perspective or schema allowed participants to pay attention to different information relevant to that new schema. This paper will be replicating and modifying Anderson and Pichert's experiment. The experiment will be modified in respect of the story used. The story is about a beach in Hue city. The story was written about this site as it is a tourist attraction, and at the same time has specific geographical data.

2. Aim

The aim of this experiment is to examine the influence of schemas on the processes of encoding and retrieval.

3. Hypotheses

3.1. Experimental hypothesis

There will be a greater number of words recalled on retrieval when the schema is changed.

3.2. Null hypothesis

There will be no greater number of words recalled on retrieval when the schema is changed.

4. Method

4.1. Design

The experiment was carried out as a laboratory experiment with the design being independent samples design. This design was used in order to avoid the order effect as this is an experiment that examines memory. It would be impossible to use the same participants for both conditions as the increased number of time reading the text would allow them to remember more information.

The independent variable (IV) was the two different schemas used in the study (Geography student or tourist). The dependent variable (DV) was the extent to which the participants could recall the story, specifically the number of words in this case.

Regarding ethical considerations, the participants were asked to agree and sign a consent from before they take part in the experiment. The consent form clearly states the rights that the participants have while also informing them of the nature of the study. The participants have the right to keep their information confidential, to withdraw and view their results afterwards on request and to be debriefed.

4.2. Participants

The target population for participants included students from the boarding house of an international school in Singapore. The participants consist of 16 students with age ranging from 16 to 19 years old in order not to require parental consent. Psychology students were also excluded (Researcher finds out by asking whether they took Psychology) as they might have known the aims and nature of the experiment beforehand. The participants were gathered through opportunity sampling by asking people the investigator meets by chance in the boarding house.

4.3. Procedure

To collect data for the current study, several materials were used. The participants were given a consent form (Appendix 1) to participate in the study. The researcher created a story for both schemas for geography and tourist students (Appendix 3). Besides, paper was used for recall. There were standardised instructions and debriefing (Appendix 2) to assist the participants in the recalling process. A task of reciting the alphabet backwards was set up to distract the participants from the story that they had just read.

In the process of data collection, first, the story was written by researcher and printed with 16 pieces under the schema of a tourist and 8 pieces under the schema of a geography student. Then all the participants were gathered into a room to listen to a brief introduction of the study. The participants were asked to agree to take part in the study and sign the consent form. The participants were assigned with either number 1 or 2 in order to group them into two equal groups (Number 1's into one group, number 2's into the other). Next, group 1 was given the story requiring them to read as a geography student, group 2, tourists. After that the distraction task was done for about 3 minutes by reciting the alphabet backwards.

To assist with the recalling process, a blank piece of paper was handed to each participant and they were asked to write down as accurately as they could what they could recall of the story they had just read. They were asked to write down their initials on their own piece of paper to be able to match them afterwards. The first recall papers were collected. Then the story paper of participants in the first group were collected and replaced with ones of the other schema. The other group was given the story paper of the same schema again. They were asked to read the story. After the same distraction task, they were given paper and asked to recall the second time. The researcher then collected the papers and debriefed to the participants. Finally, the papers of stories recalled by participants at both recalls were collected and separated into the number of their groups. The two pieces of paper of each person were matched based on their initials. The number of words were counted and recorded into a raw data table. (Appendix 4)

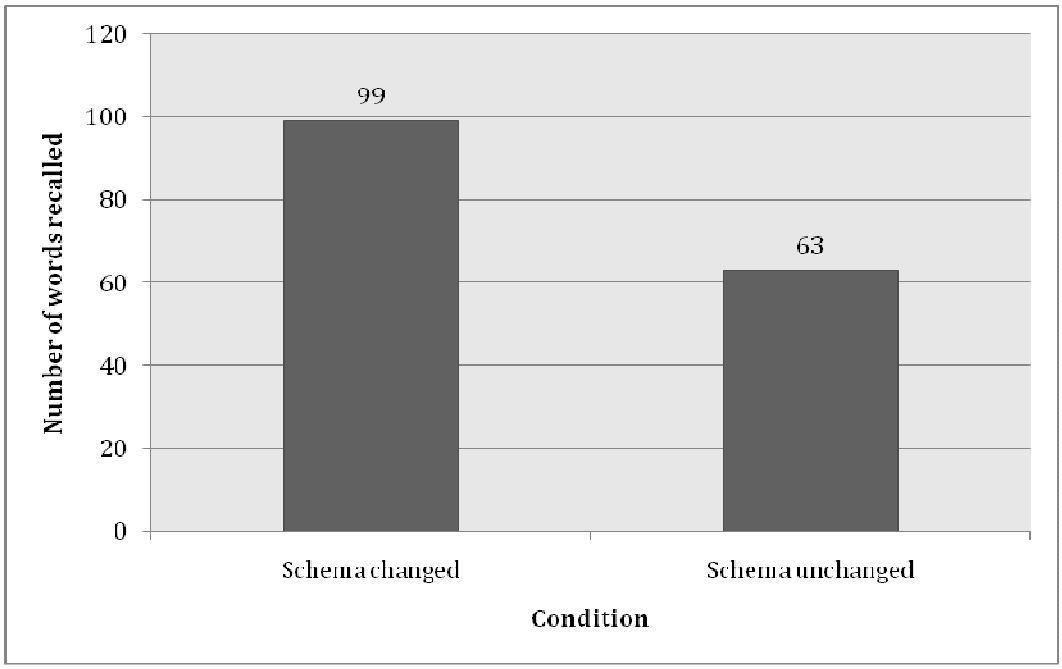
5. Results

5.1. Descriptive statistics

The median and interquartile range is calculated to measure the number of words recalled by participants from the two groups: schema changed and schema unchanged. The statistics are presented in the table and chart below.

Table 1: The Median and Interquartile range
of the number of words of groups 1 and 2 in the second recall

	Schema changed	Schema unchanged
Median	99	63
IQR	53.5	44



The results obtained after calculations (presented in Table 1) showed that for the second recall, the number of words on the recall sheets of participants in the first group (99 words) was greater than that in the second group (63 words). The median was used here, as the data is not continuous. The interquartile range is an indication of how spread out the data is. A smaller interquartile range means that the data is more reliable.

5.2. Inferential statistics

The Mann Whitney U test (http://www.statisticssolutions.com/mann-whitney-u-test/) is used for at least ordinal data in an independent samples design in an experiment testing a difference between two conditions. The Mann Whitney U test was applied in this experiment to test whether the null hypothesis is to be accepted or rejected.

The results suggest that there is a greater number of words were retrieved when the schema was changed. Detailed calculations are included in Appendix 5.

6. Discussion

Upon analysing the descriptive statistics, the number of words recalled by participants in the first group (with changed schemas) was higher than the people in the second group. This supports the schema theory in the way that participants remember information relevant to

one schema, but if introduced to another schema, this means that they would remember aspects of the other schema, which ultimately leads to the memorisation of more information reflected in the increase in the number of words. The interquartile range shows how spread out and reliable the data is. In this experiment, the interquartile range is quite high which means that the data is spread out and there are great differences among the figures. Using the Mann Whitney U test with the level of significance P less than 0.05 gives the result of the test: 21 (greater than the critical value), the null hypothesis is, therefore, accepted.

Table 2: Mann Whitney U test results

Calculated (Observed) value of U	Critical value	Level of Significance	Accept Null Hypothesis?
21	15	P<0.05	Yes

Despite the fact that the null hypothesis is not rejected, the data collected still supports the studies under the influence of schemas conducted before. Bartletts' experiment, "War of the Ghosts", Loftus and Palmers', Bower, Black and Turner's and Darley and Gross' studies all reflected how schemas can affect a person's encoding and retrieval process. The similarity of these studies, including Anderson and Pichert's study, is the fact that the schemas are triggered by the use of words. Bartlett's story demonstrated that people coming from a different culture than the schema of the story. Thus, they saw the same idea or thing mentioned in the story, yet under different expressions. This was also true for Loftus and Palmer's experiment in which the different words to describe how the cars came into concact in an accident caused them to estimate differently the speed of the cars when they crashed.

However, there are many limitations to this study that should be taken into consideration. Though it might be possible to generalise the findings to the student body of this International school in Singapore, it is still uncertain if it can be applied to everybody in the world. Another drawback can be although the participants had been asked beforehand if they took Psychology as part of their course, it does not necessarily mean that they have not done the experiment before. If this were the case, it would mean that they might have known the aim of the experiment and, hence, leading to demand characteristic. The way the results are assessed can also be improved. This is because the greater number of words might not reflect what people remember of the other schema but they could be a longer way of expressing the sentence or remembering more of their initial schema. The experiment is not so ecologically valid for it is unlikely that such situation of making participants read a story twice then recall would happen in a real life situation.

These limitations can be overcome by applying possible modifications to how the experiment is carried out. The sample should be taken from a wider range of population. Possibly extend the sample target to the whole school instead of only the boarding house. To improve the information processing as well as the reliability of the results, lists of words from the story that are relevant to each schema along with

their synonyms should be recorded in order to be compared to the recall by the participants.

7. Conclusion

In summary, based on the data collected, the experiment has, to an extent, shown that a greater number of words can be recalled under the influence of two different schemas. Although the Mann Whitney U test results indicate that the null hypothesis is accepted, which implies changing schemas does not improve the recall of students in a boarding house in a Singapore international school. The results, however, does suggest that the obtaining information under various schemas can improve recall considering the influence of various limitations and variables.

Appendices

Appendix 1

CONSENT FORM

Dear Participant,

I am carrying out a study on memory for my Internal assessment as part of the requirement of my IB Psychology course. I will be testing your memory after reading a story in this experiment. If you are willing to participate, please sign the statement below:

- I have been informed of the nature of the experiment.
- I have the right to withdraw.
- My personal information will be kept confidential and my results will be anonymous.
- I will be debriefed after the experiment.
- I will be able to view my results on request after the study.

I have read and give my consent to be part of this experiment.

Signature: Date:

Name:

Appendix 2

Standardised notes

Standardised Briefing notes

1. Introduce: “Thank you for coming and welcome to my Psychology experiment. I am carrying out this experiment in order to fulfill requirement of my IB Psychology course. I will be handing out consent forms to each person and please be sure to fill it in and sign it before I embark on my experiment. The consent form will inform you of the rights of participants and will state your agreement to take part in the experiment.”
2. Instructions:
   - Before starting the experiment: I will give you each a number (one or two) and I will be giving out to each of you a piece of paper with a story written on it. Please follow the instruction on the piece of paper and read the story. You will be given four minutes

- After participants have read the story: Four minutes is over. Now, you have 3 minutes to recite the alphabet backwards. While you do that, I will come around to collect the passages.
- After the distraction task: Now, I will give each person a piece of paper. Please write down the number that I have given you as well as your initials. After doing so, please write down as much as you can about what you remember from the passage that you have just read. You have 6 minutes, after that, I will collect your writing from you.
- After first recall: I will give you another reading passage, please follow the instruction and read it in four minutes. After that I will collect the passages.
- After second reading: Like the first time, please recite the alphabet backwards in 3 minutes.
- After second distraction task: Now I will give you another blank piece of paper. Make sure you write your number I gave you at the beginning onto the piece of paper along with you initials. You have 6 minutes to write down as much as you can remember from the passage.
- After second recall: Thank you very much. I will come and collect in your pieces of paper. This is the end of the experiment.

3. Debrief

Standardised debriefing notes

a. Thank you very much for taking your time to take part in my experiment. The aim of this experiment was the examine the impact of schemas on our encoding and recall processes. The hypothesis was that being put into different schemas would improve a person's recall.
b. You may withdraw your data if you wish to. All your information and results will remain confidential. Should you wish to know your results, please email me at the address written on the board. Again, thank you very much for participating in my experiment and helping me carry out my course requirement.

Appendix 3

Story was written by the investigator. The websites http://www.vietnamtourism.com/Hue/e_pages/tn_thuanan.htm and http://vietnamdiscovery.com/destination/hue/hightlight/thuan-an-a-beautiful-beach-in-hue/ were used to get the statistics for the story.

As you are reading this, imagine you are a Geography student

Thuan An beach is situated near by Thuan An mouth, where Huong river runs to Tam Giang lagoon and then to the sea.

In the beginning of the 19th century, king Minh Mang named the place as Thuan An. The beach lies 15 km away from Hue, and it takes 15 minutes to get there by car. On the route to Thuan An beach, there is a river flowing on the left with lots of boats. On the right, there are houses, temples, pagodas, rice fields and gardens stretch which all along the way.
The beach itself is 12 km long. Different from other beaches in Hue, the special geographical features and climate conditions have created a stunning Thuan An beach which transforms itself season by season. The next times visiting will always be different from the first ones due to these transformations.

Thuan An is a very lovely place to visit after a long day. It is the place where Hue people gather to enjoy the fresh air, rest on the sand and bathe in the cool waters of the sea. Intensive activities of the beach last from April up until September, when the weather is fairly hot and sunny in Hue.

Not only so, Thuan An beach is also an ideal place for camping as the beach is flat and sandy. Watching the sun set, lying under the stars as the sound of the waves lulls you to sleep and being woken up by the sunrise is a

wonderful experience that anyone could ever have. The sun sets at around 6 P.M here and rises at around 5:30 in the morning.

As you are reading this, imagine you are a Tourist visiting Hue

Thuan An beach is situated near by Thuan An mouth, where Huong river runs to Tam Giang lagoon and then to the sea.

In the beginning of the 19th century, king Minh Mang named the place as Thuan An. The beach lies 15 km away from Hue, and it takes 15 minutes to get there by car. On the route to Thuan An beach, there is a river flowing on the left with lots of boats. On the right, there are houses, temples, pagodas, rice fields and gardens stretch which all along the way.
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Appendix 4
Raw data table

Group 1 (changed)		Group 2 (unchanged)	
Scores	Ranks	Scores	Ranks
134	14	190	16
121	12	56	4
92	10	64	6
176	15	50	3
70	7	30	2
99	11	121	13
22	1	62	5
78	9	73	8

Appendix 5
Processed data

$$U = N1N2 + \frac{N1(N1+1)}{2} - R1 = 8*8 + \frac{8(8+1)}{2} - 79 = 21$$

U’ = N1N2 – U = 8*8 – 21 = 43

References

[1] Anderson, R. C., & Pichert, J. W., Recall of previously unrecallable information following a shift in perspective. Journal of Verbal Learning and Verbal Behavior, 17(1) (1978) 1.

[2] Bower, G. H., Black, J. B., & Turner, T. J., Scripts in memory for text. Cognitive psychology, 11(2) (1979) 177.

[3] Darley, J. M., & Gross, P. H., A hypothesis-confirming bias in labeling effects. Journal of Personality and Social Psychology, 44(1) (1983) 20.

[4] Bartlett, F. C., Remembering: A study in experimental and social psychology, 1932.

[5] Loftus, E. F., Leading questions and the eyewitness report. Cognitive psychology, 7(4) (1975) 560.

[6] "InterQuartile Range (IQR) Calculator." Find Quartile Range. Http://easycalculation.com, n.d. Web. June 2013. <http://easycalculation.com/statistics/inter-quartile-range.php>.

[7] http://www.statisticssolutions.com/mann-whitney-u-test/