

# Internal Assessment Psychology HL

## Imagery vs. Rehearsal

An experiment that examines the effect of visual aids on memory

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15  
3/CS

**Internal assessment: group 3 individual candidate cover sheet**

Submit to: moderator                      Arrival date: 20 Apr / 20 Oct                      Session: May 08

School number:

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- Write legibly using black ink and retain a copy of this form.
- Attach one completed copy of this form to the work of each candidate represented in the sample.

Subject: Psychology                      Level: HL

Candidate name: .....

Candidate session number:

Title(s) and dates of work: (complete if appropriate)

- (1) Imagery vs Rehearsal: An experiment that examines the effect of visual aids on memory
- (2) \_\_\_\_\_
- (3) \_\_\_\_\_
- (4) \_\_\_\_\_

**Teacher declaration**

To the best of my knowledge, the material submitted is the authentic work of the candidate.

Signature of teacher: .....                      Date: 27 March 08

**Candidate declaration:** I confirm that this work is my own work and is the final version. I have acknowledged each use of the words or ideas of another person, whether written, oral or visual.

Candidate's signature: .....

**Types of work undertaken** (to be completed by teacher)  
(for example, written assignment/essay/case study/fieldwork/portfolio/photography/video/computer)

*Geography SL:* note whether the one piece is *fieldwork* or a *research assignment* and to which theme it is linked.

*Business and management SL:* note which of the prescribed list of topics/subtopics (*Business and management guide, February 2000, page 45*) the subject matter of the investigation is linked

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**Other relevant information** (where appropriate)

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**Teacher support** (where a candidate could not have completed the work without substantial support, please indicate)

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## Abstract

In 1967 Bower conducted an experiment and Paivio replicated it in 1973. Their experiment was called Imagery vs. Rehearsal. The experimenters were trying to see which group will recall more words, the experimental or control group. The experimental group got the list that had the picture of the word. The control group got a list of words that just had the words. Their results showed that the experimental group recalled more words than the control group. This shows that when the students have a visual image of the word they have a higher chance of remembering that word rather than having just the word. Since we are manipulating their experiment we also used independent samples design. We used grade 5 students as our participants. Bowers and Paivio's results were that the experimental group who got the pictures recalled more words, and in our manipulation the experimental group successfully recalled more words. The pictures did not have an effect on the participants because there was no significant difference between the number of recalled words between the control and experimental group. So we conclude that the images had no effect on the participants.

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## Introduction

Will the pairing of pictures with words have an affect on memory?

**Aim:** The aim of the experiment was to see if the visual aid of pictures would help the experimental group recall more words than the control group

### Lit Review #1

Paivio conducted most of his work about dual coding and through experiments his research supported that is easier to recall words when they are presented with a picture rather than just the word. He conducted three experiments, one required participants to encode words and pictures verbally, by writing or pronouncing the words pr picture labels; or from imagination, by drawing or imagining the picture or object-suggested by the word. Two further experiments involved a probability learning task which required no encoding reaction to pictures or words, but an analogue of the imaginary and verbal coding was provided in one experiment using picture-picture, picture-word and word-word repetitions. (Anderson, 2005; Paivio, 1991 and 1973). The results show that the use of two distinct “codings” of the same material make it more likely that the information will be recalled, that is using pictures and words and this is due to the structure of the brain.

### Lit Review #2

Allan Paivio conducted an experiment to see if concrete words evoked images more directly than abstract words. He had two sets, one set had to form a verbal association and the other had to form an image. The results were that it took a long time to form both images and verbal associations for abstract than concrete words. It took about 30 seconds longer to form a verbal association and 1.5 seconds longer to form an image. This supports Paivio’s claim that concrete words do evoke images more directly than abstract words. We used this theory and got all concrete words so with the help of the visual cues the participants will be able to recall more words.

### Lit Review #3

Memory is the basis of all knowledge and thought. This is why Paivio did research on dual coding. What is important for dual coding are the beneficial effects of concreteness and imagery on memory. Memory works better with concrete words (e.g., chair) than abstract words (e.g., truth) because concrete words evoke images much better than abstract words. Concrete memory exceeds abstract memory by a 2:1 ratio on average. The concreteness advantage is even more striking in associative memory tasks in which recall of response items is cued by concrete stimulus words or by pictures. Since concrete words are easier to imagine they work perfectly with dual coding but because abstract words are hard to imagine, they are least likely to be dual coded. The expected additive memory benefit of dual coding has been confirmed in numerous experiments (e.g., Paivio, 1975; Paivio & Lambert, 1981).

**Alternate Hypothesis:** The visual cues will have a significant effect on the participant’s number of recalled words.

**Null Hypothesis:** The visual cues not will have a significant effect on the participant’s number of recalled words.

## Method

### Design:

In the experiment conducted, independent sample design was used. There will be two groups with 15 students each. Repeated measure will not be used because we want to see if the pictures will affect the participant's ability to recall more words, it's more important to have the same words rather than the same people because what will be tested is how much the pictures affect recall. The test scores might change by the fact that they have had some practice or they might get bored from it. The experimental group will see the slides with the pictures. The control group will just see the slides that have only words but no pictures. The independent variable will be the pictures that will be shown to the experimental group. The dependent variable is the amount of words that the two groups are able to recall.

The controls will be that the control group and, experimental group will get the same words, they will be in the same class, same day, same period and will be given the same amount of time to recall words.

### Ethics that will be followed during the experiment:

The experimenter will not cause any lasting harm, will not use deception, give the students the right to withdraw at anytime, they will not be pressured to continue and they will be debriefed at the end, informed and parental consent and they will be able to withdraw their results.

### Participants:

In this manipulation of the Bower 1967 and Paivio 1973 experiment, Imagery vs. Rehearsal, the target population will be the 7<sup>th</sup> graders at . . . . It was a sample of convenience because they are in the same school and they had a class so the experiment did not interfere with their work. We will randomly pick 28 students and randomly place them into the control and experimental group. We will place the 28 parental consent forms that we got back, and randomly choose one name at a time. Then we will evenly distribute them so that there will be 14 in the control group and 14 in the experimental group. The grade 7 students will need a consent that we already have sent to their parents so they can accept whether their kid(s) can participate in the experiment. They will mostly be Egyptians, upper-middle class to high class and bilingual.

### Materials:

- 14 Pencils
- 14 Erasers
- 28 blank sheets of paper
- Projector
- Laptop or computer
- Screen for projector
- Paper with instructions
- Stopwatch

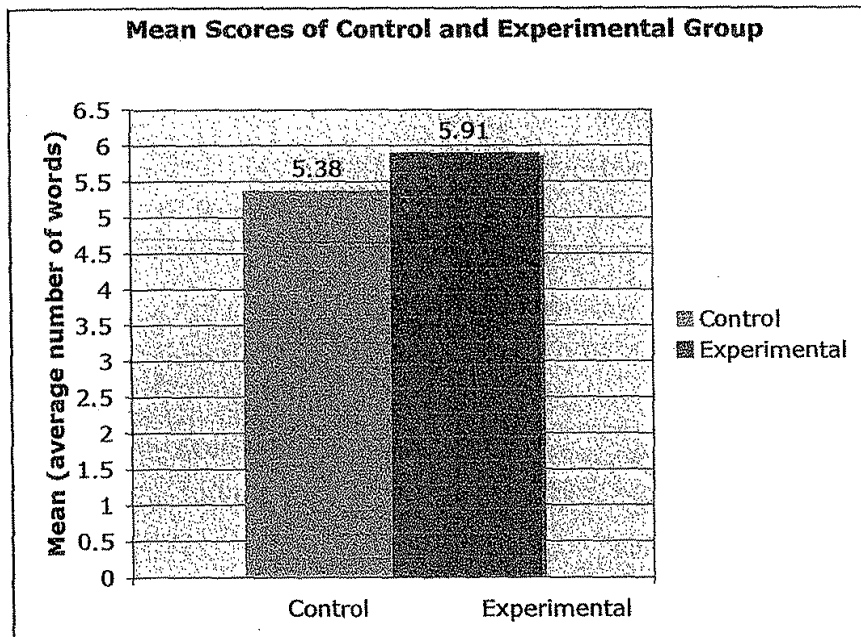
### Procedures:

- Randomly allocate 28 students into the experimental and control group. 14 in the experimental and 14 in the control.
- Get the computer, projector and the control slides ready.
- Leave the experimental group outside the class and put the control group in the class.
- Tell them to sit on any of the desks.
- Tell them to memorize all of the words that will be on the slides.
- Show each slide for 5 seconds with words. (See appendix 1)
- Handout to each student a blank paper and tell them in 50 seconds recall as much words as you can.
- After 50 seconds take back the papers.
- Switch control group with experimental group.
- Get the computer, projector and the experimental slides ready.
- Tell them to memorize all of the words that will be on the slides.
- Show each slide for 5 seconds with picture and words. (See appendix 2)
- Handout to each student a blank paper and tell them in 50 seconds they recall as much words as you can.
- After 50 seconds take back papers.
- Debrief them
- Dismiss the class

## Results

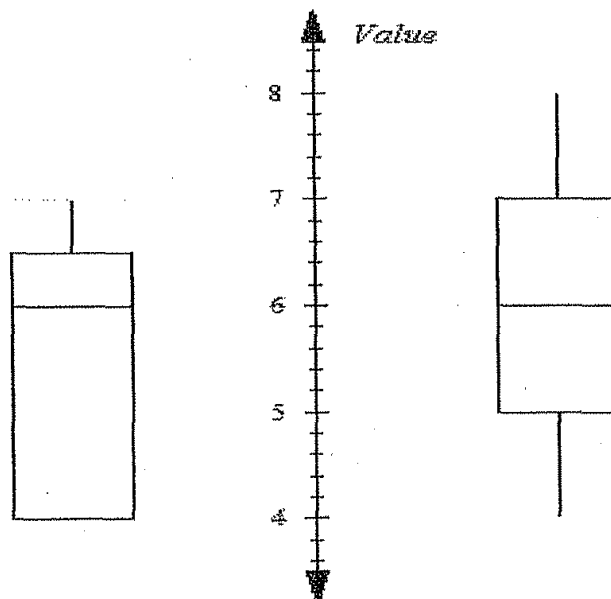
By looking at the graph one can see that both groups recalled approximately 5.53 words, which mean that the pictures had no effect. The difference between the mean of the two groups was not significant, there was only a difference of .53. This does not support our hypothesis because we stated that the pictures would let the participants recall significantly more words, but that did not happen.

	<u>Mean</u>
Control Group	5.38
Experimental Group	5.90





<u>Control</u>		<u>Experiment</u>	
<b>n:</b>	13	<b>n:</b>	11
<b>Mean:</b>	5.385	<b>Mean:</b>	5.909
<b>Mode:</b>	4	<b>Mode:</b>	5
<b>Minimum:</b>	4	<b>Minimum:</b>	4
<b>Q1:</b>	4	<b>Q1:</b>	5
<b>Median:</b>	6	<b>Median:</b>	6
<b>Q3:</b>	6.5	<b>Q3:</b>	7
<b>Maximum:</b>	7	<b>Maximum:</b>	8
<b>Range:</b>	3	<b>Range:</b>	4
<b>IQR:</b>	2.5	<b>IQR:</b>	2
<b>Std Dev. (p):</b>	1.211	<b>Std Dev. (p):</b>	1.164



The Box and Whiskers Plot shows how close both data were because both plots are almost in the same position. The control group's lacks a whisker, which shows the lack of dispersion in its data and the experimental group's is equally distributed.

Unrelated t-test (Appendix 7):

$$t = \frac{0.53}{0.5092} = 1.04$$

One tailed test

Degree of freedom = 21

Value 0.05 = 1.721

No significance

The justification for the result of the unrelated t-test are the normal distribution of the data, the interval level of the data, the number of words recalled, and the closeness of the standard deviation (control group 1.26 and experimental group 1.22). The unrelated t-test shows that our results were insignificant, thus the alternative hypothesis is rejected and the null hypothesis is accepted.

## Discussion

By eyeballing the raw data one can see that the pictures did not really have a significant effect on the participant's recall of words. The mean of the control group was 5.38 while the experimental group was 5.91. There is a very small difference of .53, which shows that the pictures did not have a significant effect. Thus we accept our null hypothesis. The standard deviation shows that both data were much dispersed. The control group's was 1.21 while the experimental group's was 1.16. The mode also supports the fact that the pictures had no effect. Both modes were 6 and this also shows that the data was not spread out. The range for the control group was 3 while for the experimental was 4. This shows that both data were very close to each other. The Box and Whiskers Plot shows how close both data were because both plots are almost in the same position. The control group's lacks a whisker, which shows the lack of dispersion in its data and the experimental group's is equally distributed. This is a one-tailed test, with a degree of freedom of 21 and has a 0.05 level of significance the critical value is 1.721 which is significantly different from the value we obtained from the t-score 1.04. Thus we accept the null hypothesis because in order for the pictures to have a significant result the t-test result had to be greater than 1.721 when it was 1.04. So we conclude that the pictures had no significant effect on the experimental group.

After conducting the experiment and we analyzed the results we came to the conclusion that the pictures had no significant effect so we accept the null hypothesis and reject the alternate hypothesis. This however seems to be contradicting all the results of the experiment that we were manipulating and past experiments. In Paivio's experiments (1973) the pictures did have a significant effect on the participants recall. Even though we had concrete words and pictures the experimental group still did not recall more words which contradicts Paivio's theory that states that concrete words evoke images more directly thus improving memory. Our results also contradict the dual coding theory because the concrete words and the pictures did not have a significant effect, (Paivio, 1975; Paivio & Lambert, 1981).

The strengths of our experiment were that we used independent samples design because it was the most appropriate design we could have used. Repeated measures would not have worked because we would have used the same participants in both groups

and that would have caused order effect. We used independent samples so we would not use the same participants in both groups so we can avoid repeated measures. The words were obtained from the Fifth grade-spelling book to make sure that the words were not too hard or too easy for the fifth graders.

The limitations of the experiment were that several errors occurred while we were conducting the experiment. First of all due to some technical errors the control group got to see some words before they were supposed to see them. Second some participants were caught writing the words on the desk, which helped them, recall the words afterwards.

For future manipulations of this experiment, the experimenters should have some modifications. First of all the conductors should rehearse first a couple of times so they can have an idea of what to expect when they are conducting the real experiment. Second, all pens and pencils should be taken away from the participants and only handed out at the appropriate time so the participants won't write out the words on the desk. We conclude that if in the future this changes are made the pictures will have a significant effect, just like Bower and Paivio's experiment.

## References

Islam, Daria. "Three Ways to Improve Memory." Columbia University Graduate School of Education. 17 Oct. 2007 <<http://www.mathforhumanity.com>>.

Paivio, Allan. "DUAL CODING THEORY AND EDUCATION." University of Western Ontario. 29 Nov. 2007 <<http://www.umich.edu>>.

<http://www.scism.sbu.ac.uk/inmandw/tutorials/memory/qu2.htm>

## Appendices

### Appendix 1

The words that the control group got

Motorcycle

Tent

Kangaroo

Hospital

Juice

Mobile

Refrigerator

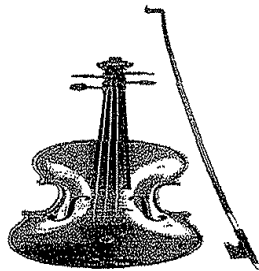
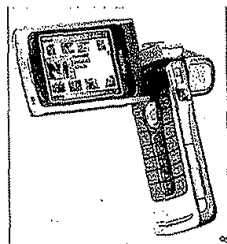
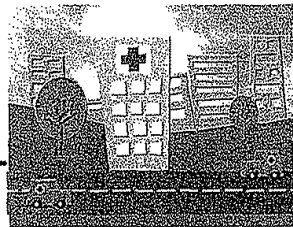
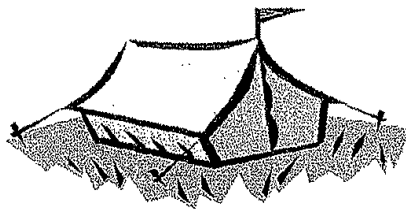
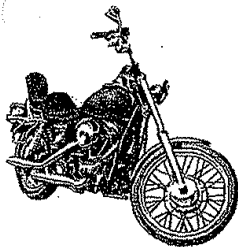
Broccoli

Violin

Computer

Appendix 2  
The words with pictures that the experimental group got

- Motorcycle
- Tent
- Kangaroo
- Hospital
- Juice
- Mobile
- Refrigerator
- Broccoli
- Violin
- Computer



Appendix 3  
Control Group Results

Participant	Number of words recalled
1	6
2	4
3	4
4	7
5	7
6	7
7	4
8	6
9	6
10	5
11	4
12	6
13	4

Appendix 4  
Experimental Group Results

Participant	Number of words recalled
1	8
2	4
3	7
4	7
5	6
6	7
7	6
8	5
9	5
10	5
11	5

Appendix 5  
Statistics

Frequency Table

Control Group	
X	Frequency
4	5
5	1
6	4
7	3
Total	13

Experimental Group	
X	Frequency
4	1
5	4
6	2
7	3
8	1
Total	11

Appendix 6  
Debriefing Letter:

In this experiment we were testing how many words you could remember by presenting you with some slides with words. You were split into two groups; the first group viewed the slides with only words while the other group viewed the slides with words and pictures.

The results were:

That the two groups ended up having very similar average number of words recalled, which resulted in accepting the null hypothesis which is that there is no difference whether there are words or not, which means that the pictures did not play a major role in helping you remember the words better.



Appendix 7  
Unrelated t-test

Control Group	Experimental Group
6	8
4	4
4	7
7	7
7	6
7	7
4	6
6	5
6	5
5	5
4	5
6	
4	
$N_{CG} = 13$	$N_{EG} = 11$
$\bar{X}_{CG} = 5.38$	$\bar{X}_{EG} = 5.91$
Standard Deviation $_{CG} = 1.26$	Standard Deviation $_{EG} = 1.22$
$\sum x_{CG} = 70$	$\sum x_{EG} = 65$
$(\sum x_{CG})^2 = 4900$	$(\sum x_{EG})^2 = 4225$
$\sum x_{CG}^2 = 396$	$\sum x_{EG}^2 = 399$

$$t = \frac{|\bar{X}_{CG} - \bar{X}_{EG}|}{\sqrt{\frac{(\sum x_{CG}^2 - \frac{(\sum x_{CG})^2}{N_{CG}}) + (\sum x_{EG}^2 - \frac{(\sum x_{EG})^2}{N_{EG}})}{(N_{CG} + N_{EG} - 2)}} \left[ \frac{N_{CG} + N_{EG}}{N_{CG}N_{EG}} \right]}$$

$$t = \frac{|5.38 - 5.91|}{\sqrt{\frac{(396 - (\frac{4900}{13})) + (399 - (\frac{4225}{11}))}{13 + 11 - 2}} \left[ \frac{13 + 11}{(13)(11)} \right]}$$

$$t = \frac{0.53}{\sqrt{\frac{19.08 + 14.91}{22}} \left[ \frac{24}{143} \right]}$$

$$t = \frac{0.53}{0.5092} = 1.04$$

One tailed test  
Degree of freedom = 21  
Value 0.05 = 1.721  
No significance

#### Appendix 8 Parental Consent Forms

Dear Parent,

We are the grade 12 IB Psychology Higher Level Class. We would like to take your permission for your son/daughter to take part in our experiment. It will take place on Wednesday, October 31<sup>st</sup>.

The experiment will require them to try to remember as many words as they can and they will be asked to recall more words later. There are ethical considerations which we will follow, thus there will be no lasting harm, students will be debriefed at the end of the experiment, and they will have the right to withdraw their results at anytime during the experiment.

If you accept for your son/daughter to take place in our experiment please fill in the spaces below.

Student's Name: \_\_\_\_\_

Parent's Signature: \_\_\_\_\_

Date: \_\_\_\_\_