Psychology Coursework Introduction

"***An experiment to see the effect of chunking on short-term memory recall***".

Many psychologists studying memory suggest that there are different stages through which information must travel if it is to be remembered. According to Atkinson and Shiffrin (1968) there are three kinds of memory storage and these vary according to their function and the length of time information is retained. Sensory memory is the first storage. This refers to the initial momentary storage of information, which lasts only a short time. It is recorded by the persons sensory system as a raw non-meaningful stimulus. Short-term memory is the next storage. This can last from around 5 to 15 seconds. The difference between this stage and the sensory stage is that here the information is stored in terms of its meaning rather than as mere sensory stimulation. Repetitive rehearsal would retain the information in short-term memory for longer. The third type of storage is long-term memory. Here information is relatively permanent although it may be difficult to retrieve. Continual rehearsal would be needed here if the information were to be stored for a long time. However, it is said that sometimes the brain does not forget certain things such as a language; even without rehearsal people seem to remember languages for long periods of time. For this coursework I am going to be concentrating on short-term memory, i.e. the effects of chunking on short-term memory recall.

Chunking refers to a process by which information committed to memory is restructured. The term was first used by George Miller in a famous 1956 review paper entitled " The magical number seven, plus or minus two: Some limits on our capacity for processing information. " Miller discussed a memory span experiment conducted by S. Smith. Smith, measured the span of immediate memory for strings of binary digits (e.g. 110010110) and found the span to be about the same as for decimal digits. A few subjects who were taught a higher-level structure that could be applied to the binary digit strings were able to dramatically improve their span, and Smith himself, who mastered the higher-level code, was able to remember strings of 40 binary digits. One higher-level code was based on representing the eight possible 3 digit binary strings as the numerals 0-7 so that 3 binary characters could be recoded and stored as one. For example the code for the string 101 is 5, which takes less storage and can be decoded into 101 when recall is required. This process of recoding the input into a higher-level more compact form is what Miller meant by chunking. Chunking is not reserved for unusual situations like memorizing long strings of ones and zeros, but appears to be widely used. For example a word can be considered a higher-level code (chunk) for the letter sequence of which it is contained.

Miller (1956) claimed that the number of items that can be held in the short-term memory is seven; with the allowance of two either side as not everyone had exactly the same amount of memory. However Miller accounted for the fact that we can get more than nine items into our short-term memory even if it does go through into our long-term memory through rehearsal, by saying that nine items can be nine chunks. Chunking also refers to the structuring of collections of elements during learning and retrieval. For example in remembering a phone number you tend to learn groups of digits rather than a single string of numbers.

Another experiment carried out on chunking was conducted by Herbert Simon (1974). He presented himself with a list of words and found he could not recall them correctly after just one presentation. However he found if he arranged the words into chunks of information the task was considerably easier.

De Groot (1966) also did an experiment on chunking. He found that experienced chess players remembered where 90% of the chess pieces correct places were on the board compared to a much lower amount of non-experienced chess players. De Groot believed that the reason for this was that experienced chess players chunked the board into meaningful units and reproduced the chess pieces by using these units, therefore proving that chunking increases short-term memory.

Rationale

In view of the limited capacity and duration of short term memory the phenomenon of chunking appeals to me and after having read various studies of how we can increase short term memory for example Herbert Simon in 1974 when he found that words chunked together to make meaningful chunks of information helped him better remember the data. Another study performed by De Groot in (1966) concluded that chess players could chunk the chess pieces on the board to remember where they were correctly placed after being removed. This shows that chunking can be related to real life situations and that people use chunking throughout the day. This interested me further and I wanted to discover more about chunking and decided to carry out my own experiment into the effects of chunking on the short-term memory.

Aim

The aim of the experiment was to investigate whether chunking of words would affect short-term memory recall based on Millers experiment of chunking. For example I wished to see if I was to give a participant a list of words that are un-chunked and then a list of words that were chunked, if there would be a difference in recall of the words of the participant.

Experimental Hypothesis

I predict that there will be a significant difference in the amount of words recalled from a list of un-chunked words than a list of chunked words, as chunking is proven to significantly help memory and also the fact that the letters will have meaning to the participants will help them remember them even more.

Null Hypothesis

There will be no difference in the recall of chunked words and non-chunked words, and any difference will be due to chance and not due to the fact that the words and chunked or due to some other factor.

Method

Method and Design

An experimental method was used to collect data using a repeated measures design. Using a repeated measures design means that you do not have to use so many participants, however order reffects might take place, which is when performing one task affects the performance of the next task. This is why I will be counter balancing. This is when you split the participants into two groups so that half the participants complete Test A and then do Test B, while the other half do Test B and then Test A. One advantage of counterbalancing is that without it the participants might get tired after the first test and then not do so well on the second. This would mean that the results would not be accurate. Alternatively there could be a 'practice effect', which is when the completion of the first task means that they do the second task better and then again the results would not be accurate. The problems with this experiment is that there could be demand characteristics as the participants will realise what the experiment is about after the first time, as they can compare the different parts of the experiment. For example by completing the first task which included triograms and then seeing the next list of words which were acronyms, the participants might realise that they are expected to do worse in the second experiment and therefore do worse on purpose which would mean that the results were not accurate.

Variables

The Independent Variable (IV) in this experiment is the list of chunked and un-chunked words. The Dependent Variable (DV) is the amount of information recalled in each group. The chunked words are triograms for example BED and the un-chunked words are acronyms for example GAH

Participants

The participants used were students at a 6th form College, so the age range therefore is 16-18. Both genders were used and a varied amount of ethnicities were used. An equal number of males and females were used and the total number of participants was 20. The sample used will be an opportunity sample. The advantages of using an opportunity sample are that it is easy, quick and efficient. However the disadvantages is that it can contain bias. This is because some people might be more approachable to ask to do the experiment, this might be because of their appearance or maybe their personality, however because of this it means that the way in which the sample is obtained contains bias.

Apparatus

The apparatus that was used to complete this experiment consisted of a stop clock to measure the time allowed to complete each stage of the experiment and spare paper for the participants to write their answers on. A stop clock was used because this is more efficient and more accurate way for measuring the time. Paper was provided for the participants because this way their paper was clean and new and there would be nothing on the paper that would distract the participants.

Procedure

I chose a list of triograms and acronyms and made a list of 10 of each.(see appendix 1 and 2) After this I decided on my instructions and typed them up onto a piece of paper. I then stood outside a classroom and asked people who came out if they would

take part in an experiment. When I had obtained all of the participants I took them into an empty classroom and randomly split the participants into two groups of 10. I then placed them at opposite ends of the room and gave them a piece of paper and a pen. I then delivered the following instructions

"This experiment is testing memory; you have the right to withdraw from this research if you feel any discomfort. When you receive your word list do not turn over until you are told to do so. When you are told to turn over the piece of paper you will have 15 seconds to memorise as much as possible. When told to stop memorising, turn the paper over and straight away start recalling as much as you can. You will have 30 seconds to do this and then be told to stop. Stop straight away, turn your papers over and put your pens down."

After these instructions were given I asked all the participants if they understood the instructions clearly so as to avoid confusion. I then started the experiment. After the first test was done and the results were collected in I repeated the procedure explaining that they should repeat what they did with a different word list. The word list firstly given to one group was given to the other and vice versus. The papers were then collected in and the students were debriefed on what they were tested on and what we were looking for. This debrief consisted of
"This experiment was testing short-term memory and the effects of chunking. You were tested on, un-chunked words, and chunked words. Thank you for taking part"

After this they were asked a series of questions to help reduce the number of participant variables.
Did you have any breakfast this morning?
Has anyone had a late night and feel they didn't get enough sleep?
Did anyone drink any caffeine?

Controls
Situational controls
These were controlled so that nothing distracts the participants or affects the results. A "Do Not Enter" sign was placed on the door to make sure that no ones entered the room and interrupts the experiment. The experiment was done in the middle of the day. This makes sure that the participants are alert and capable of doing the test. This also ensured that the amount of light in the room is sufficient to read the data. The door will be shut during the experiment as to keep out as much noise as possible, and the room used was detached from the building so there was less noise from the other students.

Extraneous Controls
The room temperature was controlled so that it is not uncomfortable for the participants, so that it would affect the results.

Participant Variables
Controlling these factors, which could affect the outcomes of the experiment, is not easy, if at all possible. The experiment was taken mid day so as to limit the tiredness of the participants. However controlling the participant's emotional state is not possible, but questions involving the amount of sleep and if any caffeine has been

drunk were asked after the experiment to give us some idea of the state of the participants.

Ethical considerations

These are important to the experiment, as it should be ethical. Firstly informed consent must be given. This is done when the instructions are given out as it explains the experiment fully and the participants are given the option to discontinue with the experiment at any time that he/she feels uncomfortable or upset with what is going on. The participants were also debriefed after the experiment took place so that they understood what had happened and what we were testing. The experiment does not put any of the participants in any danger and should not cause in harm or distress to any of them. The participants were told at the beginning to the experiment what we were testing so that they had some knowledge of the experiment however they will not be told a lot of information because then the experiment will loose its validity.

Results

Tally Chart

Test A

Test B

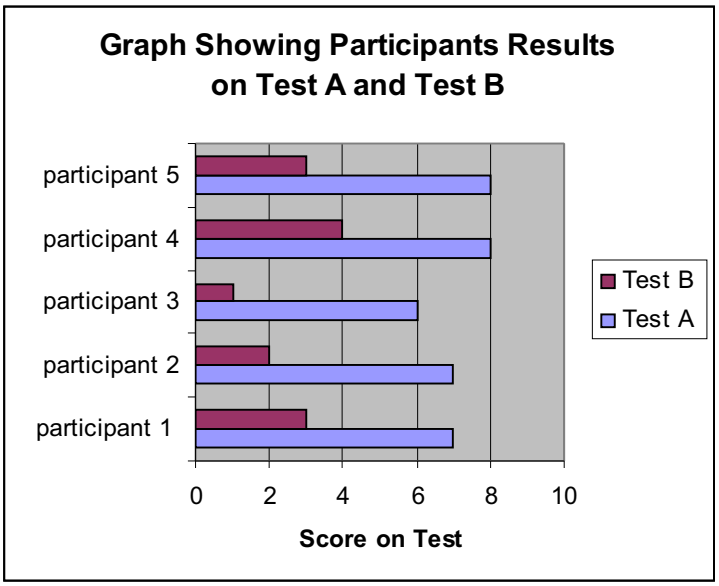
Summary Table

	Average Score	Mode	Median	Range
Test A	7.2	6,7	7	5
Test B	2.5	2	2	5

Summary Table Commentary

The tables show a number of interesting points. Firstly they clearly show that chunking does improve short term memory. This is shown initially by the average score calculated in the table above. This shows that with Test A on average the score on the memory test was 7.2. This test used the chunked words which were triograms, and this shows that when the letters were chunked the memory was improved. However with Test B the average score was 2.5. This is a very low score and shows that when the letters were unchunked into acronyms the memory was drastically altered. The mode is consistent with the average score as it shows that with Test A the most frequent score was 6 and 7 which is a high score and similar to the average. This is similar with Test B as the most frequent score was 2 which is also consistent with the average score.

Additional Graphical Description of Results



Descriptive Statistics Commentary

This graph shows a few randomly selected participants and their achievement on Test A compared with Test B. This graph clearly shows that the results on Test A were noticeably better than on Test B. This is consistent with the summary table above. This graph also shows that in general the scores on Test A range from 6-8 whereas with Test B they range from about 0-4. There was a much larger difference in the scores on Test B than the scores on Test B.

Relationship of Results to Hypothesis

In my experimental hypothesis I predicted that there would be a significant difference in the amount of words recalled from a list of un-chunked words than a list of chunked words. I said that this was due to the fact that chunking is proven to significantly help memory and also because the letters will have meaning to the participants which will help them remember them even more. My results relate to my hypothesis because what I had predicted came true in the actual experiment. Chunking significantly helped the participants remember more in Test A with the chunked words, than Test B with the un-chunked words. The letters in Test A also had meaning for the participants as they were actual words that they would use in everyday life which meant that this would be easier to remember than words or letters chunked together that they had never heard before.

Validity

This experiment does have ecological validity. This is because what was claimed to have been measured, which was whether chunking affects how much a person can remember, is exactly what was measured. The experiment tested whether chunking affects the memory and also if chunked words with meaning are easier to remember than chunked words with no meaning. However the experiment was taken in unnatural settings and surroundings so you could say that it is not valid as these would not be the same results if this were done in real life. Because the experiment was done in unnatural settings you could say that demand characteristics had taken place because the participants thought that they should remember more words with meaning rather than without.

Suggestions For Improved Validity

To make the experiment more valid it could take place in a more naturalistic place like in a real life situation, for example a person trying to remember a telephone number long enough from the phone book to call it one the phone. This was it would be more valid as it is a real life situation, however this would be hard to measure. This could be used as a further study into this topic. The effect of having this same study taken place in a more naturalistic setting might make the results decrease in the amount the participants remembered. This is because in real life the participants will have much more they need to remember for example daily activities and this would act as interference into their memory therefore making it harder to remember the various numbers to type into the phone.

Reliability

This experiment has reliability. This is because the instructions to how the study was carried out and even what was said during the study and the age group and gender of the participants used has been mentioned so it could be repeated with the same results. Also the questions asked to the participants after they had taken part in the experiment gives the reader an understanding of what sort of emotional frame of mind the participants were in at the time of the experiments and if they had had enough sleep etc. The study however may not get the same results because it would not be possible to get the participants with the exact same personal problems and lives as the ones who took part and this would affect the results. The people who would take part may also not have the same IQ or memory, which would also affect the results. Also there is not way that the person could replicate the same place that the experiment was done in so the surroundings would be different.

Improving Reliability

Although I had a lot of control over the variables in this experiment there were still things that I could not control. For example I could not control any noises outside such as birds singing or cars passing by. To improve the experiment I think that an important thing to do would be to change the instructions to make them more understandable. People who have not done psychology would have trouble understanding what they were meant to do and this could cause problems. This could be that the participants would not understand what they had to do and then for example they could start writing before they were meant to which would ruin the results. Having improved and adapted instructions could affect the results because

then the participants would be less worried about how to actually do the experiment and they would be able to concentrate more on what words to remember. Therefore this would mean that the results for the actual memory test might increase slightly.

Implications Of Study

In the background research I discussed how Miller (1956') claimed that the number of items that can be held in the short-term memory is seven; with the allowance of two either side as not everyone had exactly the same amount of memory. This is shown in the results as the results range from six to nine letters or numbers remembered. Miller also said that the amount of information that can be retained in the short-term memory can be increased through chunking and this is shown in my experiment because in Test A some people remembered up to all 10 chunks of information when they were chunked. I also discussed in the background research how Herbert Simon found that if he presented himself with a list of words and found he could not recall them properly after just one presentation unless they were chunked. This is also shown in my experiment because due to chunking the participants found it increasingly easier to remember the chunked words compared to the un-chunked words. De Groot also found that chunking affects the short term memory when related to chess players. I believe this can be related to my experiment because

Generalisation Of Findings

The experiment was done on a very small age group from 16-18 so it would be hard to generalise to younger children and also to adults or elderly people. This is because the results may vary depending on the age range. The participants were from different ethnicities and genders so you can generalise to them. This means that the results cannot be generalised to the larger population.

Application of Study to Everyday Life

You can apply this study to everyday life situations. For example if you looked up a phone number in the telephone book and you didn't have a pen so you had to remember it long enough to type it into the phone, you might chunk the numbers together to make it easier to remember. This would be chunking. Another example in a real life situation would be that sometimes people have trouble remembering how to spell words so they chunk the words together to make it easier to remember. For example, to spell 'altogether' you could chunk it into four words. 'All', 'to', 'get', 'her'. This would be another example of chunking.