

The Effect Chunking of Numbers has on Short-Term Memory Recall.

Introduction

In this experiment, the cognitive approach was investigated, focusing on the study of memory within it. Chunking, a technique used to extend short-term memory capacity was studied.

Miller (1956) suggested that we can hold 7(2 pieces of information in our short-term memory, which lasts for approximately 10-30 seconds. However, the amount of information stored in each unit or “chunk” varies. He proposed that STM would improve if long strings of information can be chunked into sections so that more can be stored. For example, the letters “m, e, m, o, r, y” can be chunked into the word “memory”, reducing the number of chunks from six to one. Information would be also easier to retain when put into units that have more meaning to people, ex. FBI, BBC, CIA, etc.

Bower (1969) studied the difference in recall of the same words in 1, 2 and 3 word phrases. Results showed that organised material was learnt 2-3 times quicker than disorganised. Disorganised material took longer because people need time to identify the relationships between the words, while this would be already presented to them in the organised material. This shows people have natural mechanisms to chunk information into units to increase their learning capacities and that chunking of information into an organised structure aids recall of information.

Chase and Simon (1973) investigated the different chunking processes which novices and experts used in chess playing, building on Miller’s “magical number” 7(2. They found that experts could identify relationships, like colour and proximity, between the pieces, creating chunks of 4-5 chess pieces. However, novices could only see each piece individually. This meant that while novices could only recall around 7 single-pieces, experts could recall up to 7 multi-piece chunks (more that 30 pieces in total). Therefore, chunking can greatly improve recall, and practice and development of skill levels also increase the ability to chunk information.

In a later study, Simon and Gilmarin, (1973) guest-estimated that “grandmasters” could hold 50,000 chunks of chess pieces in their memories. Gobet (1998) developed on this research on chess expertise, investigating the number and size of the chunks that they can hold in their memories. He found that while the sizes of chunks vary accordingly to players’ expertise, the average number of chunks that they could hold was 3 to 4.

Rationale

Past studies have shown results that chunking has improved memory recall. However, previous experiments tend to focus on organised information, which had meaning to people, like FBI, so it was very likely that recall would be from long-term memory storage and not STM. In this study, nonsensical numbers will be used to test recall so that it is certain that information will be recalled from STM and not LTM. Participants of past studies also tend to be adults, so this study was conducted on students to explore a new age group.

Aim

The aim of this study is to investigate the effect chunking of numbers has on short-term memory recall.

Hypothesis

There will be a significant difference between the results of the two conditions. Chunking of numbers will improve memory recall of short-term memory: the number of correct numbers recalled in the second condition will be greater.

Method

Method and design

This experiment was conducted using the experimental method. This was selected because it brings advantages such as the control of extraneous variables, which enables cause and effect to be established. Findings can also be repeated by others, increasing reliability of results. Participants were tested in two conditions, making it a repeated measures design. This is suitable because it eliminates the extraneous variable of differences in everyone's memories.

Variables

The independent variable was the way that the lists of numbers used in the experiment were read. In condition one, numbers were read one by one, with the same lengths of pauses between each one. In condition two, the numbers were put into chunks of three and read out.

The dependent variable was the amount of material recalled in each condition. It was measured by comparing the number of correct numbers that participants could recall.

Participants

The target population was students attending Park Lane College. They were selected through the opportunity sampling method, which is an efficient, convenient and less time-consuming method since participants were chosen by chance. The same group of subjects did not participate in both conditions.

Apparatus

The experiment was carried out in different surroundings. Participants were seated. A list of numbers (see appendix 1) was read out for the test of recall in two conditions. Numbers in condition one were read one by one, with pauses of equal lengths between each letter. Letters in condition two were chunked into groups of three letters and read with pauses of equal lengths between each chunk.

Procedure

1. Participants were selected using the opportunistic method of sampling.
2. A set of standardised instructions was read out to them (see appendix 1).
3. Condition one: A list of numbers (not chunked) was read by the participants who had to try and remember as many of them as possible in the same order.
4. Participants were given two minutes to try and recall as many numbers from the list—in the correct order.
5. Participants were given two minutes to try and recall as many letters from the list—in the correct order.
6. 7. Lastly, participants were debriefed (see appendix 2)

Controls

The same group of people were not tested in both conditions to eliminate the possibility of one condition affecting another. Students and adults, living in the same country were selected.

Extraneous variables such as temperature and outside distractions could not be controlled. The temperature of the area in which the experiment was conducted varied.

A set of instructions read out before the start of the experiment dealt with ethical issues that may be related to this study, such as informed consent, deception and ability to withdraw. They were given the aim of the experiment and were given the option to withdraw at any time during the experiment. They all had to agree to take part in the tests before the experiment started as well and results were kept anonymous, abiding to ethical regulations for participant confidentiality.

Relationship of results to the hypothesis

The hypothesis of this experiment was that chunking of numbers will improve recall in STM.

Results showed that cause and effect could not be established between the IV and DV. Chunking did not improve recall in this experiment significantly, even though the total number of numbers recalled in the second condition was more than that of the first condition, which suggested there was a big difference. The results became more dispersed, causing the difference in the two conditions to appear much bigger.

Conclusion

Validity

Validity refers to the “trueness” of an experiment to what its intended aim was—whether it measured what it was supposed to measure.

One aspect of this is internal validity, which assesses the extent to which manipulation of a variable in the experiment (IV) was able to do its intended job (change the DV). This includes the control of extraneous variables so cause and effect can be established between the IV and the DV. There was internal validity because confounding variables from external factors, ex. distractions and temperature were not controlled this could effect the results.

Experimenter bias was eliminated because participants were not affected by any special behaviour in the experimenter’s part. The participants may have deliberately “forgot” letters read out in an attempt to disrupt the experiment. Certain participants were also familiar with the theory of chunking to aid STM recall as they also study psychology, which may have affected results.

The experiment also had construct validity as the method used to measuring STM recall was able to measure what it claimed to. Results showed differences in recall quantitatively, which can be compared.

Improvements for validity

To improve the validity of this experiment, demand characteristics must be reduced. Teachers may have been asked to conduct the experiment as a task set during lessons. This would also improve EV, as it is more realistic for students to be “learning” information in their lessons rather than under artificial conditions.

Reliability

Reliability measures consistency in results: whether or not it can be repeated by another researcher afterwards.

There was external reliability as many aspects of the experiment were controlled, making it easier to repeat. The same method was used to measure recall in both conditions so comparisons could be made accurately between results. Procedures and instructions used were standardised, so they can be used again and again in other experiments. The apparatus and controls of confounding variables used were very basic and could be duplicated in many other locations. However, the sample used in this experiment may be harder to repeat in different locations as it was from a very small target population. Participants have to be from Park lane college and surrounding area so it cannot be repeated in other countries

It also lacked internal reliability, as memory is a very subjective thing. We cannot go inside someone's head to read their thoughts and look through their memories. Therefore, it cannot be certain that results showed exactly what participants remembered, as they may leave out some information deliberately.

Improving reliability

This could be improved by increasing the sample size. More participants could be used so results are more representative of the target population, ex. using a sample of 50. However, the process of collecting data with such a big sample becomes more difficult, as it would be hard to control them and make them do the experiment in absolute silence.

Appendices

Appendix 1: Standard instruction

Appendix 2: Debriefing

Appendix 2: Debriefing

Thank you for participating in this experiment.

You have just participated in an experiment investigating the effects chunking has on information recall of the short term memory

You may cancel your results if you wish to.

If you have any queries about this experiment or wish to gain further information about this study, you are welcome to ask me.

Good bye.