Short and long term memory

Memory can be defined as a cognitive function that acquires information through encoding by changing it to a usable form, storage for later use and retrieval by bringing stored memories into conscious awareness state (Sternberg, 1999). Sensory memory store lasts for a brief period of time when information is received from sensory systems before it is processed (Atkinson & Shiffrin, 1968). Thus, this information is selected by attention and then transferred to the short term memory (STM) for further processing. Control process aids the flow of information from the STM into the long term memory (LTM) and this has to be encoded in a manner that is reliable. Therefore, when information is needed, it can be retrieved from the LTM into STM and vice versa. Multiple elements throughout the processing of information in both STM and LTM affect how reliable the human memory is. Hence, empirical studies and theories has enabled one to recognize the elements that affect the reliability of human memory in different conditions.

According to Peterson & Peterson (1959), the capacity of STM is limited (18-20 seconds) and also the duration. This contrasts with LTM which have unlimited and permanent storage capacity. Transferred information from sensory inputs together with STM can be encoded falsely as a result of the capacity of items received. Although retrieval of information from STM may be quite fast and accurate. Sternberg (1999), have shown that the retrieval time for information in STM such as letters and numbers ranges from 10 to 30 milliseconds per character. However, the retrieval of information from LTM store is significantly more complicated. This is because so much information stored in the LTM store and the major problem is finding access to some small subset of this information (Atkinson & Shiffrin, 1968). Retrieval

of information from LTM is sometimes unreliable due to the amount of information contained. The high capacity of information can lead to inadequate selection of probe information in LTM (Atkinson & Shiffrin, 1968).

Furthermore, variables that influence LTM but not STM can also be manipulated. One variable that affects LTM is the number of words presented in the list. Words in a long list are recalled less likely than words in short list. The list length effect demonstrates LTS retrieval failure in free recall. The recency region appears to reflect retrieval from both STS and LTS, whereas the serial position prior to the recency region reflects retrieval from LTS only. The findings from this is that LTS is a function of the number of rehearsals and that the recency effect arises from STS retrieval rather than LTS. Moreover, if a sequence of information is presented, the recall of the latter information will be the most accurate according to the recency and primacy effect (Rundus, 1971). The recall which is frequently based on rehearsal is then followed by the initial stimuli and is used to store information in STM (Rundus, 1971). However, the duration of recent words recalled before testing of word retrieval after presentation is limited (Peterson & Peterson, 1959).

STM have a limited capacity to store information and when exceeded, it reduces the reliability of recall (Miller, 1956). Although STM is not completely reliable, it can be useful in various circumstances. If the recent information is recalled more accurately, the retrieval of information is triggered by a stimuli. The psychological state or context one is in during the time an information is encoded can act as a retrieval cue (Hill, 2009). Despite the capability to recall the primary stimuli, the subject should be able to

categorize with the state and context in which the current stimuli was formed. Although, some of the stimuli may not be processed in a reliable way, the efficiency of recall can be increased to some extent which allows for a more accurate contextualisation of the state. Bartlett (1932, pg. 206) reported a number of experiments and concluded that remembering is a schematic process. Therefore, people interpret stimuli by a means of a set of schemas or by making inferences from one's personal accumulation of world knowledge. In addition, the reliability of human memory varies in children. Loftus and Davies (1984) asserts that the pre-existing schema in children is limited and this can lower the understanding of information. However, the use of schema may also lead to memory errors such as associated events that did not actually occur. Memories can be influenced by other factors such as repression (Loftus & Davies, 1984). Repression may also occur and false memories can be created, making memory even less reliable.

Despite the unreliability of human memory, various retention strategies such as repeated studying and study test condition can be used to encode information transferred from the STM into the LTM. Roediger and Karpicke's (2006) provided evidence for these retention strategies and found out that repeated study condition improved recall relative to study-test condition after 5 minutes. However, on the delayed tests, study-test condition produced substantially greater retention than repeated studying, even though repeated studying increased students' con¬ ꟾdence in their ability to remember the material (Roediger, Gallo, & Geraci, 2002). This pattern of results is similar in a way to the finding in the spacing-effect literature that massed presentation improves performance on immediate tests whereas

spaced presentation leads to better performance on delayed tests (Peterson, Wampler, Kirkpatrick, & Saltzman, 1963). That is, in both cases, massed study or repeated study leads to a short-term benefit, but the other (testing or spaced studying) has a greater effect on long-term retention is more reliable than mere repetition. Moreover, neither of this conditions produced perfect recall. Both outcomes may reflect the role of desirable difficulties in promoting long-term retention (Bjork, 1994). According to Bjork (1975), test effect can be as a result of information recalled through different methods such as corrective feedback. This increases LTM reliability and the depth of processing. Therefore, the human memory is efficient, but at the same time fallible. One has to take full advantage of the methods for encoding and recall in order for the information to be encoded deeply.

Furthermore, Craik and Lockhart (1972) theoretical perspective on human memory has shown that testing increases the depth of processing. The level of processing theory asserts that memory depends on the depth of processing an item obtains. Therefore, the recall of memory is more reliable when an item is studied in depth (Craik & Lockhart, 1972). An in depth study will enable items in the memory to be traced more effectively with semantic processing. Semantically processed words includes deep processing which leads to a more accurate recall. Information that is encoded in terms of a comprehensive representation of the word is likely to be recalled later in a reliable way (Roediger & Karpicke, 2006). Likewise shallow processing which is based on phonemics leads to the phenomena associated with STM and has an impoverished encoding scheme. Craik and Tulving (1975) asserted that semantics is the most reliable process of encoding irrespective of the

amount of information presented. If an information has an added meaning, the recall will be more reliable and would be encoded in the long term store. According to Craik and Tulving (1975), incidental learners recall as well as intentional learners, which suggests that it is the nature of processing that determines recall. Thus, depth of processing with semantics facilitate a more reliable subsequent test recall in the absence of rehearsal (Craik & Lockhart, 1990).

The most reliable source of information depends on the LTM store due to its limitless duration and capacity. LTM gives a strong reliable premise to understand new circumstances and react to meaningful gestures. However, the accuracy of recall from both STM and LTM is imperfect. The efficiency of memory recall can be increased to an extent by making inferences from our personal accumulation of world knowledge and with the use of schema which is the basis for encoding information in the LTM. However, the use of schema can lead to false memories. Assumed or associated events that did not actually occur are added to our memories. Loftus (1975) provided evidence to this claim, which states that leading questions can change an individual’s awareness of an event. For example, the question how fast was the car? Compared to how slow was the car? Affects the estimation of the speed of the car. Likewise the use of the words smashed or collided. The words smashed provided the participants with verbal information that activated schemas for a severe accident. Memory can be easily distorted by the type of questions given to witness and information acquired after an event, which merges with the initial memory causing inaccurate recall or reconstructive memory (Wade & Tarvis, 2012). Hence, this study which tested the extent to

which memory is reliable points out that memory can be manipulated and also differs depending on the subject and time which makes it less reliable.

In conclusion, the brain arbours a vacuum under the best of observation conditions. We only detect, encode and store in our brain bits and pieces of the entire experience we are exposed to. When it is important for one to recall the experience, we have a partial memory and the accuracy in which we recall is fallible. The brain fills in information that was not initially there as a result of the reconstructive nature of our memory. This evidence was provided by the research on eyewitness testimony and leading questions. Memories are reconstructive and they are the product of our experiences. In addition, the primacy and recency effect referred to a restricted capacity and duration an item can be stored in STM. This prevents a perfect encoding of information into the LTM. More focus is given to relevant items and the irrelevant information are not encoded. Hence, the inaccuracies of memory could relate to some benefits. Finally, frequent testing aids for future retention and permit relatively high levels of performance. Rehearsing can also help improve one’s memory once deep processing has been completed and encoding of information. The basic pattern of remembering consists of attention and the representation of an event. The reliability of human memory depends on the encoding strategies in both STM and LTM.

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