



COURSE TITLE

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"MEMORY"

FINAL ASSIGNMENT

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MEMORY

INTRODUCTION

Memory refers to the processes that are used to acquire, store, retain, and later retrieve information. There are three major processes involved in memory: encoding, storage, and retrieval.

Human memory involves the ability to both preserve and recover information we have learned or experienced. As we all know, however, this is not a flawless process. Sometimes we forget or misremember things. Sometimes things are not properly encoded in memory in the first place.

In popular culture, memory is often thought of as some kind of physical thing that is stored in the brain; a subjective, personal experience that we can recall at will. This way of thinking about memory has led many to wonder if there is a maximum amount of memories we can have. But, this idea of memory is at odds with advances in the science of memory over the last century: memory isn't really a fixed thing stored in the brain, but is more of a chemical process between neurons, which is not static. What's more, advances in information technology are pushing our understanding of memory into new directions. We now talk about memory on a hard drive, or as a chemical change between neurons. Yet, these different definitions of memory continue to co-exist. A more narrow definition of memory, as the storage of experiences in the brain, is increasingly at odds with an extended definition, which acknowledges these advances. However, while this expanded definition is often implicitly used, it is rarely explicitly acknowledged or stated. Today, the question is no longer, how many memories can we possibly have, but, how is the vast amount of memory we process on a daily basis integrated into cognition?

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In this paper, we outline these advances and the currently accepted definitions of memory, arguing that these necessarily imply that we should today adopt an extended definition. In the following, we first describe some key advances in the science of memory, cognitive theory, and information technology. These suggest to us that we are already using a unified, and extended, definition of memory, but rarely made explicit. Does this new definition of memory mean that *everything* is now a form of memory? We argue that looking at natural and biological processes of incorporation can help us think of how incorporation of internal and external memory occurs in cognition. Finally, we note some of the implications of this extended definition of memory.

DEFINITION

Memory, the encoding, storage, and retrieval in the human mind of past experiences.

The fact that experiences influence subsequent behavior is evidence of an obvious but nevertheless remarkable activity called remembering. Memory is both a result of and an influence on perception, attention, and learning. The basic pattern of remembering consists of attention to an event followed by the representation of that event in the brain. Repeated attention, or practice, results in a cumulative effect on memory and enables activities such as a skillful performance on a musical instrument, the recitation of a poem, and reading and understanding words on a page. Learning could not occur without the function of memory. So-called intelligent behavior demands memory, remembering being prerequisite to reasoning. The ability to solve any problem or even to recognize that a problem exists depends on memory. Routine action, such as the decision to cross a street, is based on remembering numerous earlier experiences. The

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act of remembering an experience and bringing it to consciousness at a later time requires an association, which is formed from the experience, and a “retrieval cue,” which elicits the memory of the experience.

Practice (or review) tends to build and maintain memory for a task or for any learned material.

During a period without practice, what has been learned tends to be forgotten. Although the adaptive value of forgetting may not be obvious, dramatic instances of sudden forgetting (as in amnesia) can be seen to be adaptive. In this sense, the ability to forget can be interpreted as having been naturally selected in animals. Indeed, when one’s memory of an emotionally painful experience leads to severe anxiety, forgetting may produce relief. Nevertheless, an evolutionary interpretation might make it difficult to understand how the commonly gradual process of forgetting was selected for.

STAGES OF MEMORY

1. MEMORY ENCODING

When information comes into our memory system (from sensory input), it needs to be changed into a form that the system can cope with, so that it can be stored.

Think of this as similar to changing your money into a different currency when you travel from one country to another. For example, a word which is seen (in a book) may be stored if it is changed (encoded) into a sound or a meaning (i.e. semantic processing).

There are three main ways in which information can be encoded (changed):

1. Visual (picture)

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2. Acoustic (sound)

3. Semantic (meaning)

For example, how do you remember a telephone number you have looked up in the phone book? If you can see it then you are using visual coding, but if you are repeating it to yourself you are using acoustic coding (by sound).

Evidence suggests that this is the principle coding system in short-term memory (STM) is acoustic coding. When a person is presented with a list of numbers and letters, they will try to hold them in STM by rehearsing them (verbally).

Rehearsal is a verbal process regardless of whether the list of items is presented acoustically (someone reads them out), or visually (on a sheet of paper).

The principle encoding system in long-term memory (LTM) appears to be semantic coding (by meaning). However, information in LTM can also be coded both visually and acoustically.

2. MEMORY STORAGE

This concerns the nature of memory stores, i.e., where the information is stored, how long the memory lasts for (duration), how much can be stored at any time (capacity) and what kind of information is held.

The way we store information affects the way we retrieve it. There has been a significant amount of research regarding the differences between Short Term Memory (STM) and Long Term Memory (LTM).

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Most adults can store between 5 and 9 items in their short-term memory. Miller (1956) put this idea forward and he called it the magic number 7. He thought that short-term memory capacity was 7 (plus or minus 2) items because it only had a certain number of “slots” in which items could be stored.

However, Miller didn’t specify the amount of information that can be held in each slot. Indeed, if we can “chunk” information together we can store a lot more information in our short-term memory. In contrast, the capacity of LTM is thought to be unlimited.

Information can only be stored for a brief duration in STM (0-30 seconds), but LTM can last a lifetime.

3. MEMORY RETRIEVAL

This refers to getting information out storage. If we can’t remember something, it may be because we are unable to retrieve it. When we are asked to retrieve something from memory, the differences between STM and LTM become very clear.

STM is stored and retrieved sequentially. For example, if a group of participants are given a list of words to remember, and then asked to recall the fourth word on the list, participants go through the list in the order they heard it in order to retrieve the information.

LTM is stored and retrieved by association. This is why you can remember what you went upstairs for if you go back to the room where you first thought about it.

Organizing information can help aid retrieval. You can organize information in sequences (such as alphabetically, by size or by time). Imagine a patient being discharged from hospital whose

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treatment involved taking various pills at various times, changing their dressing and doing exercises.

If the doctor gives these instructions in the order which they must be carried out throughout the day (i.e., in the sequence of time), this will help the patient remember them.

TYPES OF MEMORY

While several different models of memory have been proposed, the stage model of memory is often used to explain the basic structure and function of memory. Initially proposed in 1968 by Richard Atkinson and Richard Shiffrin, this theory outlines three separate stages of memory: sensory memory, short-term memory, and long-term memory.

Sensory Memory:

Sensory memory is the earliest stage of memory. During this stage, sensory information from the environment is stored for a very brief period of time, generally for no longer than a half-second for visual information and 3 or 4 seconds for auditory information. We attend to only certain aspects of this sensory memory, allowing some of this information to pass into the next stage: short-term memory.

Short-Term Memory

Short-term memory, also known as active memory, is the information we are currently aware of or thinking about. In Freudian psychology, this memory would be referred to as the [conscious mind](#). Paying attention to sensory memories generates information in short-term memory.

While many of our short-term memories are quickly forgotten, attending to this information allows it to continue to the next stage: long-term memory. Most of the information stored in active memory will be kept for approximately 20 to 30 seconds.

Long-Term Memory

Long-term memory refers to the continuing storage of information. In Freudian psychology, long-term memory would be called the preconscious and [unconscious](#). This information is largely outside of our awareness but can be called into working memory to be used when needed. Some of this information is fairly easy to recall, while other memories are much more difficult to access.

THE END

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