

**Memory**  
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**Lecture - 1**  
**Introduction to Memory & Models of Memory**

Hello, I welcome you all to the introductory lecture series of Memory. And in today's first lecture, we are going to talk about the philosophical perspective and the experimental perspective on memory. Why this topic is so important and relevant in current day to day scenario. Talking about this, for this course, these two books I have referred to and I recommend you all to look into these two books. Along with these, there will be couple of papers which I will be sharing with you as the lecture proceeds.

Memory. In general, memory plays a very crucial role in everyone's life. Our day-to-day activities, retrieval of information, learn experiences, what to do, how to plan our task, what we have planned, few years ago, few months ago, few days ago, and what we have to plan, all these actions require memory. And not necessarily these actions require memory, but each and every moment of our life requires memory. Imagine you are getting up in the morning and then you realize that today is a weekend.

You don't have to go to office. Then you go back to your bed again. But the retrieval of information, collection of information that today is weekend, you have to rely on memory. You got up on time in the morning, 7 o'clock because you assumed that today is at office. And how do you know that?

Because every morning you are getting up at the same time. And this you have stored it in your memory. That this is your daily routine. So as an individual, memory at each and every step plays an important part. When you go back to sleep, then you may not require memory.

But the second you are up from your bed, you rely on memory. Eating same breakfast last several days. Or eating some new things every day in your breakfast, in your lunch, in your dinner. What did you have few days ago? What did you have in the early morning?

And what are you going to have tonight is a part of memory. What you liked most, what you don't like, what you are tolerant towards and what you are not tolerant towards requires memory. Wearing the same shirt as a week ago or wearing the same shirt every day. Acquiring this information, retrieval of such information, you need to rely on your memory. That is why memory system, memory topic becomes crucial for everyone.

Will you go for running after the work or will you not go for running after the work? What are your plans after running? What are your plans before the running? What have you done while running? What haven't you done while running?

Which song you were playing while running on the track? Which song you were not playing while running on your track? The song which you like most, encourages you most, motivates you most. Relying on the memory. Meeting the deadline for your office assignment.

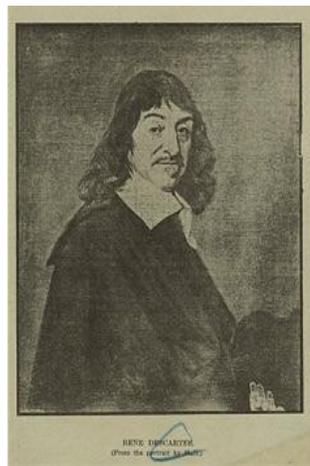
A deadline has passed and still you haven't submitted your assignments. Memory performance. How much you can retrieve, how much you can encode, how much you can store everyday memory is involved at each and every action of your life. Our understanding about memory dates back millions of years ago but the cave painting indicates the introspective human behavior. The cave paintings, 40,000 years old, indicate the introspective perspective of the hunters, our ancestors, how one is hunting, how one has hunted, what kind of animal we have hunted, what kind of eco-environment, ecology was existing at that time.

Not only this, our ancient understanding on human memory dates back to 1500 BCE, when Ebus Papyrus, an Egyptian physician, was talking about the deficits of memory due to injury. Our great philosopher, great philosopher of humankind, Plato, 428 to 347 BCE, when he compared the human memory to a wax tablet. The way people are acquiring information, the way people are storing information, and the way people are retrieving information, the encoding, storage, retrieval can be changed because it is being written on a wax tablet. It can be modified. Now this introspection, this metaphor from Plato indicates their understanding about the human memory.

Another metaphor which Plato referred to, human memory retrieval is like a bird in a cage. When we try to grab a bird inside a cage, exactly the same way we are trying to retrieve information from our memory. Sometimes when we catch the bird, we catch the information. We retrieve it better. We retrieve it accurately.

But some chances we may miss to catch the bird. And that is when the retrieval is not happening. When we are trying to retrieve some information, we are failing. So this philosophical perspective which Plato, the introspection which they are having about the memory, give us an understanding that the curiosity of human memory is so important and relevant for the people investigating human memory. Of course, in addition to this, modern philosophers, John Locke, George Berkeley, gave a foundational understanding about the human memory.

But till 150 years ago, no such empirical evidence was available in the human history talking about the human memory, how it is happening, how the information is being learned, how much we can store, we can preserve, we can save, and how much we are forgetting. What is the rate of forgetting? And that is when Hermann Ebbinghaus, a German scientist, came into existence. And his phenomenal work and documentation, *Memory, A Contribution to Experimental Psychology*, gives a lot of insight about the first empirical work on memory research. Talking about the philosophers, Rene Descartes and John Locke, both had a different perspective altogether.



Source: <https://digitalcollections.nypl.org/items/510d47e3-288f-a3d9-e040-e00a18064a99>

What memory is and what we should be looking into it. Their understanding even is talking about the two aspects of the memory. There is a mind and there is a body. Descartes believed, a French philosopher, believed in the innateness. The idea of innateness is there.

Whatever we are there, we have learned. We have learned and nothing is there which we have learning, which we are learning or which we are experiencing. Everything we are here with the as we are born with. So everything is innate in us. We are just exploring it.

We are just revealing it. And this innate idea is talking about the perfection, how perfectly we are doing the task. He even referred it as the abstract concepts like time, hope and infinity is being sensed through our senses and because of our innateness, because we know these things prior hand, It provides an aid and help to an individual to understand the environment and execute the task. He even believed and suggested the distinction between the mind and a body, that there are two different entities when people have been talking about that mind body could be one, he gave an insight that no, there is a dualism.

He gave the idea and concept of dualism. Body is different from the mind. And both had different functionalities. Rene Descartes John Locke had different perspective altogether.

He believed that to some extent he believed that things could be innate in nature. However, Descartes emphasis entirely on dualism, Descartes emphasis entirely on innateness cannot be true and valid. We are learning. We are learning species. As a result, when we are born, we are born as a blank slate.

Different people are experiencing differently. The same stimuli can be experienced differently by different individuals. And as per their experiences, they write on a blank slate. Their experiences are different because they are perceiving differently. So they write differently on a blank slate.

Tabula Rasa. We are not born with information. There is nothing like innateness. So he has different opinion altogether from Descartes. And he proposed that the British philosopher, what he is talking about, innateness, is not innateness.

Human knowledge comes from human experience. We are experiencing and we are documenting. We are experiencing, we are consolidating. We are experiencing and we are preserving. And at birth, devoid of this idea, he proposed the "tabula rasa" or the blank slate.

Now Locke's perspective on memory are copies of earlier sensation. What he was talking about as earlier sensation or experience is basically his perspective was on memory. Whatever you are experiencing it, you are documenting it. Then some more philosophers or researchers came into light And their understanding about memory contributed evenly in this direction, in the foundation of memory.

Immanuel Kant, after John Locke, this German philosopher agreed to both the views which Descartes and Locke were proposing, innateness and tabula rasa, blank slate. And that is what, he also even got inspired more from Descartes' proposal of dualism, mind-body. And then he gave a concept, an idea about interactionism. That mind and body are interacting with each other. So the experience sensation from the body is getting integrated with our experiences, perception.

And this is influencing each other. Body is influencing mind, mind is influencing body. And there is a clear interaction between the two. And this interaction is being represented in a form of a schema. And Kant proposed for the first time a schema for the abstract knowledge of the world.

Whatever people are experiencing. So when Kant agreed to both Descartes and Locke's perspective, he proposed interactionism is happening and with every experience, with every interaction, there is a schema emerging out. And then as an individual, we are having an abstract knowledge about the world. So for each and everything, we are having different schemas, different information, different schema, different stimuli, different schemas. William James, an American psychologist, he believed in adaptation.

He was talking about the other philosophers and agreeing to that, but he said we are more adaptive human beings. We are adaptive species. We adapt. There is a stimulus, there is a response and then we adapt. And in this adaptation, we learn, we acquire, we encode, we store, we retrieve.



He refined memory as knowledge of an event. The event has happened and the knowledge about that specific event or the fact which is out of conscious awareness currently. And this is adding the experience. More and more we adapt, more and more we acquire the experience.

And different experiences is getting added into our system. When Descartes, Locke, Kant, James have proposed this, getting inspired from all their perspective, Hermann Ebbinghaus, the first memory researcher, did a wonderful study on himself using the memory drum. Almost 150 years ago, approximately 150 years ago, 1883, he proposed that how we are storing, how we are forgetting. Today, in the modern world, when we are doing research with 20 participants to 200 participants to 2,000 participants, he did this study with only one participant, that is, on himself. Though it is a subject to controversy, but still his finding, his first documented experiment on memory gave us lot of insight about how the memory is being formed and how we are forgetting.



Source: <https://cdn.britannica.com/98/161598-050-BE0EF112/Hermann-Ebbinghaus.jpg>

So he conducted this first experiment being a German psychologist and native German. He used a nonsense syllable which doesn't have any meaning in it. three-letter syllable in German word for sure, but what you are seeing on your screen is being an English three-letter nonsense syllable. Similarly, he used the German syllables. What he did, he

took a drum, a roller, a drum could be a glass bottle which is cylindrical in shape and he pasted around the cylindrical cylinder, three letter syllables.

Like T-O-B, H-I-F, G-I-T, T-O-B, H-I-F, G-I-D, A-D-S. All these are nonsense syllables. Doesn't have any meaning in it. And then a memory drum was there like this. And he just did the, pasted the letters here. Like you can see T-O-B.

He used this nonsense syllable. Retention interval was varied. Time between the encoded to the retrieval. So we know that the, they have to encode it. What he has to encode?

He has to encode this letter T-O-B. Then it goes into his storage and then after storage he has to retrieve it. So the time between this encoding to retrieval, this 't', this is the retention interval. And what we observed, while people are encoding it, if you increase the time of retrieval, the forgetting happens. And there is a forgetting curve which he proposed.

He proposed that if the rehearsal is there, if the learning is there, then it can prevent the rapid forgetting also. He did this test on himself. He wrote TOB, learned. Then he rotated HIF, GID, ADS till 10 syllables. 10 nonsense syllables.

And then after remembering all these 10 syllables, he tried to recall. Once his accuracy reached to 100%, then he tested his memory. What he reported that if people do the overlearning, overrehearsal, then they can prevent forgetting. What we understand and what we learned in this first introductory lecture of memory is that memory is like a wax tablet or a bird in a cage which Plato was referring to that whatever you have encoded, whatever you have stored can be rewritten. When you are retrieving the information sometimes you get the information sometimes you miss the information it's just like catching a bird in a cage

Sometimes you catch, sometimes you cannot catch. The time when you are not catching is unable, you are retrieving the information from your memory. Using such metaphor provided an insight and gave an introspection about the understanding and curiosity of the researchers at that time. The memory research dates back to Egyptian period when

Papyrus reported what happens after the injury to the brain. What are the memory deficits?

The real Descartes, on one hand, when he is proposing, that listen, whatever you are documenting, whatever information you are recollecting, retrieving, is based on your innate information. Everything you have learned, everything is innate. Nothing is learned. But Rene Descartes further proposed the idea of dualism, that mind and body are there and these are two different entities. John Locke, a philosopher, had disagreed the opinion of Rene Descartes and he said that the information cannot be made.

We are learning. Based on this learning, our experiences are being built up. Based on this learning, different experiences, we are doing the consolidation. And he gave the idea of tabula rasa, which means we are born with a blank slate. We are born with blank slate.

And on this blank slate, we are writing. We are writing. And this writing, this experience is getting consolidated. When Immanuel Kant agreed to both the ideas of Rene Descartes and John Locke, he even proposed it that there is an interactionism. The interaction is happening between the two information.

Experience is important. Same time, we are born with some information. There is some innateness. And he said, we are having a representation of abstract knowledge about the world. This representation, he called it as schema.

So we are having lot and lot of schema about different information. Further down the line, William James proposed that we human beings are adaptive. Because we are adaptive so we are experiencing and whatever we are experiencing we are consolidating so human memory is adaptive in nature not till this period we haven't done any we didn't had any empirical evidence to support the idea of memory research. We didn't have any empirical evidence to support how the learning is happening, how the forgetting is happening, how the encoding, storage and retrieval is important. What are the stages of memory processes?

When for the first time, Harman Ebbinghaus with his memory drum demonstrated that how we are storing information, what is the saving cost and with what rate we are losing

the information. His finding on forgetting curve gave lot of insight to individuals to understand that how we are losing the information and how we are storing the information. His understanding about the retention interval, the time from the time the information is encoded and to the time the information is being retrieved. This gives us lot of insight about the information that how people are forgetting.

So this time, retention interval. Such understanding give us an insight about the memory and memory research and give us an introspection why memory is so important to us. In coming lecture series, we are going to talk in detail different types of memory, the nature of memory, the variables which can alter memory, the boundary conditions of memory, false memory, and what are the ways to strengthen memory, and what are the parameters which weaken the memory. With this, I end this introductory lecture. See you in next class with further discussion on memory.

Thank you.