

Eternal Sunshine of the Spotless Mind: Selective Memory Erasure

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Selective memory erasure is the process in which specific memories are selected and completely deleted from one's mind. The scientific theory that one could potentially manipulate what a person does and does not remember is what inspired the "far fetched" 2004 film, *Eternal Sunshine of the Spotless mind*. The movie focuses on a couple who have broken up and undergo a medical procedure to erase the memories of each other. Though a procedure such as this sounds like science fiction, studies have shown that erasing certain memories from the human brain could be possible in the future, or at least a variation of the idea (Johnston, 2017).

Before one can understand the process of erasing specific memories, an understanding of how memory works is needed. Memory refers to the mental system that inputs, stores and retrieves information that has been learned or experienced (Kasschau, 2008). Until recently, memory was thought to be organized in the brain like a library. If one was to recall a specific piece of information, one would simply find the book that contained it, read it, and then put it back (Zambrano, 2016). However, more recently, researchers have discovered that this is not the case. Different components of a single memory are stored in different sections of the brain (Zambrano, 2016). Factors including visual, audible and motor input are all stored separately. The hippocampus (a complex structure in the brain) has the role of pulling these factors together to produce a memory. Emotional memory is another factor to consider in selectively erasing something. Just as the other components, emotions associated with a specific memory are stored individually in a structure called the amygdala. Long-term memories that involve conscious recollection (known as declarative memories) are the result of activity within these two brain

structures (Kasschau, 2008). This is important to note when looking into the possibility of selective memory erasure.

When one *recalls* a memory (i.e. bringing all its factors residing in the brain together), they are actively reconstructing previously learned information (Kasschau, 2008). The growth of new connections on a cellular level is what allows a memory to exist and not be forgotten (Zambrano, 2016). It is not yet apparent how these connections are established when new information is being learned, however two aspects are quite clear: the formation of new connections involves a very complex chemical process (Kasschau, 2008), and everytime one calls up past memories the same chemical process occurs. This suggests that everytime one recollects a past experience it is vulnerable to alteration (Johnston, 2017).

In theory, to alter or erase specific memories, one would first need to trigger that memory (as we know this makes it subject to change), then something would have to be done in order to disrupt that memory from properly forming (Zambrano, 2016). Presently, doctors are able to “dampen” specific memories using certain drugs. The most commonly used drug that is being experimented with is propranolol; a blood pressure medication that blocks the brain’s anxiety signals during a fearful event (Zambrano, 2016). The drug interferes with the re-stabilization of an original memory focusing on the amygdala. As stated earlier, most emotions connected to a memory are stored here; the process in which doctors are testing relieves the patient of the emotion associated with a memory (Johnston, 2017). In the case of propranolol that would be anxiety. However, the manipulation of emotions within a memory is not erasure, it simply

modifies the feelings toward a past experience. Erasing the cognitive content within a memory is theorized to be a lot trickier, with many professionals saying it would be impossible (Johnston, 2017).

The film *Eternal Sunshine of the Spotless Mind* deals with a hypothetical, but scientifically backed procedure that achieves this. The movie revolves around the characters Joel and Clementine who have gone through a messy breakup. This event leads Clementine to undergo a medical procedure to have her memories of Joel erased. When Joel discovers this, he decides to undergo the same procedure to forget Clementine. This procedure is done at a firm called Lacuna Inc. When starting the procedure, patients of Lacuna are asked to bring in items associated with the person (or thing) they are erasing, (for Joel, this includes items such as photos, journal entries, clothes etc.). Patients are then presented these items while hooked up to a machine resembling an MRI. Lacuna technicians then tag the memories that are triggered within the brain. In the film this is called “mapping”. The next day, Joel is given a pill that systematically re-triggers the memories that have been recorded (or mapped). As they are re-triggered, the Lacuna technicians erase them using an unspecified machine. The majority of the film takes place inside Joel’s memories. The perspective is shot as if Joel’s consciousness is aware of the erasing and is reliving the memories of his relationship with Clementine. Though, while getting his memory erased, Joel decides he wants to stop, the procedure finishes successfully and Joel wakes up the next morning having completely forgotten Clementine. Despite this, it is apparent to Joel that things are “off”. By complete chance, Clementine and Joel meet again and are emotionally drawn together despite having both erased each other. The film

ends with the two characters discovering this. However, regardless of their still-forgotten past together, they decide to give their relationship a second chance.

The unique component within this film is the fact that, despite using no distinctive scientific terminology, the memory topic being dealt with is broadly compatible with theories doctors are presently producing in regards to memory erasure. As implied above, this *is* a non-existent procedure, but the application of the theory that one could selectively erase memories is almost entirely accurate (though it should be noted that because the topic was applied so broadly in the film specific details such as how one would successfully “tag” memories and “delete” them is not apparent). *Eternal Sunshine* demonstrates a thorough understanding of how the brain forms and stores memory; this is in particular regard to the process of recall and how once a memory is recalled, it is vulnerable to change. As said above, during the procedure in *Eternal Sunshine* they had recall and mapping components; these techniques are what scientists today are experimenting with.

Another accurate component was the result of the procedure. In the end of the film, Joel and Clementine were still emotionally drawn together, leading the audience to believe that completely erasing a person you care about from your brain (or at least have a form of emotional attachment towards, negative or positive) would be next to impossible. Studies have shown that patients that are incapable of forming long-term memories due to hippocampal damage are still able to form subconscious emotional memories if the amygdala is still intact (Johnson, 2017). Because of the way memories are distributed throughout the brain it is next to impossible to

erase every component of a memory, especially when dealing with complex memories, such as those of a romantic relationship, as they aren't localized. This being said, the only far-fetched plot points within *Eternal Sunshine of the Spotless Mind* are the obstacles that apply to the real studies being conducted.

It is theorized that one day one may be able to erase specific memories in a human brain by blocking the chemical processes that occur when re-constructing memories. However, as demonstrated in *Eternal Sunshine*, for one to have no trace of remembrance, emotional or conscious, of a person or thing is almost impossible (Johnston, 2017). Regardless, many doctors have made progress in “dampening” a patient's emotional connection towards an experience; one cannot disregard the potential benefits of such studies. This research is in the process of improving conditions such as severe anxiety disorder, substance abuse/addiction, and PTSD by working with the attached emotions. Researchers believe that though a procedure such as the one in *Eternal Sunshine* could be developed, technology will never be precise enough to target all the places memory is stored.

Citations

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