Cambridge Quarterly of Healthcare Ethics (2022), 31: 4, 575–578

CAMBRIDGE UNIVERSITY PRESS

CQ REVIEW

The Neuroethics of Memory: From Total Recall to Oblivion, by Walter Glannon. Cambridge: Cambridge University Press, 2019

In the now famous film *Eternal Sunshine of the Spotless Mind* (2004),[1] the sci-fi technique of memory erasure takes on a familiar, routine dimension. We see no shimmering futuristic buildings but a small office with squeaky machinery that does not always achieve the expected result. The implicit message (beyond the artistic choices of director Michel Gondry) is that this kind of technology will eventually become available and commonly accepted. In this perspective, the modulation of memories is part of everyday life and can be freely accessible.

This is not yet the case, and many of the innovations that can be glimpsed on the horizon are confined to laboratories for the time being. Nevertheless, ethical reflection needs to examine in greater depth the relevant issues raised by clinical medicine and neuroscientific research: these include the effects of the increasing spread of degenerative diseases or the possibility of acting on memory to modify its capacity and content in a targeted manner.

Walter Glannon does just that in his *The Neuroethics of Memory: From Total Recall to Oblivion*, the first monograph on the ethical issues concerning memory, perhaps the most important cognitive capacity we have. The concepts mentioned in the title are not new. Since ancient mythology, humans have aspired to remember some things better and be able to forget others. Today, these goals are approaching, and Glannon's informed and detailed arguments highlight the risks involved in such a delicate matter as memory intervention.

The book is divided into six chapters, in addition to the Introduction and the Epilogue. In the first chapter, the author provides a wide and excellent treatment of the concept of memory (including a historical approach), explaining how it works at a psychological and a cerebral level. The reader is thus offered all the information needed to address the various aspects of ethical relevance with sufficient factual knowledge. In particular, Glannon emphasizes the reconstructive character of memory: Our memories are not immutable digital photographs that can always be recalled at will. Rather, they are elements that change over time, mingle with others, and are modified by frequent recollection. This is not only a psychological process, but also an effect due to so-called reconsolidation.

Recently, in fact, it has been shown that when memories are recalled to consciousness, they trigger a phase of lability of the cerebral mnestic trace, which is followed by a molecular process known as *reconsolidation*.[2] In this phase, the memory undergoes spontaneous "adjustments" of varying magnitude, functional to adapt to the context and new experiences, but it can also be artificially manipulated.

These aspects are extremely relevant from an ethical standpoint. So is a Darwinian view: Indeed, the evolutionary approach to medicine and psychiatry shows that certain features of memory that evolved to suit a past environment may in fact be maladaptive today.[3] The disconnect between certain automatisms or sensitivities and the demands of current circumstances means that a positive adaptive bias does not apply to memory. That is, not everything with which natural evolution has endowed us is currently good for us. This can be seen, for example, in our instinctual responses (which are forms of memory) to food, and in the mechanisms of fear and anxiety, which developed in response to situations very different from those we experience today, and those mechanism now can be hyper-activated by stimuli and memories related to a context that is brand new for our brain.

In the second chapter, titled "Agency, Identity, and Dementia," Glannon illustrates how the ability to form and translate intentions into actions is largely dependent on different memory systems; therefore, when the latter are affected by dementia, agency itself can be at risk. Regarding identity, in the author's view, as memories change and adapt to new existential conditions, psychological continuity is maintained by "only a critical core set of representations of the past."

Nevertheless, Glannon concludes that memory is what makes us persons. In fact, "failing to recall an advance directive to withhold hydration and nutrition does not weaken its legal force. People with advanced dementia eventually lose all memory functions and all aspects of their agency and identity. […] They cease to exist as psychological beings before ceasing to exist as biological beings. Alzheimer's disease and other dementias are examples of the essential role of memory in our lives and how losing memory can undermine the meaning and value of the last stage of life" (p. 83). Not everyone will agree with this claim, but certainly the outcomes of neurodegenerative diseases raise issues of extreme relevance.

In the third chapter, Glannon discusses a topic that has not been dealt with much until now, perhaps because it is often considered marginal: anesthesia awareness and postoperative recall. If a patient wakes up during surgery and is at risk of having a trauma, are healthcare professionals allowed to administer a drug that erases or attenuates that memory? Should these cases be included in the informed consent for surgery under general anesthesia? These are the questions that are often overlooked but deserve much attention.

In the fourth chapter, titled "Disorders of Memory Contents and Interventions," the author considers all the techniques that are currently being used or tested to treat memories related to traumatic or stressful events. Some, such as psychological extinction procedures and drugs like propranolol, still have a rather low rate of effectiveness. More invasive interventions, such as protein synthesis inhibitors infused into the basolateral amygdala or deep brain stimulation, could totally erase a memory, but we are still in a hypothetical stage of the research, where many aspects are still to be explored.

Glannon concludes his ethical analysis by stating that "erasing an unpleasant memory would be an irrational act if it meant acting against one's best interests. But provided that the means through which it was erased was safe, the act was voluntary, and any change in one's behavior did not harm other people, it would be permissible. Modifying memory would not be justified if it eroded the capacity to have and respond to moral emotions and resulted in a weakening or loss of moral sensibility in recognizing and responding to the rights, needs and interests of others" (p. 139).

The author takes a balanced position on this key issue that causes much discord between bio-liberals and bioconservatives. The former tend to leave more autonomy to the individual about interventions on memory,[4] whereas the latter, in various degrees,[5,6,7] emphasize risks of various kinds that the erasure of memories might entail. However, there are two aspects that complicate the moral framework outlined by Glannon.

First, it is worth considering the argument against the feasibility of erasing single memories, brought, among others, by Daniel Dennett. Memories are almost all closely interconnected by content (and perhaps by storage), as shown by their resurfacing in clusters, by similarity or spatial–temporal contiguity. However, it should be noted that single neurons called *concept cells* have been identified in the medial temporal lobe: these are capable of responding selectively and abstractly to specific people and objects (e.g., the actress Jennifer Aniston or the Empire State Building), as if such neurons entirely encoded the memory of a given element.[8]

Second, concept cells notwithstanding, it remains that a hypothetical memory-erasing intervention could have important secondary effects due to the concatenation of memories in our psychic life. Indeed, one would probably wish to erase mainly important memories of a traumatic or painful nature, and these memories are likely to have a strong connection with other memories—a connection that is more extensive and stronger the more time has passed since the event to which the memory is linked. Moreover, it is not possible to predict with certainty what the consequences of removing memories will be on identity and overt behavior of individuals undergoing the procedure. Furthermore, the erasure of a memory would appear to be irreversible (although thanks to optogenetics one might have the possibility to inactivate the recall of the memory trace in a non-definitive way).[9]

In this sense, the caution urged by bioconservatives might be justified. But if one takes into account the autonomy of individuals and the possible progress of the techniques in question, Glannon's position is perhaps the most reasonable one, providing a good starting point to push forward or backward the moral limit to these kinds of interventions.

In the fifth chapter, dedicated to disorders of memory capacity and related interventions, the author examines both disorders of memory deficit, which include various forms of amnesia, and memory excess, and considers psychotropic drugs and neurostimulation for memory improvement. Glannon's view is that "to be adaptive, enhancement should result in optimal levels of memory formation, storage and retrieval and a balance between learning and forgetting" and "memory enhancement may involve trade-offs between learning new information and applying existing information, given that the brain can process only a certain amount of information at any given time" (p. 11). The author also discusses the classic therapy versus enhancement issues concerning different types of interventions on memory. Interestingly, he rejects the extended mind theory regarding memory, arguing that "there is no object or system external to the brain that could replace it in generating and sustaining memory" (p. 156). Several pages are devoted to potential hippocampal neural prosthetics that could replace damaged areas of the brain, highlighting opportunities and risks involved with connecting artificial elements to the brain.

From an ethical standpoint, Glannon's conclusion is that interventions to treat amnesia have no substantial differences compared to those for posttraumatic stress disorder and, therefore, acting on memory content or memory capacity can be morally equated, because the individual's discomfort is of similar magnitude. Enhancement of normal memory, on the other hand, is more problematic to justify, according to Glannon, because normal memory is not disabling, the benefits of modifying it are predictably moderate, and the risks are very high.

The last chapter, titled "Legal Issues Involving Memory," is mainly focused on criminal responsibility. Different cases of amnesia may have different judicial outcomes. For example, to establish criminal responsibility, it is not so important that the wrongdoer remembers the actions committed: what matters is their ability to adequately use working memory and prospective memory, insofar as these skills influence reasoning and decisionmaking at the time of the crime. In fact, if the offender does not have good working memory and prospective memory, their ability to understand the consequences and disvalue of their actions will be greatly diminished. In that case, therefore, there would be mitigating factors for the offender.

Glannon appropriately points out that, in some cases, the moral and legal judgment is very clear, whereas the defendant's condition is harder to establish. For instance, "assessing responsibility for omissions in criminal negligence can be difficult because of difficulty in distinguishing between a memory lapse caused by a neurological or mental disorder beyond the agent's control and a lapse caused by a failure to attend to the circumstances of the action" (p. 12).

Another very fascinating issue concerns the duty of a crime victim to preserve the memory of the felony so that society is able to learn what happened and punish the perpetrator. In this case, the moral conflict is between the victim's right to be relieved of a painful memory and society's right to prevent further crimes by the perpetrator. A relevant example is that of victims of Nazi crimes, who testified against their abusers at the time and still continue to perform a valuable service to society by telling young people about the atrocities they suffered, with the aim of educating new generations. Do they have the right to erase their painful memories by depriving the world of their firsthand testimony, which is more effective than many books and films? Can a moral duty to remain active witnesses exist?

In the Epilogue, Glannon explores possible future directions in research on memory. Specifically, he focuses on developments in digital technology with large-scale artificial memory systems. These systems may modify our conception of memory and our needs in relation to biological memory. Thanks to the possibility of storing and easily retrieving huge amounts of information, including personal data, the aspiration to have a prodigious memory will decline, because this capacity is being replaced by a simple smartphone. But the desire to intervene on unpleasant or painful memories will probably always be there. Therefore, it is likely that research and demand for methods to erase memories—whether for therapeutic or "cosmetic" purposes—will accelerate soon.

In short, for its clear style and its rigorous and sound analytical arguments, *The Neuroethics of Memory* is a candidate to become an indispensable companion for any research on the ethics of memory and its manipulation.

Notes

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doi:10.1017/S0963180122000378