

Andrea Lavazza *

Memory Modulation: Ethical Issues and Identity-Broadening

Abstract

The human desire to erase negative memories is as old as civilization itself, mirroring our long-standing aspiration to enhance our memory. While the latter goal has been partially achieved without significant ethical concerns, the former has remained elusive. Recent scientific advancements, however, have opened the possibility of manipulating memories to mitigate their emotional impact and potentially remove certain mnemonic traces. This raises several ethical quandaries that form the focus of this paper. The inquiry extends beyond the moral implications of memory erasure to examine the concept of personal identity, which is deeply rooted in memory and may become less rigid and persistent in light of these emerging memory manipulation techniques.

Keywords

Autonomy; Authenticity; Liberal View; Conservative View; Propranolol.

1. The attempted erasure of memories and its ramifications

Memory is one of the most important cognitive functions of living beings, in humans specifically. By virtue of its neural underpinnings, this mechanism facilitates the encoding and retrieval of diverse information encountered by the individual. Memory presents itself as a natural capacity that can be moulded within certain limits. In general, it seems that memory has developed with features useful to the environment and social life that have marked much of our evolutionary history. Dangers are strongly inscribed in our brains (to help us escape them), as are faces (a key element for interactions in the group). Unimportant aspects are soon forgotten, lightening the cognitive load, and making room for new, more important memories (Foster 2008).

* Centro Universitario Internazionale Arezzo – Università degli Studi di Milano.

Human beings seem to have always been torn between the need and the will to forget and the need and the will to keep in mind. Both remembering and forgetting are physiological processes that are necessary to our life and subject to constant reworking and adjustments, due to the cerebral mechanisms underlying memory and the selective pressures that induce adaptation to our natural and social environment (Eichenbaum 2011).

Within the context of this simplified empirical-conceptual framework (further elaborated upon below for pertinent aspects), the possibility of addressing the desire to eliminate memories that, for certain reasons, would be best left undisturbed in the unconscious mind, becomes plausible. While these memories are predominantly distressing experiences from an individual's life history, they can also encompass other categories, such as those hindering interpersonal reconciliation or causing significant social mortification.

The *Odyssey* presents an early exploration of the human desire for forgetfulness, and the dangers of succumbing to it. This is depicted through the Lotus-Eaters, the inhabitants of an island who consume a mystical plant inducing a state of blissful amnesia. But in the real world it was immediately clear that if it was viable to improve memory with practice, it was impossible to forget voluntarily. Also in Shakespeare's *Macbeth*, the eponymous character asks the doctor to find a medicine that can erase from the mind of his wife, who is beset by remorse, the memory that haunts her. But the doctor replies that this is impossible, and that Macbeth must turn to God for such a thing.

Indeed, contemporary psychology has made this impossibility clearer. Consider the "don't think of the white bear effect" (Wegner et al. 1987). This effect refers to the psychological process whereby deliberate attempts to suppress certain thoughts make them more likely to surface. This phenomenon is exemplified by the well-documented ironic process theory, which posits that deliberate thought suppression can paradoxically lead to increased preoccupation with the unwanted thought. The classic illustration involves participants instructed to avoid thinking of a white bear, which often results in a heightened focus on the very image they are attempting to suppress. The phenomenon was identified by social psychologist Daniel Wegner. The inspiration for this research came from another literary work, demonstrating that the theme of memory has always been at the centre of humanity's intellectual reflection. Namely, Fyodor Dostoevsky wrote in his *Winter Notes on Summer Impressions* (1863), "try to pose for yourself this task: not to think of a polar bear, and you will see that the cursed thing will come to mind every minute".

These days, neuroscientific research on the removal of unpleasant and traumatic memories is still at a very early stage but is making rapid prog-

ress and has stirred a significant philosophical and neuroethical debate. The main purpose of memory-modulation techniques is to give relief to those who have experienced or witnessed negative events (accidents, assaults, natural disasters, terrorist attacks) which caused serious psychological consequences and, in severe cases, even led to post-traumatic stress disorder (PTSD). In this sense, *unpleasant* memories should be distinguished from *traumatic* memories. Unpleasant memories are those we'd rather not have, as they can jeopardize our serenity, but typically do not lead to any known pathologies. Traumatic memories, on the contrary, are memories that often lead to PTSD and other psychiatric disorders, memories whose negative emotional charge prevents one from leading a fully "normal" life (Glannon 2019; Lavazza 2022).

It is important to stress that the two directions in which we can attempt to modulate our mnemonic capacity involve different functions and have different implications. Enhancing memory can be done through exercise (basically, the repetition of strings of information). Since antiquity, so-called mnemonics have been developed that, starting with the legendary Simonides of Ceos, passing through Quintilian and Cicero, up to the intellectuals of Italian Humanism, perfected the method of *loci* (Yates 2013). This involves placing the elements to be remembered in an ideal physical sequence, for example by putting them in different rooms of an imaginary palace of memory, and then finding them again by following the path drawn previously. The point is that the mnemonic functions that can be increased in this way are the semantic and episodic ones, i.e. those related to knowledge of facts or events. And current attempts to use memory-enhancing drugs also focus on this research strand.

In contrast, the act of forgetting specifically targets autobiographical and experiential memories. These memories are intrinsically linked to an individual's direct encounters and are further strengthened by the emotional salience associated with life's pivotal moments. This highlights the epistemological and ethical asymmetry of the two ways to modulate memory. The augmentation of mnemonic capabilities demonstrably expands an individual's access to information, potentially constituting a valuable resource for achieving success in physical or social environments. When implemented universally with safety measures in place, this technology may not present significant ethical concerns (there is of course a large literature on cognitive enhancement, which I cannot, however, consider here; Lavazza and Colzato 2018). On the other hand, intervening to remove memories involves personal identity, the authenticity of the individual, the duties we have towards others and other consequences that may be considered controversial to say the least. Moreover, as it will be seen below, even forms of autobiographical memory *enhancement* have the same implications as the erasing of memories.

To lay the groundwork for a more nuanced philosophical discussion, a brief methodological note is warranted. The following discussion necessarily combines a concept such as personal identity/personality (which is a psychological construct), a typically philosophical and strongly normative concept such as authenticity, different mnemonic sub-functions (neuropsychological *fluid* entities, because they are constructed using different approaches, corresponding to the different types of memory: episodic, declarative, procedural...), and the memory brain systems involved in modulation, which in turn are not (yet) precisely related to the functions identified at the psychological level (Zawadzki 2024).

The proposed approach adopts an empirically informed framework, drawing upon neuropsychological data, to investigate memory modulation within a specific subsystem – the autobiographical memory system. This investigation aims to determine the extent to which such modulation might impact personal identity and, consequently, whether the induced changes (transient or permanent) in personality could contribute to an altered level of authenticity. By establishing this link, the ethical implications of various memory intervention techniques can be systematically analysed and subsequently evaluated within the context of diverse meta-ethical frameworks.

It is not possible here to carry out this analysis in full, which also depends on the still experimental techniques and their unconfirmed effectiveness. While this work lays the foundation for discussion, I acknowledge the need for further exploration to delineate a more robust philosophical framework with far-reaching implications. This pursuit remains a valuable avenue for future research.

2. Strategies for Memory Intervention: potential suppression of memories

The aforementioned “white bear effect” exemplifies the inherent difficulty of intentional forgetting. However, empirical observations raise another critical concern regarding memory erasure research, prompting caution (and scepticism for some). This concern stems from the interconnected nature of memories. Memories are seemingly inextricably linked at both the functional level (emerging through thematic, temporal, and spatial associations) and the neural level (despite our limited understanding of the underlying neurophysiology). Consequently, intervening on a single memory might inadvertently modify closely associated memories, potentially causing unintended consequences.

A tentative definition, however, helps to frame subtractive interventions on memory. Diminishing memory-modulation is a psychological (modification of the associative processes related to memories) or neuro-

biological (pharmacological and / or optogenetic) intervention to relieve or change the subjective negative valence of autobiographical memories or completely remove the memory trace of an autobiographical event (Lavazza 2019).

The most promising avenue of research in recent years has appeared to be propranolol. It is a beta-blocker molecule that has the effect of mitigating the emotional burden of memories, if taken a few hours after the negative event. The semantic memory of the fact is not affected, while the physiological arousal associated with emotions is greatly reduced. The effectiveness of propranolol has not been fully determined yet. Recent experimental trials in French emergency departments have explored the administration of propranolol to road accident victims as a potential preventative measure for developing PTSD (Pigeon et al. 2022).

Several experiments conducted with propranolol at first seemed to indicate that the molecule has some efficacy when taken a few hours after the traumatic event whose memory one wants to mitigate. Studies conducted in the emergency room on people involved in car accidents have confirmed that the efficacy of propranolol is affected by the time factor (Brunet et al. 2018). In addition, the treatment of people who had already developed a post-traumatic stress disorder (PTSD) has produced no significant results, with few exceptions (Muravieva and Alberini 2010).

However, the administration of propranolol has given some results in the suppression of fear responses (Kindt et al. 2009), beyond the traditional mechanisms of extinction according to the Pavlovian protocols. Subjects have been able to overcome the fear of spiders by alleviating the emotional reaction caused by the sight of the animal, while remaining cognitively aware of the dangers of a spider bite. Researchers have acted on re-consolidation in order to impact on memories encoded by time.

Reconsolidation is a mechanism by which every time one recalls a memory, a complex molecular process takes place in our nervous system that makes the memory malleable at the biological level (Nader and Hardt 2009). This explains why the memory of episodes that are often recounted ends up changing over time. Exploiting the fact that a memory becomes malleable whenever it is recalled, it seems possible to intervene on traumatic memories even some time after the fact that has caused them (Elsej and Kindt 2016).

Some reviews of the results obtained in recent trials with propranolol do not seem to confirm a specific efficacy of the drug on negative memories. Above all, there appears to be very high individual variability in responsiveness to the molecule. This means we are not that close to widespread uptake of these interventions. However, research continues in trying to find other ways to treat disorders related to traumatic or negative memories (Raut et al. 2022).

Recently, researchers have shown that repetitive transcranial magnetic stimulation can disrupt fear-memory reconsolidation and prevent the return of fear, targeting the dorsolateral prefrontal cortex 10 minutes after a reminder cue that reactivated a fear memory acquired one day before (Borgomaneri et al. 2020). These findings highlight the causal role of dlPFC in fear-memory reconsolidation and suggest that rTMS can be used in humans to prevent the return of fear (Farina and Lavazza 2022).

It is also possible to interfere directly with reconsolidation. In this case, after the reactivation of the memory, one can intervene chemically to weaken or erase it. In animal models this has been done with anisomycin, an inhibitor of protein synthesis at the basis of the molecular process of memory reestablishment (Wang et al. 2005). Its action seems to be quite effective but, in addition to the toxicity of anisomycin for humans, too great still seem to be the risks of an action that is not targeted to a single memory trace and goes to affect in an uncontrolled way a series of memories.

Very promising results have been instead obtained with a new technology that makes it possible to finely modulate the activity of individual neurons. While safety concerns preclude its current application in humans, this technique has demonstrated unprecedented intervention capabilities within animal models. Researchers succeeded in “reversing” in mice the emotional valence of positive and unpleasant memories. They make the place where the animals had received an electric shock no longer able to trigger fear and avoidance. Such reactions arose instead in the place where the animals had had the pleasant experience of meeting a mouse of the opposite sex. This can be done through optogenetics, a very recent technique that exploits the property of certain light-sensitive proteins identified in algae. Mice are injected *in situ* with a harmless virus, and it is introduced to mark with that protein neurons encoding memories in a circumscribed time window, thanks to an antibiotic that blocks their expression and is only suspended for a certain period when a light of a specific wavelength triggers or blocks the activity of some neuron (Redondo et al. 2014).

3. The epistemic and ethical debate

The emergence of memory modulation techniques in humans has ignited a philosophical and neuroethical debate. As I pointed out, the core issues at stake appear to revolve around personal identity, authenticity, individual autonomy, and well-being, alongside our responsibilities towards both us and others (Lavazza and Inglese 2013).

Personal identity consists of what characterizes the individual personally and socially. It ideally includes the individual's personality traits, beliefs, and dispositions (desires and goals); their autobiography understood as a coherent narrative of facts and events that have involved them in a constant process of self-awareness and self-monitoring; the public facts and events about them as projected by others onto the individual.

Authenticity can be taken to be the consistency (and the second order identification of one's own desires, "à la Frankfurt") of the choices made by the individual – apparent choices or ones with potentially observable effects – with their identity (at any given time), or at least some of the relevant identity components for the choice at hand (Iftode et al. 2023).

The concept of authenticity is generally considered valuable, and its worth stems from several key factors. The act of making significant choices that contradict one's core identity may necessitate a process of self-redefinition, potentially leading to a sense of betrayal of the former self, whereas respect for authenticity is a form of honesty and loyalty to the "true self". The narrative suggests a profound discontinuity in the sense of self, potentially reflecting a significant shift in personality or a dissociative experience. As for the social or objective aspects, the consequence is a level of unreality: inauthenticity implies disregard for facts (wanting to be someone one is not). Finally, coherence is often considered a value itself, or an adaptive function, related to the adherence to the facts and social reliability that it guarantees.

In general, there seem to be two main contending paradigms in the memory-modulation debate: a *liberal* one and a *conservative* one (The terminology employed here is intended to be descriptive rather than judgmental, reflecting established usage within the field. For instance, *conservative* could be replaced with *prudential* to emphasize a cautious or risk-averse approach).

The liberal view roughly refers to the principle of individual autonomy in a perspective linked to Mill's harm principle. Mill articulated this principle in *On Liberty* (1859), where he argued that "the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others".

Within philosophical discourse, autonomy is typically understood as the capacity for self-determination or self-governance. An autonomous individual can live one's life according to reasons and motives that are taken as one's own and not as the product of manipulative or distorting external forces. Those who are autonomous can decide for themselves without interference from others or personal limitations; they can act according to a project of their own, designed without constrictions.

Autonomy also concerns the freedom to decide what to believe in and the ability to weight the pros and cons of a given course of action (Christman, 2020).

In the realm of personal freedom, the concept of cognitive liberty and mental integrity, recently proposed as human rights within the neurotechnology debate, underscores the fundamental right of individuals to govern their own minds, the most intimate and protected aspect of their being, without external interference (Ienca and Andorno 2017). However, even within a deontological framework, where autonomy holds primary value, the field of memory modulation presents exceptional cases, as will be discussed below, where recourse to a consequentialist metaethics may be necessary to balance competing demands.

On the contrary, in the conservative view, the considerations in defence of the authenticity of the subject, challenged by the voluntary deletion of some memories (be they unpleasant or traumatic), rely on the idea of a core of the person (The President's Council on Bioethics, 2003). This core of the person consists of those distinctive features that maintain continuity, and which one needs to remain faithful to (within the limits of imperfection and self-deceit that are common to all human beings). Since a significant memory modification is likely to change personal identity, the conservative side, given its concern for preserving authenticity, cannot approve of such a modification.

But does a persistent Self exist? Or is it always changing? Although we adopt a narrative model of self (a model which considers the self as the result of complex story we and the others tell), it seems like we cannot do without a continuity of our memory (Schechtman, 2011). The manipulation of memory and its voluntary reconstruction can create a separation between a cerebral reality and the actions and experiences in the outside world. This could lead, in the most extreme scenario, to a form of solipsism following artfully reconstructed memories. As exemplified in the movie *Strange Days* by Kathryn Bigelow and James Cameron, where people become "dependent" on other people's memories relived as if they were their own. And some fears that the selective removal of negative experiences would make us desist from the effort to construct ourselves and our world according to the model of virtue and a self-perfecting attitude.

To illustrate the complexities involved, the memory-modulation literature offers several intriguing thought experiments. Consider the story – imagined by Erler (2011) – of young Elizabeth, who was always harassed in high school, but later was able to build a satisfying life. Her only concern is not being able to spend time with her former classmates, now that they invite her to their parties, because they never apologized for what they did.

A friend of Elizabeth's with a similar experience, Sonya, is instead capable of letting the past go: she sees her new friends and doesn't suffer from the memory of being once bullied. Liz envies her and does not want to suffer for those past events, so she chooses to take propranolol. Her memories of schooldays lose sharpness and intensity, and Liz forgives her friends without them ever apologizing. Now she goes to their parties, her beautiful childhood memories are no longer dominated by negative ones, and her wellbeing has undoubtedly increased.

Was this an authentic choice? In erler's analysis, the "true self" is also related to the main characters of one's narrative identity, which shape our life and the way we interact with others: personality traits translating into specific reactions to certain events, with those traits justifying such reactions; personal preferences and aversions (sexual orientation, self-image, moral or religious commitments). Being yourself therefore means showing yourself as you are (for example, it means not pretending to be heterosexual if you are homosexual) and refusing to change some of your peculiarities in situations where you may be tempted to do so – even though changing might not be wrong as such.

Lavazza (2015) imagines that in a masculinist society, subjugated women individually resort to pharmacological modulation of memories to endure their situation. In this way, the potential for resistance and struggle against societal abuse is diminished by an unintended compounding effect, due to which women will not be able to emancipate themselves because the drug makes them even more submissive (these techniques effectively "erase" the negative emotions associated with the memory, thereby eliminating distress and resentment as an effective push for rebellion).

Zawadzki and Adamczyk (2021) see in optogenetic interventions for the removal of painful memories the loss of opportunities for those involved to positively reframe their existential events, a path that very often leads to renewed well-being because of new experience and awareness. They argue that suffering can serve as a valuable learning experience and contribute to personal growth, provided it remains within tolerable limits. (It is worth noting that optogenetic interventions may be reversible, opening up new avenues for ethical considerations).

Other examples do not deal with identity and authenticity but introduce the theme of the duties we have towards others and ourselves. The potential application of memory modulation techniques raises dilemmatic questions regarding their use in historical contexts. Could individuals who have endured extreme trauma, such as Holocaust survivors, have benefited from interventions like propranolol, hypothetically available at the time? The horrific experiences of concentration camps demonstrably devastated the lives of many survivors,

with some committing to suicide. This tragic outcome underscores the potential therapeutic value of mitigating or erasing such deeply disturbing memories.

However, the preservation of these traumatic memories with their a rotational component also presents a crucial ethical consideration. Holocaust remembrance serves as a vital tool for preventing similar atrocities in the future. Survivors who dedicate themselves to this task become active agents in a noble pursuit. This act of remembrance, while not erasing the trauma, could offer a form of partial compensation for their suffering by contributing to a greater social good.

It could be argued that, in general, a single witness of the Holocaust who chose to forget their experience for personal wellbeing would be justified and would not be harming society. But if everyone chose to do so, the so-called composition effect would cause the lack of witnesses. Perhaps a pragmatic solution, which does not conflict with any of the principles under discussion, would be to allow the treatment to those who show the greatest signs of suffering. Or, since the list of survivors is known, one might ask an adequate number of survivors to “volunteer” to keep their memories to preserve the direct remembrance of extermination camps.

A more realistic but similar scenario involves people who have been victims of assault and who want to forget their negative experience as soon as possible. However, the loss of emotional activation (as in the case of propranolol) could result in their not testifying in court against the offender, who could then go free. Here, too, the individual’s personal autonomy and the demands of social protection that require the victim to testify against the offender collide.

Glannon (2011) depicts the case of a highly emotional and anxious young scholar who experiences a minor setback during a conference critical to their career progression. The thought of that event continues to distress him and threatens to jeopardize his public activity. Thus, he decides to take a drug that makes the emotional charge of memories fade so to make the disturbing event disappear from his mind. Such decision seems to be morally plausible. And yet, what led the young man to his first failure could be a structural weakness that, by taking the drug, he will not even begin to address, thus exposing himself to many other potential failures.

Even though he will still be able to use the tranquilizing psychoactive drugs, his colleagues will not forget the signs of his inadequacy to the role. After being at peace and confident for a while the scholar might end up ruined. His “cerebral” world will eventually be challenged by external reality: that is, the fact that he is no longer valued as a scholar. The individual’s constructed reality will inevitably confront the ob-

jective world. At this juncture, no pharmacological intervention will be sufficient to maintain the illusion – absent a hypothetical scenario where the individual embraces a radical form of solipsism that rejects objective reality.

4. Personal identity and normative concepts

Except for severe conditions like schizophrenia and dissociative identity disorder, most individuals exhibit a degree of stable personal identity, largely underpinned by the continuity of memories as classically described by Locke. However, contemporary psychological research has cast doubt on the notion of a singular, unchanging, and definitively characterized self. Identity changes over time, as do memories, which are subject to processes of reconsolidation of their material basis, as well as being influenced by the social context and interpersonal relationships, giving rise to extended memory phenomena, where memory is an intersubjective construction that the individual then makes their own (Clowes 2017).

This nuanced, dynamic understanding of identity compels us to re-evaluate the application of normative concepts like autonomy and authenticity within the context of memory-modulation interventions (Noonan 2019). These concepts may not necessarily be mutually exclusive; instead, they might function as alternative guiding principles depending on the specific circumstances. Furthermore, the evolving landscape of scientific and technological advancements introduces additional complexities that demand careful consideration.

Very recently, a group called Domestic Data Streamers started using generative AI to turn some people's memories into pictures that never existed before (Heaven 2024). The proposal suggests utilizing emergent technologies like Dall-E 2 and Stable Diffusion to address memory loss in specific demographics. These programs could potentially assist migrants who have lost connection to their past and elderly individuals suffering from neurodegenerative diseases. The concept involves inviting individuals to recount memories, with engineers iteratively refining these prompts until a digital image emerges that the individual recognizes as a representation of their memory. Engineers have built a glossary of prompting terms to construct different historical periods and specific locations and situations, like a set designer tries to do in a movie reconstructing the life of some character from the past.

What influence can these kinds of glitchy, and blurred images have on people? (The less hyper-realistic they are, the more they are recognised as authentic by people whose memories generated them). Can they help people come to terms with the past, objectifying memories, which can

never be erased again? Or can they create a false sense of reality, perhaps embodying fantasies or distorted memories, thus leading individuals to believe that their mental world is real? But aren't those fantasies, if they are fantasies, already part of their identity?

Studies on infantile amnesia, the phenomenon whereby children up to about 20 months old quickly forget everything or almost everything that they do or happen to them, indicate that memory loss may not be permanent (Power et al. 2023; Reardon 2024). Childhood memories are potentially retrievable to consciousness and some techniques can prevent (at least in animal models) infantile amnesia. This technology could potentially influence the ongoing formation of personal identity by reinforcing the notion that identity is a dynamic construct shaped by various internal and external factors (McAdams and McLean 2013). These factors encompass both individual agency (the ability to exert control) and external influences (including memory interventions). Consequently, identity turns out to be less a static, pre-determined essence that demands preservation than a fluid process subject to ongoing modification, at least as far as memory is concerned.

Our memories of past experiences influence the way that we think about ourselves and our relations to others. But, as a growing body of empirical research has demonstrated, these memories are often biased and distorted. We sometimes play an active role in this process through our attempts at interpreting the past and *uncovering* its meaning; friends, partners, and therapists often encourage us to do just this. Our memories are also subject to moral evaluation. How we remember the past can enhance or impair our ability to relate to others in morally appropriate ways. There are various forms of indirect control that we can exercise over our memories. While we cannot remember or forget literally at will, we can influence our memories by using external aids, guarding against biases, and revising the interpretations that we develop of our past experiences.

What remains to be accommodated, however, are the normative aspects potentially regulating the memory modulation in the ways described above. Should autonomy prevail on authenticity, or vice-versa? Do we have duties of memory towards others (e.g. those with whom we have made sentimental commitments: see a philosophically loaded movie like *Eternal Sunshine on the Spotless Mind*) or are we always free to choose how we can govern our minds? Is the consistency of our attitudes a value to be preserved in the face of potential changes in our memories? Is adherence to reality not a prerequisite for a functional society and for the flourishing of all humans?

Questions that can be answered precisely on a case-by-case basis, without this meaning the desired absence of a more structured framework. Such a framework should be built based on a scientifically informed phi-

philosophy on the possibilities of new intervention in our memories. This is a task that scholars from different backgrounds will hopefully have to apply themselves to in a shared effort. It is not only a matter of resolving (theoretical) ethical dilemmas, but also of accompanying technological progress in a reasonable manner, so that it is oriented towards the inclusive well-being of all members of our society.

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