

SECOND THOUGHTS

Changing Memories: Between Ethics and Speculation

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Abstract

Over the past decade, a debate has emerged between those who believe that memory-modulating technologies are inherently dangerous and need to be regulated and those who believe these technologies present minimal risk and thus view concerns about their use as far-fetched and alarmist. This article tackles three questions central to this debate: (1) Do these technologies jeopardize personhood? (2) Are the risks of these technologies acceptable? (3) Do these technologies require special regulation or oversight? Although concerns about the unethical use of memory-modulating technologies are legitimate, these concerns should not override the responsible use of memory-modulating technologies in clinical contexts. Accordingly, we call for careful comparative analysis of their use on a case-by-case basis.

Introduction

Memory, in its different manifestations, plays a crucial role in everyday life as well as in the formation of a narrative sense of self-identity, created through linkages among memories [1]. Linguistically, the concept of memory suggests a monolithic capacity to remember. In reality, however, there are several different memory systems: for example, short-term memory allows one to retain information for short periods of time, while long-term memory allows one to remember knowledge, past events, and experiences associated with different contexts [2]. Working memory overlaps with short-term memory; it designates a task-oriented form of memory and attention required to manage daily tasks and likely involves multiple cognitive systems [2].

Memory “Manipulation”

Given how crucial memory is, its shortcomings can have wide-ranging consequences for daily living. Alzheimer’s disease (AD), for example, leads to memory loss as well as several other symptoms such as depression, insomnia, psychotic behavior, and anorexia that will eventually rob a person of the ability to recollect events crucial to his or her self-identity [3]. The fear of AD in the absence of effective treatment and prevention has generated a lucrative market for complementary and alternative medicine [4]. In contrast, post-traumatic stress disorder (PTSD) involves vivid revival of traumatic experiences such as war situations and sexual violence [5]. This memory dysfunction is a

result of endogenous (noradrenaline) stress hormones, which over-consolidate the traumatic memory, leading it to become easily reactivated by contextual cues that elicit strong conditioned emotional responses as well as hypervigilance and avoidance of trauma reminders [6]. The impact of such memory dysfunctions, whether they diminish or aggravate memories, helps to explain the long-standing public and scientific interest in advances that can shed light on the nature of memory and the treatment of its dysfunctions [7].

Of late, the possibility of “manipulating” memories through technologies, including pharmacological agents, has surfaced. Memory-modulating technologies include [deep brain stimulation](#) (DBS) as well as more promising and less invasive forms of neurostimulation such as transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS) [8]. Pharmacological agents include donepezil for memory enhancement [9] and propranolol for the treatment of PTSD [10]. Moreover, a range of behavioral and neuroscience interventions have been deployed, e.g., electroconvulsive therapy (ECT) and cognitive-behavioral therapy (CBT), in the treatment of patients who suffer from traumatic memory-related symptoms [11, 12].

The use of memory-modulating technologies has generated controversy. Some of these devices (for example, do-it-yourself tDCS) can be built at home using YouTube videos as a guide [13]. The [use of pharmacological agents](#) has raised concerns about potential side effects and overuse, although some claims of drug efficacy lack evidence [14]. CBT and, in particular, exposure therapy for PTSD, has aroused few ethical concerns, even if some of its negative effects, such as symptom aggravation, could be similar to those of more technologically complex interventions [15].

Three common arguments are frequently voiced against the use of memory-modulating technologies. We discuss and evaluate each of these arguments, calling for case-by-case analysis of the ethical use of memory-modulating technologies in clinical contexts. These technologies may be considered unacceptable for some uses (e.g., enhancement and military uses because of the risks involved to soldiers without any health problem) but justifiable in others (e.g., therapeutic uses for patients who may stand to benefit from the intervention).

Do Memory-Modulating Technologies Jeopardize the Person?

One of the common fears associated with the use of some interventions, including ECT, TMS, tDCS, and propranolol, is that they will induce radical changes in the person’s identity or autonomy [16]. These fears are justified inasmuch as we know that memory changes produced by disease or trauma (as they occur in AD or PTSD) can create radical ruptures in the narrative of a person. These fears are also captured in terms like “memory manipulation,” which imply that the administrator of the intervention has a negative intent. Fears about the loss of [self](#) through memory modulation are also

reflected in Hollywood films such as *Eternal Sunshine of the Spotless Mind*, which features radical memory erasure procedures.

However, these concerns are both theoretically and empirically problematic. First, they presuppose that all memory is essential, which is not the case. In fact, forgetting is a fundamental component of maintaining personal identity [17]. Indeed, the inability to forget certain memories lies at the heart of disorders such as hyperthymnesia (a condition in which extremely detailed autobiographical memory interferes with other cognitive capacities and daily functioning) and PTSD. Second, there is limited evidence that concerns over the loss of personhood or personal identity are justified. For example, while the enhancing and impairing effects of tDCS on working memory have been reported in several studies [18], unanswered questions remain about the long-term sustainability of these effects and on the corollary inhibitory effects of tDCS on other brain systems [13]. Much the same could be said for TMS [19]. Similarly, DBS has been shown to enhance memory [20], but the applicability of this invasive surgical technique prevents widespread usage for this purpose given the risks involved. Propranolol is now being piloted as a treatment for PTSD [10], but it has been widely prescribed to patients over several decades as a treatment for hypertension, arrhythmia, migraines, and angina pectoris. To date, no significant problems with memory loss or concerns over the loss of self-identity have been reported [21]. Therefore, to a large extent, the argument that altering or attenuating certain memories will affect self-identity lacks evidence.

That said, it would be unwise to completely dismiss ethical concerns about the effects of memory-modulating technologies, which can include the perturbation of memories, at least for some of the older technologies like ECT [22, 23]. And, if misused—as was demonstrated by the unethical CIA-funded research program, Project MKUltra, which notably investigated the use of Lysergic acid diethylamide (LSD) and ETC for brain washing in the 1950s-1970s—technologies like ECT can have devastating effects on highly vulnerable people [24]. The evaluation of such practices by scholars [16, 25], while sometimes criticized as being overstated or excessively speculative [26], is an important component of a democratic watchdog system. Combined with research and clinical practice guidelines, this oversight can help ensure that memory-modulating technologies are only used in controlled research and clinical environments. We must be careful, however, that the focus on worst-case scenarios is not conflated with the clinical use of memory-modulating technologies that are desired—and potentially consented to—by patients.

Memory-Modulating Technology: Too Risky?

Beyond the potential effects of memory-modulating technologies on the identity of the person are concerns about the risks of these technologies, given the profound role of memory and the incomplete understanding of its contribution to other cognitive functions. The aggravation of traumatic memories and other unintended effects, such as

mood changes or the inhibition of other cognitive functions [27], could be highly consequential when easily available neurostimulation techniques such as tDCS are used without medical supervision [13].

The risks of memory-inducing interventions can be misunderstood not only because of the complexity of memory and its interaction with other cognitive systems, but also because enthusiastic or fear-mongering discourse in media reporting can overemphasize the positive or negative effects of memory-modulating technologies [28]. In reaction to positive reporting, researchers and clinicians may be tempted to jump on the bandwagon with a new fad or to downplay risks in favor of the promising benefits associated with a new technology. The possibility of a dismissive attitude toward risks could be fueled by ethical debates that focus solely on the technology's most controversial uses and applications and are therefore disconnected from patients' realities [26].

Despite the potential risks of memory-modulating technologies and the possibility of their being downplayed by the media and researchers, there are some rather substantive and invasive interventions such as ECT—and eventually DBS—that may be medically justified given the severity of the symptoms experienced by some patients who suffer, for example, from traumatic memories. In a clinical setting, some interventions may raise undue suspicion if taken out of context. For example, ECT is often considered negatively in the public domain even though it represents an important therapeutic intervention [29, 30]. Hence, we submit that the debate about memory-modulating technologies should focus on the reasons for their use and their related benefits and harms in specific clinical contexts. And when the benefits could outweigh the risks, patients (or their proxies) should be able to make informed decisions based on their judgment and preferences. This approach has been proposed for ECT, a controversial but nevertheless therapeutically effective technology [31].

Do Memory-Modulating Technologies Require Special Regulation or Oversight?

Given the risks associated with memory-modulating technologies and the misunderstanding of those risks, there could be a temptation to propose specific regulations or oversight mechanisms for their use. Examples of regulatory exceptionalism typically associated with technological feats (e.g., therapeutic and reproductive cloning [32]) are the Genetic Information Nondiscrimination Act in the United States [33] and restrictions on the commercial use of neuroimaging in France [34]. Such ethical and regulatory exceptionalism is sometimes warranted but we would urge caution because of its potential drawbacks. Stressing that genetic tests carried substantive and sensitive clinical information actually curtailed the acceptance of these tests by patients who would have benefited from them [35]. The restrictions on genetic testing also erroneously imply that other forms of examination (e.g., common blood tests) do not carry potential substantive risks of revealing important clinical information that could be used in discriminatory ways.

We suggest that any restrictions on access to memory-modulating technologies or other special regulations should be carefully considered by policymakers and other stakeholders with the goal of allowing well-justified uses to proceed. Special regulation could forestall research on these technologies or access to them. For example, ECT still carries a heavy stigma in the public eye [29, 30], one which is likely to make any patient who has undergone ECT treatment fear being stigmatized or discriminated and therefore think twice before undertaking this therapy. Likewise, clinicians involved in delivering such treatments may be viewed suspiciously and refrain from the appropriate use of the technology as a result [29]. Instead of stressing the exceptional nature of such an intervention, it is important to come back to the facts and carefully evaluate the impact of reducing access or proposing special oversight.

Conclusion

Memory is fundamentally important for everyday life, and its dysfunctions are associated with severe conditions that significantly reduce quality of life. There is a common fear that memory-modulating technologies will be used to fundamentally change people's self-identity and "manipulate" their memories. Although often dismissed as farfetched, the potential for such abuses is real and needs to be monitored, as the MKUltra experiments of the mid-twentieth century demonstrate. At the same time, the more common and predictable clinical uses of these technologies should be evaluated for their own risks and potential benefits to often-neglected patient populations. We urge careful comparative case-by-case analysis of the risks and benefits of different technologies in comparison with other treatment alternatives to ensure that undue caution does not limit their ethical and potentially beneficial use.

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