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To whom do our Memories Belong? About the Burden to Remember and the Freedom to Forget

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ABSTRACT

To whom do our Memories Belong?

Autobiographical memories contribute to forming the core of who we are. However, memories of traumatic events can be experienced as a burden. Recent neurotechnology research indicates the possibility of selectively dampening or even erasing specific memories. On a personal level, altering even a single memory could lead to significant changes in one's self-understanding and psychological continuity, ultimately threatening authenticity. On a collective level, memory dampening and erasure neurotechnology could affect accountability mechanisms (e.g., in witness testimony) and more in general, alter the process of collecting and recollecting society's historical memory. The question is whether these concerns outweigh the possible mental health benefits to the individual. We argue that the fundamental rights to cognitive liberty and mental health grant a subject the right to decide upon their own memory, within constraints and having met several conditions.

Keywords: Memory erasure - Memory dampening - Cognitive liberty - PTSD

1. Introduction

Autobiographical memories contribute to forming the core of who we are and the psychological continuity that makes perceiving one's own identity and self possible[1]. While most autobiographical memories are considered to contribute positively to this core, traumatic memories seem to diverge from it. Such memories are frequently described as a burden and are closely linked to psycho-

pathology, particularly post-traumatic stress disorder (PTSD henceforth). To improve treatment options for PTSD, research efforts are made to dampen traumatic memories or erase specific memories entirely[2,3,4]. In particular, research efforts are put into developing neurotechnology, including pharmacological interventions, that can selectively dampen and/or erase one's memory (memory dampening memory erasure neurotechnology, MDME henceforth). These research developments require close inspection regarding the freedom and responsibilities connected to our memories and their content.

Several implications of MDME neurotechnology affecting both individuals and society are worth ethical consideration. On the one hand, individuals might be interested in MDME to erase traumatic events and with that improve their quality of life. On the other hand, altering the memory of even a single event could lead to significant changes in one's self-understanding and psychological continuity, ultimately threatening an individual's authenticity. On a collective level, MDME may affect accountability mechanisms (e.g., in witness testimony) and, more generally, alter the process of collecting and recollecting society's historical memory.

Therefore, the question is which interests and values should be prioritized and how to negotiate an optimal tradeoff. In this paper, we propose that the fundamental rights to mental health and cognitive liberty can provide a useful starting point for ethically informed decision-making. We argue that an individual's need or desire to alter their memory via MDME neurotechnology should be prioritized, within constraints, even in the presence of (some) negative outcomes for society. We further argue that the disadvantages of MDME in society are not as grave as they have been framed, especially if certain institutional design solutions are adopted.

In section 2, we provide an overview of PTSD, indicating the current state of knowledge regarding MDME research and application. We demonstrate fundamental reasons to consider MDME as a realistic and valuable therapeutic option for PTSD patients. In section 3, we discuss several societal and individual risks and ethical concerns that could ensue from MDME interventions. We highlight some argumentative weak spots in these concerns and, when possible, provide suggestions on how to (partially) address them. Section 4 expands on the rights to mental health and cognitive liberty and how they can contribute to a responsible use of MDME. We argue that PTSD patients should be granted the possibility to choose whether to undergo MDME therapy, provided certain constraints and best practices. In the 5th and final section, we summarize our findings, highlight the limitations of this paper, and provide suggestions for further research.

2. MDME in PTSD: state of the art

With a projected lifetime risk of approximately 9%, PTSD is a common pathological condition that can develop after exposure to traumatic events[5]. PTSD is characterized by intrusive symptoms, including nightmares, flashbacks, dissociations, and recurring

trauma memories. Furthermore, affected individuals often display negative alterations in cognition and mood, as well as hypervigilance and avoidance behavior towards stimuli associated with the trauma[6]. Symptoms of PTSD can persist over long periods and are associated with poorer general health and negative life outcomes[7,8]. The mental health burden of PTSD is substantial. Affected individuals demonstrate high comorbidity with other mental disorders and an elevated risk of self-disruptive behavior and suicide[9,10]. One Holocaust witness and survivor of the Sobibor concentration camp stated, 'One can be alive after Sobibor without having survived Sobibor'[11]. This illustrative description of an individual reveals the mental health burden of PTSD. This burden is verified by research indicating that PTSD can be a lifelong challenge for Holocaust survivors[12]. Moreover, an elevated risk of PTSD in the children of Holocaust survivors has been observed, demonstrating the negative impact PTSD can have on the subsequent generation[13].

Therapeutic interventions are available to reduce the impact of traumatic memories. Evidence-based therapies include cognitive behavioral therapy, prolonged exposure therapy, eye movement desensitization therapy (EMDR), and cognitive processing therapy[14]. These PTSD treatment options are possible because our memory system is not static. Therefore, it is not comparable to a novel, in which the story never changes, but can rather be seen as a sketchbook, in which the content can be altered and adapted each time the book is opened[15]. Through strengthening neuronal connections between simultaneously activated neurons, memory traces termed 'engrams' are formed. Following formation during the encoding phase, engrams are further stabilized during consolidation. Once the engrams are stabilized, they enter a dormant state, that is, a stable state between the two active processes of encoding and recovering a memory. Each time an engram is recovered (also called 'retrieval'), it returns to a fragile state in which the patterns of neural activity destabilize temporarily. In this state, engrams are susceptible to interference. After each retrieval, memories are stabilized again and return to their dormant state: this process is called 'reconsolidation'[16,17]. Elisabeth Loftus demonstrated this susceptibility when introducing false memories into an individual's memory systems[18].

The process of engram formation in traumatic situations is complex. Research indicates that a broad collection of brain regions is involved in the encoding and consolidation of traumatic memories, including the amygdala, which plays an essential role in the stress response. It is believed that traumatic events are partly caused by overconsolidation due to a release of glucocorticoids. In such cases there is greater engram strengthening than in less stressful and emotional situations[19]. In therapy, the brain's flexibility is used to compensate for this overconsolidation by reducing the emotional load of trauma memories[20]. Unfortunately, therapy resistance in PTSD is high[21]. Consequently, research efforts seek ways to reduce traumatic memories and erase memories entirely[22,23,24].

Pharmacological interventions using propranolol, a noradrenergic beta-receptor blocker, show promise in memory dampening. Research indicates that the use of propranolol shortly after the experience of a traumatic event can decrease the occurrence of PTSD[25]. Furthermore, it has been demonstrated that both electroconvulsive therapy and propranolol can block the reconsolidation of traumatic events and with that reduce PTSD symptoms. Here the susceptibility during reconsolidation is used to reduce the strength of engrams[26,27,28]. Currently, total memory erasure of traumatic events has not been achieved in humans. However, research reveals that targeted memory erasure is possible in animals. By identifying neural subpopulations involved in engram encoding, researchers showed that selectively deactivating neurons involved in fearful memories is possible in transgenic mice. This process was achieved using genetic techniques that facilitate temporally and specially controlled apoptosis (programmed cell death)[29]. In accordance with this research, studies of rats revealed successful fear-memory erasure using optogenetics and the modulation of long-term depression (LTP)[30]. This research frame further indicates that MDME techniques and methods are improving, and that we might expect human applications in the future.

The fact that human application is not yet a practical reality should not prevent the timely discussion of its ethical and societal implications if only to avoid what Sven Ove Hansson (2004) termed the 'delay fallacy'. Waiting to know more about a technology before discussing its potential implications and risks could hinder timely preventive actions from being undertaken[31]. Technological innovation is relentless, and it has no timetable; it is wise to address concerns as early as possible. Moreover, regulatory action typically suffers from a lack of information about technological development, sometimes resulting in inadequate reaction times. In this paper, we initiate a preliminary discussion evaluating several of the risks and benefits of MDME neurotechnology for both individual patients and society, largely from an ethical, as opposed to a clinical standpoint.

In this section, we have stated that MDME could represent a critical therapeutic option for patients affected by PTSD. Although its actual efficacy is currently hard to estimate, there are reasons to explore MDME's therapeutic potential in humans with PTSD or similar trauma-related disorders. In the following, we discuss several arguments that could limit or prevent the acceptance and deployment of this neurotechnology.

3. Problems with MDME: collective memory, witness testimony, and authenticity

In the preceding section, we revealed important benefits in considering MDME neurotechnology for the treatment of PTSD. In this part, we present and discuss several concerns that such neurotechnology could bring about. We isolate three different arguments and discuss their merits as well as their limitations.

3.1. Collective memory and active responsibility

In 2003, the U.S. President's Council of Bioethics argued in its report 'Beyond Therapy' that memories play an important role not only in forming our own personal narrative identity but also in shaping the collective memory of society[32]. Collective memory refers to the memory of a group formed by the recollection of past events[33] . The role of Holocaust survivors in bearing witness is a strong example of this significance. Numerous Holocaust survivors have taken an active role in keeping these memories alive to ensure that history does not repeat itself[34]. Another more recent example is the '#MeToo' social movement against sexual abuse and harassment. Following sexual abuse allegations against a well-known Hollywood producer in 2017, the movement proliferated on social media. Many of those affected were encouraged to share their story and raise awareness of sexual abuse and harassment[35]. Sharing these types of memories and raising awareness can be seen as part of our contribution to collective memory and be considered an essential duty towards society. This is especially important because it enables a form of collective active responsibility that aims at preventing unspeakable events from happening again. MDME neurotechnology could directly conflict with this responsibility, as it may ultimately affect the capacity to recollect and learn from society's mistakes, especially if adopted on a large scale. In other words, it could prevent a truthful and constructive formation of our historical, collective memory. These arguments deserve careful consideration and constitute reasons to be cautious with MDME neurotechnology. It is, however, important to draw attention to several caveats and provide a realistic evaluation of such concerns. While the importance of collectively remembering (e.g., the Holocaust) is indisputable, the question remains what collectively remembering means on an individual level and how it should affect personal lives and mental health. To what extent, in fact, does collective memory rely on an individual's autobiographical memory? Collective remembrance refers to a collective responsibility to learn from the past, honor the affected, and prevent comparable situations in the future. This responsibility is independent of an individual's autobiographical memory and can be fulfilled through other sources such as museums, archives, organizations, and prevention programs[36,37]. Consequently, fulfilling this responsibility does not exclusively, or even primarily, rely on individual recollection. This is the reason why historical events can be remembered even when the last witness has passed away, and the reason why prevention programs are possible without the help of witnesses[38]. While sharing a personal narrative should be praised, considering that as an individual moral obligation would be unwarranted and unnecessary.

3.2. Accountability and witness testimony

The DSM-V classifies traumatic situations, such as those characterizing PTSD, as 'actual or threatened death, serious injury or sexual violence'[39]. Therefore, victims of different kinds of abuse represent an essential portion of potential candidates for

MDME procedures. At the same time, these victims are often mandated by law to witness criminal offenses in court. In this regard, Dutch law is a clear example: failure to testify constitutes a punishable offense[40]. Moreover, the law prohibits the destruction of evidence, and the dampening and erasure of engrams could be considered such[41]. Choosing MDME following a traumatic event to prevent or reduce PTSD could make truthful witness testimony impossible and ultimately affect accountability mechanisms. Moreover, in the best-case scenario, neurotechnological intervention could render the retrieval of incriminating information impossible. In the worst-case scenario, it could lead to manipulated, partial or incorrect information. The latter possibility could eventually lead to false testimony and wrongful convictions.

Nevertheless, fundamental limits to these arguments should be pointed out. First, engrams are dissimilar to physical objects regarding evidence. The latter can be confiscated and safely stored for retrieval at any point in the future. Conversely, the information contained in engrams is constantly evolving due to the memory's dynamic nature (see Section 2)[42]. This is assuming that we have a sufficiently reliable method to gather the information in the first instance[43]. Second, engrams can be manipulated in many ways, including the use of legal drugs (e.g., alcohol), different forms of psychotherapy, and simple recollection[44, 45, 46]. As all engram manipulations can make witness testimony unreliable, solely prohibiting MDME would not address the problem in the first instance[47]. Third, solutions have been suggested to allow MDME while acknowledging, to a reasonable extent, the value of witness testimony. One solution is to officially record a witness testimony as soon as possible after the event, even before a court case is started, with as little interference as possible. MDME interventions can afterwards immediately take place, as research indicates that they are most effective when offered early after the trauma[48]. This implies that in-person witness testimony could not, and in some cases, should not be expected in court months or years after a traumatizing incident[49]. We are aware that this might present challenges, as investigations tend to collect relevant elements over long periods. However, we have to also consider that the validity and truthfulness of a witness's testimony tend to gradually diminish over time, which makes the late recollection of events anyway substantially less valuable, especially in court[50].

3.3.Autobiographical memory, identity, and the self

Since autobiographical memories form an essential part of who we are, it can be argued that any manipulation of our memory is undesirable. Here the U.S. President's Council of Bioethics argues that MDME could lead to changes in individuals' identities[51]. Furthermore, the (quite broadly formulated) right to mental integrity, as implemented in the E.U.'s Charter of fundamental rights, could be interpreted as safeguarding against similar concerns[52]. The connection between autobiographical memory and personal identity is further substantiated by research illustrating that memory loss

through severe retrograde amnesia can lead to a reduced sense of self, therefore threatening one's authenticity[53].

It is crucial to note that MDME differs from severe retrograde amnesia since specific memories are affected rather than the majority of one's autobiographical memory. Furthermore, memory interventions in the case of PTSD would be used to address the consequences of traumatic events. These very events alone, like retrograde amnesia and MDME, can alter the sense of self and identity. Common clinical accounts such as 'I do not know myself anymore' describe this change and indicate modified self-related thoughts following exposure to a traumatic situation[54]. The question is whether it would be more desirable to allow painful memories to change oneself rather than external neurotechnological intervention. In both cases, changes are unavoidable. Therefore, even under the threat of being inauthentic, MDME might be admissible when freely chosen and if there is a significant chance to reduce individual suffering[55]. This discussion is similarly formulated in the debate concerning deep brain stimulation or neuropharmacology, for example, in which it is argued that personality changes could, in many cases, be seen as part of a treatment goal rather than an unwanted complication[56]. Furthermore, when diverging from a rigid to a narrative perspective of identity, identity can be understood as something that changes over time with a person's experiences[57]. In that line, processing a traumatic experience without MDME neurotechnology can also change one's identity. Current therapeutic methods often work in fact through repeatedly recollecting and reinterpreting the traumatic experiences[58]. The changes in personality promoted by these therapeutic interventions are rarely an object of concern and are usually accepted as beneficial[59]. It could be argued that there are quantitative or qualitative differences between traditional therapeutic methods and novel neurotechnologies, but this is currently an empirical question for which we do not yet have an answer. All we can do is remain vigilant and closely monitor the risks of MDME neurotechnological interventions, weighing their benefits against traditional therapeutic alternatives.

The U.S. President's Council of Bioethics further argues that memories are not only crucial elements of one's identity but also critical for personal growth, even when traumatic[60]. This argument aligns with scientific research indicating that some child Holocaust survivors showed post-traumatic growth and positive psychological outcomes even after exposure to traumatic events. Hence, individuals do not purely overcome a trauma but can experience a positive change after exposure to a traumatic situation[61]. Although post-traumatic growth is frequently observed, certainly not everyone displays it. Additionally, post-traumatic growth and PTSD symptoms can coincide. It could be envisaged that due to a traumatic experience, an individual has a new appreciation for life while simultaneously struggling with recurring nightmares and dissociations. While personal growth may outweigh negative PTSD symptoms for some, this is not the case for everyone[62].

In this section, we have noted that society's responsibility to witness and remember invites caution towards MDME neurotechnology. Furthermore, we demonstrated how this neurotechnological intervention has the potential to threaten our sense of self and personal identity. We adopted a critical perspective towards those concerns, highlighting argumentative limits and sometimes providing ideas to partially address them. In the following, we argue that fundamental human rights to mental health and cognitive liberty provide grounds for arguing in favor of allowing adequately informed patients the responsible use of MDME neurotechnology, even in the presence of the critical counterarguments we have presented here.

4. The fundamental rights to mental health and cognitive liberty

In the previous part, we discussed several concerns regarding the therapeutic use of MDME neurotechnology. In the remainder of the paper, we argue that fundamental rights to mental health and cognitive liberty should suffice to grant an adequately informed patient the ability to choose whether to use MDME neurotechnology.

The United Nations Human Rights Council recognizes that every person has a right to mental health[63]. Therefore, interventions allowing the reduction of and/or recovery from negative mental health symptoms should be supported. However, this right is quite generically formulated. While it seems to warrant individuals the inalienable possibility to achieve some not better defined standard of mental health, it would be difficult to argue that it alone warrants the deployment of MDME neurotechnology to achieve such standard. In fact, as discussed in the previous section, it could be argued that there are several more classical therapeutic alternatives for attaining mental health that do not require MDME neurotechnology, even in the case of PTSD. However, a slightly more specific right, that of cognitive liberty, gives grounds for maintaining that such neurotechnology, despite its downsides, should not only be included amongst the possible therapeutical options, but that such choice should rely on the individual patient's discretion.

The right to cognitive liberty was already seminally formulated in the works of philosophers such as Kant and Mill[64,65]. The discussion was recently revived by Ienca and Andorno (2017) and Bublitz (2013) in the debate about the ethics of neurotechnology[66,67]. These contemporary authors noted that the right to cognitive liberty has two main implications. First, it grants an individual the right to choose whether to use emerging neurotechnologies on themselves. Second, it grants individuals the right to mental integrity, protecting them from any involuntary mental interference[68,69]. Proponents of the concept demand to include cognitive liberty as a fundamental human right expanding upon the right to freedom of thought[70]. They argue that cognitive liberty is a prerequisite for all other forms of liberty.

We recognize the importance of the arguments regarding cognitive liberty formulated by the above cited authors. When considering cognitive liberty as a fundamental hu-

man right, we believe it should be granted by default, and carefully evaluated against all arguments that could lead to a restriction of this freedom[71]. We do not believe that arguments against the implementation of MDME neurotechnology evaluated in Section 3 constitute a sufficiently compelling reason to deny the right to cognitive liberty. However, this is not an all-or-nothing matter, and while it is our duty to ensure that the fundamental right to cognitive liberty is preserved to a maximum extent, it is our responsibility to additionally minimize the potential negative impacts of MDME neurotechnology. This concerns both the risks that are specific to MDME neurotechnology, such as those we discussed previously, and risks that are generally associated with the use and abuse of neurotechnology in general (e.g., risks debated in the neuroenhancement discussion). Technical and institutional design solutions can alleviate the risks, as briefly exemplified at different points in the previous section. Such solutions should be associated with good medical practice, with particular attention to transparency and informed consent. The choice to use MDME neurotechnology should always be individual and well-informed. Advantages and disadvantages should be emphasized and understood, and a subject should provide their fully informed consent. Moreover, in full compliance with the right to mental integrity and the general medical ethics of autonomy, a patient should be offered a choice of alternative therapeutic approaches and be provided with a full account of their advantages and disadvantages. In addition, the implications of treatment rejection for an individual must be discussed[72].

However, individual, informed choice should not be the only criterion for deciding whether and when to use MDME neurotechnology, as reckless use could lead to undesirable outcomes. An individual's freedom of choice does not mean an individual's complete control over the modes and extent of the treatment, which should be closely monitored by medical professionals and adequately regulated. Several reference values for normative decision-making at the regulatory stage should be considered. The first is authenticity, in that a medical professional should minimize changes in identity while adequately addressing the root causes of the condition. The second is proportionality, in that the treatment should be recommended only to those patients with recognized conditions. No blatantly recreational or cosmetic use should be allowed. An analogous principle has been explored in the neuroenhancement debate[73]. Respecting the principles of general good medical practice (informed consent, authenticity, and proportionality) would already substantially reduce some of the risks and concerns discussed in Section 3 while granting access to the therapy when the appropriate circumstances are present.

In this section, we have argued that the right to cognitive liberty, if accepted, grants the individual freedom to use or refrain from using MDME neurotechnology. However, the implementation of liberty is not without significant constraints. Such constraints primarily concern the medical duty to collect fully informed consent, preserve a patient's identity, and minimize unwarranted use of the therapy.

5. Conclusion

As research progresses with regards to MDME, we aimed to discuss the rights and responsibilities connected to our individual and collective memory focusing on traumatic memories and PTSD. Despite the significant concerns discussed in Section 3, we argue that the right to cognitive liberty should provide an individual with the choice to use or refrain from using MDME. We also offer several arguments to reduce these concerns, either by deflating them on a conceptual level or by providing suggestions to partially address them at a practical level.

This work is indeed to be intended as a preliminary exploration of the societal consequences of a potentially societally disruptive neurotechnology, and therefore, has clear limits. For example, we demonstrated that MDME could provide a new approach to treating PTSD. However, we merely touched upon the implementation of MDME in clinical practice. This is due to the early stages of development in this particular neurotechnology, which does not per se prevent an anticipatory ethical discussion but prohibits conclusive statements. Future research and technological development might reveal unexpected risks in this neurotechnology, calling for a prompt re-evaluation of its dangers and benefits. Although we believe cognitive liberty to be a right, and as such inalienable, MDME neurotechnology could reveal dire consequences for other equally fundamental rights, such as mental health. Overall, we believe that there are currently sound arguments to mildly advocate for the possibility of responsible use of MDME neurotechnology, but new evidence could change this. In order to keep an ethical assessment of this neurotechnology realistic and well informed, further research is required to maintain an ethical assessment of this neurotechnology that is realistic and well-informed, especially regarding the unwanted clinical consequences of MDME and its therapeutic efficacy. In particular, further research must be undertaken to monitor the impact on essential values such as identity and authenticity.

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