

Open Peer Commentaries

# Memories: More Dangerous Than the Real Thing?

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James Elsey and Merel Kindt (2016) raise a number of bioethical concerns associated with the manipulation of memories via pharmaceuticals and/or behavioral therapy.

However, the authors failed to include a very relevant discussion on the use of emerging virtual reality (VR) technologies in therapy (North and North 2016), particularly their use in manipulating memories (Segovia and Bailenson 2009); early clinical studies have already demonstrated the promise of virtual reality in treating a variety of mental illness ranging from autism to anxieties (Gorini and Riva 2014).

However, unlike controlled substances such as propranolol, and behavioral therapies (Henry, Fishman, and Youngner 2007), which both usually require the cooperation of licensed professionals, advanced virtual reality equipment will likely be available unrestricted to the general consumer for recreational use, or otherwise. This raises particularly novel and nontrivial ethical concerns that ought to be considered throughout the continued development of therapeutic and memory-manipulating VR software.

Moreover, even licensed practitioners will likely be exposed to legal and ethical concerns when using VR software in their practices. These concerns are further exacerbated due to recent signaling from the Food and Drug Administration (FDA) suggesting that it has effectively abandoned its authority over software-based medical devices—most recently hinted at by efforts by a competing federal agency, the Federal Trade Commission (FTC), to police these devices (Wicklund 2016). Notably, the FTC will expectedly focus more on cybersecurity than on the health-related and ethical concerns of the software in these devices. As such, professionals using and designing software for VR therapies will lack the regulatory safety nets that their peers in other medical device fields might rely on. Further, without clear best practices, issues relating to privacy (the devices will transmit patient data over likely unsecured networks), telemedicine (the devices can be operated remotely, or by practitioners that are not

adequately qualified), and the practical and regulatory concerns associated with billing for remote consults (particularly with substantial variability across state lines with regard to both federal and private insurance reimbursement policies; Neufeld, Doarn, and Aly 2016) remain open questions.

The promising results of earlier VR clinical trials notwithstanding, like the technology itself, the use of VR in therapy is a work in progress. And, as a work in progress, there are substantial unknowns that can result in significant ethical, legal, and social issues. For example, some clinical trials have exploited the experiential nature of VR for its ability to mimic time travel to revisit and rectify prior harmful incidents and their associated memories in an effort to help individuals overcome prior traumatic experiences (Friedman et al. 2015). In these instances, for example, it is unclear how the brain will process reconstructed, modified, or false virtual memories and experiences relative to real memories, or even how individuals will utilize newfound abilities to perfectly recall VR memories, by way of a VR device, without the interference of the memory's natural capacity to edit and selectively forget. Perhaps the brain's plasticity may allow it to adapt to this new reality, even forgoing these natural safety mechanisms for non-VR memories. Whether true memories become retained longer, or VR memories will be artificially retained, both can be particularly problematic in social interactions, when otherwise lost, forgotten, or suppressed positive or negative memories are revisited and kept fresh. Further, this ability to revisit recreated or false memories could even lead to a debilitating overly obsessive analysis of past social interactions.

Further potentially problematic issues relate to the unexplored epigenetic effects that might arise as a result of the unrestrained manipulation of memories. Research has already shown that traumatic events can affect genetically predispositioned individuals, such as carriers of MAOA (monoamine oxidase A) variants, to be more or less prone to violence (Jezierski, Braun, and Gruss 2006), perhaps by

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85 way of epigenetic effects. What will the epigenetic consequences be, if any, when the memories of traumatic events are manipulated through VR therapy or intentionally or unintentionally falsified by a consumer product?

90 Given the preceding, it is clear that substantial clinical experimentation will be necessary until we can ascertain these and other long-term psychological and the resulting social effects of any type of VR, not just therapeutic VR. Unfortunately, it is unlikely that industry will wait. Already, VR is on the final upward trend in the Gartner Hype Cycle Graph, predicting the start of the rapid ascent of the VR industry into its final leg in the emergence of this technology (<http://www.gartner.com/technology/research/hype-cycles>).

As such, it is imperative that analyses regarding the aforementioned issues begin sooner rather than later, particularly as the pressure for consumer-side VR to go to market might supersede any ethical and legal concerns. This possibility is exacerbated by the operation of VR as recreational devices, outside of most the relevant regulatory control. Even more disconcerting is the possibility that members of the fiercely independent do-it-yourself (DIY) population may devise their own software, far outside any control of any oversight and regulation.

Finally, in addition to these ethical concerns, there are also timely social concerns; for example, unsanctioned use of virtual reality memory manipulation could potentially allow anyone to obtain and own experiences heretofore limited to the privileged, or even the underprivileged, further fueling ongoing societal debates regarding privilege and cultural appropriation: Will false VR memories be employed as a shortcut to obtain necessary personal circumstances or to develop empathy for others' conditions? Additionally, perhaps with greater repercussions, will false VR memories be introduced as mitigating consideration in criminal sentencing decisions (O'Brien 2008), much like real experiences are (*Penry v. Lynaugh* 1989)?

With the likelihood that regulatory bodies will not exert the necessary regulatory control over all or even a large subset of devices that can provide VR memory manipulation, at minimum there need to be significant educational efforts, for both professionals and the lay public, that describe the potential or unforeseen repercussions of creating false memories with VR. Conceivably, a good Hollywood blockbuster could jumpstart at least water-cooler discussions and lay interest (Greenbaum 2008; 2014). ■

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