

The Potential of Military Mixed and Augmented Reality as an Interface of Dissociation

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Virtual Reality has made great advancements in recent years (Hamad & Jia, 2022). This and similar technologies however pose significant physiological, psychological, and societal consequences, both for good and for bad (NSPCC, n.d.; *How will VR and AR affect the future of work?*, 2022). As such, it is important that we gauge in every respect the impact that these technologies could have on society if they were to become more widespread before we blindly attempt to make them so.

One of the most important differences between Virtual Reality now and a decade ago is in its affordability. Consumer headsets have on the whole seen a steady decline in price over the past several years (Orland, 2022). This has not only provided the public at large with greater access to these technologies, but also a sizable user base that has both encouraged and enabled companies invested in Virtual Reality to further develop and refine their VR products as well as the systems that underlie them (“Omdia”, 2022).

These trends are without a doubt a significant factor in the burgeoning interest on the part of military institutions in the closely related technologies of Mixed Reality and Augmented Reality. The most public and well-known case of this is the nearly half a billion dollar US Army contract given to Microsoft to test, develop, and produce over one hundred thousand headsets ultimately for combat use (Novet, 2021). According to Microsoft themselves in 2021, some of the affordances provided by these headsets will be to allow users to “see through smoke and around corners”, overlay terrain onto their vision, and more effectively conduct training exercises (Bach, 2021).

This leads into the main concern of this paper: to what extent, however subtle it may be, does Mixed/Augmented Reality’s use in combat by ground forces risk further detaching a soldier

from their environment by lodging an interface between what would otherwise be a direct and immediate connection between the two.

Background

To begin with, we should make clear the differences between these technologies. According to Laia Tremosa of the Interaction Design Foundation (2023) Virtual Reality (VR), Mixed Reality (MR), and Augmented Reality (AR) fall under the broader category of Extended Reality (XR), covering all devices that add or substitute “digital elements” onto or in place of parts of the real world. They promote a revised version of Milgram and Kishino’s 1994 continuum model with Tremosa’s model having Extended Reality technologies lie on a spectrum ranging from the lighter touch of Augmented Reality which superimposes elements onto the real world (e.g. Pokemon Go) to Virtual Reality which entirely replaces the real world with an artificial environment (e.g. the Oculus/Meta Quest line of products). Mixed Reality lies between these two where objects from both the real and the virtual world can interact with one another. Though the focus of this paper leans more so towards the side of Augmented Reality, discussion of Virtual Reality is also advantageous thanks to its similarities to Mixed Reality and Augmented Reality and because of the relatively higher prevalence of literature concerning VR.

It must of course be made clear that in no way is the implementation of MR/AR by any military institutions a certainty. For example, since its inception, the HoloLens has induced nausea and has been faced with glaring connectivity and longevity issues during the ongoing testing period (Vincent 2022; Kallberg et al., 2022). Even ignoring the possible technical limitations, military MR/AR could prove itself to be too prohibitively expensive for widespread adoption to be feasible. At a price of \$3,500 USD as of 2021, the HoloLens headset is already

many times over in excess of the \$700 M4 Carbine, one of the most common standard issue rifles of the US Armed Forces at present. (Laporta, 2021; Novet, 2021).

If these hurdles *are* ultimately surmountable (or deemed sufferable) and MR/AR is indeed on a path towards expansion beyond purely civilian use, it becomes even more vital that we critically evaluate the potential dangers it might entail. Research by Morgan and Taylor (2013, 2014) has shown that, unlike previously thought, when placed in stressful situations, a significant portion of soldiers, 13.0% in their study, will intentionally induce dissociation from their environment to cope with the stress they are experiencing. While those who practice “deliberate dissociation” would be most at risk of being enabled by possible MR/AR-caused detachment, the further 57.4% who suffer from unintentional “spontaneous dissociation” would likely be susceptible to a degree as well. Moreover, as this study was conducted within a training environment rather than one of actual combat, it can be supposed that in those latter, higher stress scenarios the pervasiveness of deliberate dissociation among those who dissociate and of dissociation among all soldiers would increase significantly.

This risk of dissociation is worrying as research has shown that it is intimately connected to violence as it inhibits one’s ability to empathize with those around you. This involves external aggression against others such as in cases of domestic violence, sexual assault, and homicide (Moskowitz, 2004). The psychiatrist Robert Lifton has even argued that dissociation facilitated the heinous experiments conducted under the Nazi regime, though this is disputed by other researchers such as de Leeuw (2020). In addition, dissociation can exacerbate suicidal tendencies in those afflicted by the disorder; research on this notably includes soldiers and veterans (Shelef et al., 2014).

At least in terms of the danger presented during a conflict rather than in its aftermath, there is a clear imbalance in the power dynamic between, on the one hand, soldiers of developed nations capable of the expenditures necessary for these technologies, and, on the other hand, civilians of disproportionately conflict-vulnerable developing nations who risk being caught in the crossfire (Stewart, 2002). As the decidedly empowered party, we have an obligation to exercise that power as justly and as responsibly as possible.

Methodology

The most apparent limitation in researching this particular subject is the secrecy surrounding it. Though the technology itself has already found a solid place in public life, detailed circumstances surrounding its military application are of course classified. In lieu of direct investigation of the consequences of military MR/AR, analogous scenarios must be investigated instead.

Firstly, I look to evidence of dissociation in non-military implementations of this or similar technologies. This includes analysis of Extended Reality as used in psychiatric settings. Secondly, I explore evidence of dissociation among relatively less “cutting-edge” technologies used by militaries such as drones which might act comparably to MR/AR in putting distance between the operator and their affected surroundings.

Given the limited time and resources available to me, my research was conducted solely through literature review. My main framework in interpreting this literature is Actor-Network Theory as it assists in organizing the complex relationships that would make up this technology’s hypothetical military application (*Actor Network Theory*). ANT is particularly useful as my focus is on whether relationships between human actors will be pulled apart by Mixed/Augmented Reality acting as a non-human intermediary actor.

Discussion/Results

Renard et al. (2018) find that simply wearing “‘vision-deforming’ glasses” can induce dissociation, particularly in the form of “depersonalization” in which an individual feels “a sense of unreality towards [their] own thoughts, sensations, or actions”. This is in contrast to “derealization” which involves “a sense of unreality towards others or the external world”; the glasses did not create such a sensation. The particular glasses used within the study would blur closer to the rims while maintaining unimpaired vision at the center. Though Mixed/Augmented Reality headsets more so transform vision than they do deform it, it is nevertheless concerningly relevant that such a small change in the way one sees the world can affect their feeling of connection to it regardless.

Some studies have also been conducted to investigate the potential of MR and AR’s sister technology, Virtual Reality, to produce dissociation within its users. Participants of Aardema et al. (2010) displayed both depersonalization and derealization when using Virtual Reality headsets. Similar results were later found in more recent research by Peckmann et al. (2022).

While literature detailing studies of Virtual Reality’s impact on dissociation is relatively common, I was unable to find similar studies on Mixed/Augmented Reality, either supporting or dismissing them as sources of dissociation. In a 2023 review of psychiatric studies which used any form of Extended Reality to resolve or alleviate mental illness, Lundin et al. noted that just 6 of the 73 studies they found used MR/AR and only one of these 6 mentioned any adverse effects produced during the course of their studies (dissociation was not one of the effects, though it was not the subject of the study either) (Lundin et al., 2023). It is very possible that this lack of data is due to Virtual Reality literature being much more plentiful in general with one broad 2018 literature review finding that Virtual Reality articles were twice as common within their dataset

compared to Augmented Reality articles (Cipresso et al., 2018). This problem is likely further compounded by the perception of VR as inherently detached from the outside world whereas MR/AR maintain a more tethered and grounded experience making it less appealing as a candidate for dissociation research.

As for technology in its use by armed forces, Asaro (2013) notes in his research on military drones that contrary to expectation, drone operators often face more stress than their “on-the-ground” counterparts. According to him, there are a number of conflicting explanations as for why this may be the case. It may be due to the work truly being more stress-dense from having to repeatedly switch between civilian and non-civilian life every day or from the “intimate” nature of the work in which an operator is unable to detach themselves from their actions given the need for constant surveillance and attention. On the other hand, Asaro notes that Pentagon and NATO-sponsored research has concluded that the work of these operators is no more inherently stressful, but rather more frequent due to “overwork”. It should be noted that while the theoretical psychological effects of MR/AR use and drone use are similar in separating oneself from the outside world, the characteristics of the networks involved in the two are very different with the latter involving 80 human actors per aircraft according to Asaro which may contribute to the differing impact of each. In any case, studies on drones and their operators do not provide clear evidence for and, if anything, may contradict the idea that perceived distance allows one to distance oneself emotionally from their actions upon others.

Conclusion

Overall, it is unclear whether MR/AR could create a sense of dissociation for its users within the military. Some evidence suggests that even a minor change in one’s perception can

affect their ability to stay connected to their surroundings, whereas other sources seem to indicate the contrary.

While the results of this research are necessarily limited due to the nature of the subject in question, that makes it even more critical that we implore those who do have access to the classified resources pertaining to military Mixed and Augmented Reality to adequately investigate any negative consequences these technologies may incur before they are given the opportunity to reveal themselves in practice. Until such studies are possible for civilian researchers to conduct as well, it is also important that the public at large voices these possible concerns to their elected officials so that reasonable and arguably universally beneficial precautions can be taken if they are not being taken already.

In place of direct study of the military use of MR/AR, further participant rather than literature research should also be done with the particular goal of judging risk of dissociation posed by MR/AR and how it compares to the signs of dissociation already found in VR. If possible, studies on the impact of similar vision-altering devices such as Night Vision Goggles on dissociation should also be undertaken.

Although there is great deal of uncertainty surrounding the military use of Mixed and Augmented Reality as the technology gradually matures, it is nevertheless best that we err on the side of caution and practice proper due diligence while we continue to expand its potential. Doing otherwise would not only be an incredible disservice to the vulnerable civilian populations caught in the middle of our conflicts, but also to the soldiers we send to fight in them.

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