



# Commentary: The Ethics of Realism in Virtual and Augmented Reality

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## A Commentary on

### The Ethics of Realism in Virtual and Augmented Reality

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## INTRODUCTION

In their opinion article, “The Ethics of Realism in Virtual and Augmented Reality,” Slater et al. (2020) raised awareness on the manifold ethical issues arising from XR developing into a ubiquitous and daily used technology. The article of Slater et al. is true in every aspect. However, there was one further aspect missing, which will likely play a very important role when XR is no longer contained in laboratories and professional applications but a daily used technology: the ubiquitousness of drugs and their influence on perception and cognition in relation to XR.

## UBIQUITOUSNESS OF DRUGS

Drugs, legal and illegal ones, are consumed widely and often on a daily basis in every society, ranging from mild substances like caffeine, via tranquilizer, codeine, antidepressants, and other psychotropic substances, to alcohol, cannabis, opioids, amphetamines, and many more (WHO, 2018a,b; United Nations, 2019). All of these substances are influencing perception or cognition or both in manifold ways and magnitudes. According to the World Health Organization (WHO), alcohol was consumed in 2016 by 43% of the world population, with an additional 12.5% former drinkers (WHO, 2018a). In their report on global drug abuse, the WHO estimated drug abusers to number 271 million in 2017, among which 188 million are cannabis users, 53 million opioid users, 29 million amphetamine users, 21 million ecstasy users, and 18 million cocaine users (United Nations, 2019). The prescribed medication for the treatment of mental health disorders has doubled in OECD countries between 2000 and 2017 (OECD, 2019; United Nations, 2019).

## DISCUSSION

Because of the prevalent consumption of drugs, all points raised by Slater et al. (2020) should also be investigated from the aspect of the possible consequences that drug consumption could have on these points, except the points concerning data privacy, safety, and security issues. Besides risks originating from XR usage under the influence of drugs, there might also be potential benefits.

From both perspectives, implications for regulatory authorities and the research community are originating. However, given the broad range of existing drugs, distinctions between them have to be made as mild substances like caffeine are sure to be treated differently from substances like alcohol or opioids.

## Risks

Physical risks originating from a combined drug XR usage are to an extent dependent on the technological platform. The physical risk of hurting oneself or another person is likely higher when wearing a head-mounted display (HMD) than when using a sedentary XR system. However, the most eminent risk when combining drugs with XR is highly likely to emerge from unanticipated interactions between the technology platform and the XR content. Some drugs might lead to inducing stronger place/plausibility illusion and body ownership while others might diminish these phenomena. Further, the emotional impact of the digital content being enhanced when under the influence of certain drugs poses a high risk, especially for first-person experiences. Besides the actual drug(s) used during an XR experience, dosage effects are likely to play a role, too.

But, in addition, the influence of drugs on certain professional XR applications, especially in the medical field, needs to be investigated. One example is the treatment of patients with alcohol disorder who are often suffering from comorbid phobic disorders (Schneider et al., 2001; Schädé et al., 2005; Hobbs et al., 2011). Some specific questions arising here are as follows:

- Do commonly consumed medications influence XR-supported therapies, e.g., for phobic disorders?
- Does the consumption of any drug, like alcohol, cannabis, and tranquilizers, influence the likelihood of suffering post-traumatic stress disorder from an XR experience?

## Potential Benefits

Although risks in the combination of drugs and therapeutic XR exist, there might also be benefits. They could be combined in a positive therapeutic way; e.g., drugs could be used to get a person to relax during a therapeutic virtual reality (VR) experience to reduce negative emotions such as fear in anxiety exposure therapies. As current research is looking into the usage of psychoactive drugs to treat depressions, the idea of a positive drug-XR treatment combination should be investigated.

Further, a beneficial potential from the combination of drugs and XR exists for creativity. Artists will likely use drugs and XR experiences either to create artistic XR experience or as an inspiration for creating new music, painting, sculpture, or the like. Also designers of any kind might use drugs in combination with XR in order to improve their creative output. Of course, these potential positive effects cannot be separated from the investigation of physical and psychological health risks.

## Regulatory Implications

There are many questions arising in regard to the regulation of XR applications and XR research from the perspective of drug consumption. Slater et al. proposed a regulative frame for XR, with severe implications for XR research and business but also for legislation. This regulative frame will also need to address

the usage of XR in conjunction with legal drugs. Some questions arising here are as follows:

- Do we need an alcohol limit for (certain) XR applications?
- Do we need to forbid the usage of (certain) XR applications when taking tranquilizers, codeine, antidepressants, and other psychotropic substances?
- How are XR experiences regulated, when they are specially designed to be consumed in combination with drugs?

## Research Implications

In particular, for VR, there exists a plethora of research for its application in anxiety treatment (Parsons and Rizzo, 2008; Powers and Emmelkamp, 2008; Freeman et al., 2017; Carl et al., 2019), craving treatment (Hone-Blanchet et al., 2014; Pericot-Valverde et al., 2014; Ghită and Gutiérrez-Maldonado, 2018), or post-traumatic stress disorder treatment (Gerardi et al., 2010; Beidel et al., 2019), where participating patients are treated with antidepressants, anxiety-reducing medication, or the like. However, the influence of these medications is not the focus of these studies but solely the applicability of VR for treatment purposes. Another field where VR is used under the influence of a drug is driving studies, where VR is used as a safe evaluation environment. Here, the influence of alcohol consumption (Irwin et al., 2017) but also of stimulation medication (Barkley and Cox, 2007) is studied. However, also in the VR driving study field, the influence of the drug itself on the VR experience is barely investigated. As important and relevant the investigation of the influence of drugs on XR is, there is to date very limited work published in this area. Lorenz et al. (2018) investigated the influence of low-dosage ethanol consumption on presence, user experience, and usability, finding no influence. However, this is just a first very small insight, which needs to be further substantiated, validated, and extended by the XR research community.

Slater et al. (2020) argued that “using XR entails modifying our current perception of reality” and that “experiences in virtual or augmented reality may become indistinguishable from reality.” Therefore, it seems likely that people will experiment with XR experiences in combination with psychoactive substances such as LSD or magic mushrooms. Science needs to investigate how such combined experiences influence the negative effects of such drug use.

There is a major need for research addressing the issues arising from combined drug and XR use. But also for the XR research community itself, fundamental research questions arise such as the following:

- During the development of existing measures for presence, place illusion, plausibility illusion, agency, body ownership, etc., the influence of drugs was not considered. Are these existent measures therefore still reliable when certain drugs are consumed? Do new measures need to be developed?
- Is the sense for distinguishing XR from reality impaired by alcohol, tranquilizers, codeine, antidepressants, and other psychotropic substances?
- Is alcohol consumption leading to an easier trust in virtual characters and virtual avatars of humans?

- How can the XR research community investigate drug influence in an ethical way?

In particular, the last question is fundamental for researching drugs in combination with XR. At first, the investigated drug surely is important for the research approach, as, e.g., actively administering caffeine to study participants surely is different from alcohol, which is also surely different from opioids. Further, the XR research community can adapt the ethical guidelines used in driving studies to investigate alcohol, cannabis, or stimulation medicine. To investigate medication for mental health disorder treatment, XR researchers could team up with researchers already using XR for treatment. Lastly, most of the relevant drugs are very well researched and understood. XR researchers could, e.g., investigate the known effect of different alcohol dosages on perception and cognition emotion to derive more specific research questions and hypotheses. Further, XR researches could adapt the method used to investigate the physical and psychological effects of a substance to the XR context.

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The questions presented here represent only a tiny portion of relevant research questions regarding the influence of drugs on XR. The aim of this commentary is not to give a conclusive picture of the entire research agenda but to raise awareness for this topic and to provide some initial research questions.

## AUTHOR CONTRIBUTIONS

ML wrote, conceptualized, and drafted the commentary.

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**Conflict of Interest:** The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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