Augmented Cognition for Music Play & Interaction

Abstract

The term "augment" in regards to cognition is a loosely defined concept under HCI referring to non-invasive apparatuses and equipment that modify a cognitive experience. In general, music along with many art forms are rapidly digitizing and significant changes are happening in regards to how these forms are created, consumed and learned. Unlike the advent of .jpgs and .mp3s, this form of experience digitization is crossing the boundary of the internet, the physical, and the mind itself. This prompts an augmented cognition framework for creators and learners to harness the latest developments in bridging the mind and computers as the future of music unfolds. Here we seek to define augmentation for music play and interaction, and structure the augmented music experience as an emerging common form.

Table of Contents

1 Introduction

Music's extended domain is changing rapidly with the marketization of digital platforms hitting their stride and forcing music makers, especially in live performance hot zones of cities, to adapt rapidly inside an online environment. Consequently the digital domain has taken the initiative in its dominance over musicians livelihoods for which they depend on income and outreach. In the face of restricted shows, closing venues, and mental health cancellations musicians are facing significant immobility[1] despite being given access to the far reaches of the internet. Meanwhile streaming services are increasing their market dominance and advertising, although user and consumer oriented services like Bandcamp have provided Friday's where they give 100% of sales to musicians. Large streaming services like Spotify who are broadening their monopolization through their research laboratories are increasingly becoming threatening entities, especially with the sharp tools of their data collection being fed into machine learning.

Music education is also changing, although it may seem not of much interest, the way music is learned is how it is cultivated and propagated. With learning becoming more remote, prospective musicians are learning on screens. Our current interfaces being phone or computer displays are a different learning process taxing cognitive resources[2] taking away from the instrument experience. Consequently instruments that take certain ear and technique training like the violin or in an extreme case the theremin are in need of a better method as the direct response of a teacher with a trained ear is much less likely to be present. This can be made up for with mixed reality experiences[2] that correlate to useful and necessary feedback for a learner. An interesting double edge to this is that these augmented learning experiences might become so good that those who use them will have a clear cut advantage over those who do not. They might

as well pick up the technique of the computer assisting them which might be a welcomed or dismissed bias.

Another level of augmentation will be the new live experiences[3] for the music consumer. This is a very experimental area as new interfaces are developed, but as humans begin to reject crude screens for more fluid means of interacting with technology music experiences will be no exception. Augmentation will be the ideal, as VR does not convey the in person worth of attending any musical experience. Concerts might begin to offer ultra sensory experiences, for instance there was a silent disco where people wore headphones instead of speakers. What other interfaces might be offered?

Music production will also be changing. Two parallel paths run: that corporations with access to large data models will begin to experiment using artificial intelligence to develop their main artist investments either partially or scarily fully, and that the regular music studio or independent producer will make use of augmented technology to improve their work as well as the former path mentioned. Those in the music studio are under heavy pressures[4] and would benefit from augmented technology to assist their workflows.

In every art form, augmentation will have a central place as we seek to broaden our media experiences during a time where the internet is flushed with too much content dampening our response to any individual experience. Augmentation will provide the scalable, non-invasive and interactive format for art to be connected with.

2 Traditional Cognitive Augmentation

Make some mention of how augmentation was defined in the past, and some examples of technology developed in relation to the idea. Maybe discuss old methods of VR and other extraneous sensory experiences.

3 Music Cognition Augmentation

Main bulk of the article discussing the definition of what it means to augment music experiences in general, and how other related models of cognition play into it. Distributed cognition and interface studies likely will be mentioned. Enactive things.

4 Sensory Extensions

Make some mention of how specific sensory extensions are achieved through augmented technology and interfaces. Discuss other methods for this.

5 Performance Integration

How this framework will fit into live performances from musicians. Musicians might make use of augmented technology in the performance, for their own instrument playing, their instrument might be modified in some form, they prepared with augmented learning, the audience might be using some augmented technology, etc.

6 Music Education Assimilation

Music education will be changing wildly with more usable VR and AR, and this might produce some biases in how music is learned. This also will change the waves in which music propagates, and the skills of musicians themselves. Why might some opt out and prefer to learn music and/or an instrument the traditional natural way.

7 Instruments and Creative Interaction

Instruments are going to become more personalized and augmented, what is the framework for this? How far might this go from bridging the instrument to include the audience in the instrument's capabilities or the entire performance?

8 In The Studio

Straightforward discussion on how workflows in studios will be improved by augmented technology and related experiences. Discuss how large corporations are going to take advantage of such technology to dominate the market.

9 Broader Mixed Media & Art Augmentation

Bring discussion outside music and into all sorts of mixed media augmented experiences which inherently will include music.

10 Conclusion

Rehash all points made into concise conclusion.

---

11 References

1. Kao, J. (2021). Another Perspective: Music Education in the Age of Innovation. *Music Educators Journal*, *107*(3), 63–69. https://doi.org/10.1177/0027432121994079
2. Johnson, D., Damian, D., & Tzanetakis, G. (2020). Evaluating the effectiveness of mixed reality music instrument learning with the theremin. *Virtual Reality : the Journal of the Virtual Reality Society*, *24*(2), 303–317. https://doi.org/10.1007/s10055-019-00388-8
3. Zioga, P., Pollick, F., Ma, M., Chapman, P., & Stefanov, K. (2018). "Enheduanna—A Manifesto of Falling" Live Brain-Computer Cinema Performance: Performer and Audience Participation, Cognition and Emotional Engagement Using Multi-Brain BCI Interaction. *Frontiers in Neuroscience*, *12*, 191–191. https://doi.org/10.3389/fnins.2018.00191
4. Lefford, M. N., & Thompson, P. (2018). Naturalistic artistic decision-making and metacognition in the music studio. *Cognition, Technology & Work*, *20*(4), 543–554. https://doi.org/10.1007/s10111-018-0497-8