

BGM, SFX, and Perceived Immersion in Video Games

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INTRODUCTION

Background music (BGM) such as theme songs and other various musical compositions create ambience resonant with a game's mood and player emotions. On the other hand, sound effects (SFX) such as contextual action and environmental sounds provide responsive feedback that facilitates a dynamic sense of engagement.

BGM and SFX are essential to create immersive gaming experiences.

While prior research recognized and underscored the individual roles of video game BGM and SFX in player immersion, their synergistic relationship seeks further exploration. Moreover, scholars of ludomusicology recommend exploring video game music through the lens of player immersion with different game genres as case studies.

This study explored how the interplay of BGM and SFX influenced perceived immersion in *Fields of Mistria*, an exemplar of the farming simulation genre underexplored in ludomusicology.

METHODOLOGY

196 participants, all recruited online via Amazon Mechanical Turk, participated in a 2 (**BGM: absent vs. present**) x 2 experiment (**SFX: absent vs. present**). Participants were randomly assigned to watch **1 of 4 gameplay videos** with identical visuals but varying audio conditions.

Participants subsequently answered a modified **Immersive Experience Questionnaire** (Rigby et al., 2019; Jennett et al., 2008) which assessed overall immersion through subscales that measure captivation, real-world dissociation, comprehension, and transportation.



RESULTS

TWO-WAY ANOVA: Immersion

A two-way ANOVA examined the effect of BGM and SFX on **overall immersion**. There was no main effect of BGM, $F(1, 192) = .21, p = .650$ or SFX, $F(1, 192) = 1.78, p = .184$. **However, the interaction effect of BGM and SFX was significant**, $F(1, 192) = 4.03, p = .046$. BGM: Absent ($M = 124.26$) was non-significantly higher than BGM: Present ($M = 123.21$) and SFX: Present ($M = 125.20$) was non-significantly higher than SFX: Absent ($M = 122.25$).

TWO-WAY ANOVA: Captivation

A two-way ANOVA examined the effect of BGM and SFX on **engagement, a factor of captivation**. There was no main effect of BGM, $F(1, 192) = .08, p = .776$ or SFX, $F(1, 192) = 1.74, p = .189$. **However, the interaction effect of BGM and SFX was significant**, $F(1, 192) = 6.36, p = .013$. BGM: Absent ($M = 5.62$) was non-significantly higher than BGM: Present ($M = 5.57$) and SFX: Present ($M = 5.70$) was non-significantly higher than SFX: Absent ($M = 5.48$).

TWO-WAY ANOVA: Transportation

A two-way ANOVA examined the effect of BGM and SFX on **detachment, a factor of transportation**. There was no main effect of BGM, $F(1, 192) = .68, p = .411$ or SFX, $F(1, 192) = .02, p = .883$. **However, the interaction effect of BGM and SFX was significant**, $F(1, 192) = 5.69, p = .018$. BGM: Absent ($M = 5.64$) was non-significantly higher than BGM: Present ($M = 5.49$) and SFX: Present ($M = 5.57$) was non-significantly higher than SFX: Absent ($M = 5.56$).

A two-way ANOVA examined the effect of BGM and SFX on **presence, a factor of transportation**. There was no main effect of BGM, $F(1, 192) = 2.36, p = .126$ or SFX, $F(1, 192) = 1.32, p = .251$. **However, the interaction effect of BGM and SFX was significant**, $F(1, 192) = 5.23, p = .023$. BGM: Absent ($M = 5.74$) was non-significantly higher than BGM: Present ($M = 5.48$) and SFX: Present ($M = 5.70$) was non-significantly higher than SFX: Absent ($M = 5.52$).

RESULTS

TWO-WAY ANOVA: Comprehension

A two-way ANOVA examined the effect of BGM and SFX on **understanding, a factor of comprehension**. There was no main effect of BGM, $F(1, 192) = 2.19, p = .141$ or SFX, $F(1, 192) = .54, p = .463$. **However, the interaction effect of BGM and SFX was significant**, $F(1, 192) = 5.27, p = .023$. BGM: Absent ($M = 5.78$) was non-significantly higher than BGM: Present ($M = 5.52$) and SFX: Present ($M = 5.70$) was non-significantly higher than SFX: Absent ($M = 5.59$).

A two-way ANOVA examined the effect of BGM and SFX on **cognition, a factor of comprehension**. **A main effect of SFX was found**, $F(1, 192) = 4.02, p = .046$, but there was no main effect of BGM, $F(1, 192) = .27, p = .604$. The interaction effect of BGM and SFX was also not significant, $F(1, 192) = .17, p = .683$. **SFX: Present ($M = 5.67$) was significantly higher than SFX: Absent ($M = 5.30$)**. However, BGM: Present ($M = 5.53$) and BGM: Absent ($M = 5.44$) did not significantly differ.

DISCUSSION

The main effects of BGM and SFX on **immersion** are non-significant, but their interaction effect is significant. This means that **while BGM and SFX alone are unable to influence the immersive experience, together they do**. Closer analyses of the subscales that constitute immersion may provide insight on why.

The main effects of BGM and SFX on **engagement**, a factor of captivation, are non-significant, but their interaction is significant. It could be that **the interaction of BGM and SFX made the experience of watching the main character throughout the gameplay clip more enriching which fostered a deeper sense of engagement**. This finding could provide insight to how BGM and SFX make a game more captivating through the engaging properties of sound and music.

The main effects of BGM and SFX on **detachment** and **presence**, separate factors of transportation, are non-significant, but their interaction is significant. It could be that **BGM and SFX facilitate transportation by creating a sense of otherworldliness for the participant and focusing their senses to the fantastical in-game world rather than the real world**. These findings provide insights to how BGM and SFX situate players in the new, in-game world.

The main effects of BGM and SFX **understanding**, separate factors of comprehension, are non-significant, but their interaction is significant. It could be that **BGM and SFX help participants understand the logic of the elements presented in the game**. The joyful BGM communicates that the game is meant to be light-hearted while the SFX provides tactile feedback for the player based on the activities they are engaging in. The corresponding sounds make sense, and the player understands the results of their actions.

The main effect of SFX on cognition, another factor of comprehension, was significant, but the main effect of BGM and their interaction effect were non-significant. **SFX: Present had a higher mean score than SFX: Absent, indicating that a game's sound effects may help players process what they are doing in the game more effectively**.

IMPLICATIONS & LIMITATIONS

Fostering engagement, focusing senses to the game world, providing logical auditory feedback, and aiding in processing game elements are ways that sound and music facilitate immersion. These insights could be useful for games user researchers, game directors, and audio designers.

This study could be improved. Studying actual players could provide a deeper look at the immersive properties of BGM and SFX than participants watching a video which lacks interactivity.

REFERENCES

- Jennett, C., Cox, A. L., Cairns, P., Dhoparee, S., Epps, A., Tijs, T., & Walton, A. (2008). Measuring and defining the experience of immersion in games. *International Journal of Human-Computer Studies*, 66(9), 641–661. <https://doi.org/10.1016/j.ijhcs.2008.04.004>
- Rigby, J. M., Brumby, D. P., Gould, S. J. J., & Cox, A. L. (2019). Development of a questionnaire to measure immersion in video media: The Film IEQ. *Proceedings of the 2019 ACM International Conference on Interactive Experiences for TV and Online Video (TVIX '19)*, 35–46. <https://doi.org/10.1145/3317697.3323361>