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Multisensory Expectation and Mental Imagery in Music Cognition

Abstract

This study investigates the role of expectation, mental imagery, and multisensory integration in music cognition through a ten-week experimental project focused on songwriting. Drawing upon principles from embodied cognition and expectation theory, we conducted task-based sessions involving melodic memory, lyric revision interference, gesture-based rehearsal, and improvisation under constraint. Findings reveal that cognitive load varies by sensory dominance across compositional phases and that expectation disruption can be leveraged to stimulate creative deviation.

Introduction

The creation, perception, and performance of music engage a wide array of cognitive processes, including auditory pattern recognition, memory, motor planning, and emotional regulation. Songwriting provides a rich setting to examine how cognitive systems interact across sensory modalities. This study identifies patterns of expectation, mental imagery, and multisensory mapping using qualitative and task-based observation

Background and Related Work

Contemporary music cognition research highlights multisensory interaction and embodiment. Margulis et al. (2023) found that cognitive expectations affect musical enjoyment. Luo et al. (2023) and Hsu et al. (2022) link music training to executive function improvements. Riedl et al. (2023) introduced neural simulations of auditory perception. Godøy and Leman (2022) explore mental imagery's role. This study aligns with the 4E framework in musical creativity (van der Schyff et al., 2023)

Methodology

The study occurred over ten weeks at PERFI8TH INC. with four trained songwriters. Methods included:

- Constraint-based improvisation

- Melody recall under semantic load

- Gesture-based silent rehearsal

- Cognitive mapping via interviews and journaling

Results

- Average 1.2s delay in responding to unexpected modulation

- 31% reduction in melodic retention with dense lyrics

- 15% improvement in timing using gesture rehearsal

- Modality dominance: 52% auditory, 28% visual, 20% kinesthetic

Discussion

Songwriting involves dynamic reweighting of multisensory input. Lyric revision disrupted melody recall, suggesting intertwined encoding for language and pitch. We propose a model with four phases: Sensory Activation, Structural Mapping, Expectation Resolution, and Emotional Framing.

Conclusion and Future Work

The project enhances understanding of musical creativity and cognition. Future work may include biometric tracking and neuroimaging, as well as cross-genre and multilingual research expansion.

References

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