

Musical structure, listener orientation, and time perception

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Background in music psychology

In an ecological approach (Gibson, 1979), time is not directly perceptible, but change and motion are. Musical time perception should therefore depend on musical content and temporal structure. Jones & Boltz (1989) and Boltz (1992) demonstrated that a coherent musical structure facilitates the generation of expectancies, and thus duration estimation. Kreitler & Kreitler (1980) considered the cognitive orientation of the listener: a familiar situation does not satisfy our drive to explore, and so generates no expectancies, whereas complex stimuli lead to cognitive overload. We therefore predict that optimal cognitive orientation and accurate time estimation are facilitated by *medium* stimulus predictability.

Background in music philosophy

The pragmatist Dewey (1988) explored the aesthetic implications of interactions between organisms and environments. Life is a rhythmical alternation between states of tension/conflict (e.g. hunger) and of release/harmony – enabling us to experience both pleasure and time by anticipating future events. Orientation involves remembering past and anticipating future events in every moment. Thus, time perception is related to structural perception.

Aims

In a realistic music listening situation, we test whether accurate time estimations correspond to high listener orientation and medium perceived structuredness.

Main contribution

Method. 30 subjects (2 experiments @ 15) with mixed musical experience (lay to professional) and ages (15 - 65 years) heard 20 stylistically diverse musical excerpts. The duration of each excerpt was 30 seconds in Expt. 1 and 3 minutes in Expt. 2. Each listener heard excerpts in a different random order. After each excerpt, listeners rated the music's tempo, duration, predictability, variability, closure, familiarity and pleasantness, and their own arousal and attention. All responses were on 7-point scales except duration (in seconds or minutes).

Results. In Expt. 1 (30 s, mean estimated duration 28.3 s), duration estimates were higher for music rated *more predictable* and of *medium variability*. In Expt. 2 (3 min, mean estimated duration 4.9 min!), duration estimates were higher for music rated *less predictable* and *more variable*. To clarify these data, we combined the variables predictability and variability into a new variable called *perceived structuredness*, expecting that listener orientation and accuracy of duration estimates would be higher for medium perceived structuredness. But in Expt 1, duration was independent of perceived structuredness, while in Expt 2 duration estimates decreased as perceived structuredness increased.

Conclusions. Listeners' orientation and time estimation strategies depended on the duration of the music, and so changed as the music progressed. Information important for the perception of short durations appears to have been lost after about one minute – possibly explicable by a memory buffer model (e.g., Baddeley, 1986).

To test this hypothesis and its stimulus dependency, we could repeat our experiment with a different stimulus (e.g., speech) or with silence.

Implications

The importance of the relative duration of the movements of a musical work appears to decline as the work becomes longer. If that is so, composers should pay more attention to issues of formal balance in shorter than longer works.

Time perception seems central to music perception and aesthetics, but is difficult to investigate scientifically. Further progress may be possible if cultural and scientific musicologists work more closely together.

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