

Groove, swing and the role of tempo: A model and some preliminary empirical evidence

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Background

The role of tempo in modeling expressive timing in music performance has been on the research agenda for quite a while now. While earlier models suggested relational invariance (i.e. timing scales proportionally with tempo), later studies showed that timing actually adapted with tempo in performance (Friberg & Sundström, 2002). However, the effect of tempo on timing was mainly studied in piano music from the classical and romantic period. In jazz and pop performance it was only scarcely investigated, Collier and Collier (1996) being an important exception.

Aim

In this study we present empirical data and a model that tries to capture the effect of tempo in two types of timing in drumming: groove and swing.

Methods

To model the relation between timing and tempo we make use of a knowledge representation of musical time (named *generalized timing functions*; Honing, 2001) that allows to describe both aspects of musical time separately and evaluate them using an analysis-by-synthesis method. To capture the desired behavior we optimized the parameters of the expressive timing component of the model by fitting it to newly acquired empirical data. Therefore three well-known expert drummers participated in a controlled experiment in which they were asked to perform three musical fragments in sixteen repetitions in six different tempi on a complete midi drum kit.

Results

Analyses of the empirical data show that the timing patterns within swing change significantly between tempi while being consistent within tempo (in line with earlier research). However, as opposed to what was hypothesized, timing within one of the two groove excerpts does scale proportionally to tempo. Depending on the type of timing (swing, groove, etc.) the micro timing deviations are scaled in an intricate way to, apparently, communicate a similar sense of swing or groove to the listener (Haas, 2007). In the presentation both audio examples of the three musical fragments using the analysis-by-synthesis method and examples of the empirical data will be presented. Next to the statistical support, this allows for judging how well the captured regularities generalize over tempo and timing perceptually.

Keywords: Timing, Tempo, Groove, Swing, Generalized timing functions.

References

- Collier, G., & Collier, J. (1996, August). The Swing Rhythm in Jazz. In B. Pennycook & E. Costa-Giomi (Eds.), *Proceedings of the 4th International Conference on Music Perception and Cognition* (pp. 477–480). Faculty of Music, McGill University, Montreal.
- Friberg, A., & Sundström, A. (2002). Swing Ratios and Ensemble Timing in Jazz Performance: Evidence for a Common Rhythmic Pattern. *Music Perception*, 19(3), 333–349.
- Haas, W. B. de. (2007). *The Role of Tempo in Groove and Swing Timing*. Unpublished master's thesis, Utrecht University.
- Honing, H. (2001). From Time to Time: The Representation of Timing and Tempo. *Computer Music Journal*, 25(3), 50–61.

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