Music and Motion

Beatrice Bretherton
University of Stirling
beb00009@students.stir.ac.uk

Roger Watt
University of Stirling
r.j.watt@stir.ac.uk

1. INTRODUCTION

Music is very effective at generating sensations of motion. From a music psychology perspective this is fascinating. Investigations can tell us about the events that occur within the minds and bodies of listeners when listening to music. However, how do we visualise the processes and states associated with the experience of musical motion? We believe that Heart Rate Variability (HRV) and motion curves are two ways of achieving this.

2. MUSIC AND AUTONOMIC NERVOUS SYSTEM ACTIVITY

The Autonomic Nervous System (ANS) switches the body between two basic states of arousal: “fight or flight” and “rest and digest”. Fluctuations in these two arousal states are influenced by music and can tell us about the inner motions that occur when people listen to music. In pilot research, we have used HRV to visualise the physiological motions individuals experience when exposed to music. HRV quantifies ANS activity over small durations by measuring the variance in intervals between heartbeats. Findings demonstrate that music can physiologically move listeners in distinctive ways: music can increase ANS activity, so arouse listeners. Or music can decrease ANS activity and therefore calm listeners.

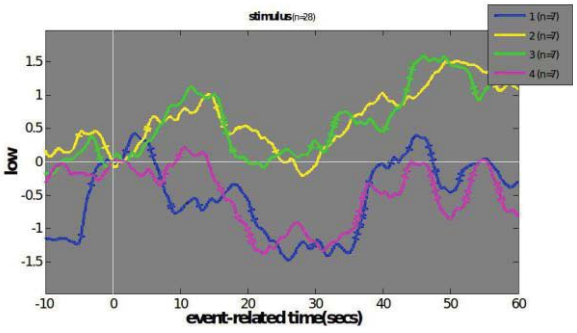

Figure 1: *ANS activity for four pieces of music*

Figure 1 demonstrates that in our research, music samples 2 and 3 aroused listeners, whereas, music samples 1 and 4 calmed listeners. Upon further inspection, rises and falls in ANS activity coincided with certain musical features, including: changes in timbre, dynamics and musical articulation. These findings suggest that music physiologically moves individuals and by using HRV, it is possible to visualise experiences of musical motion.

3. MUSIC AND MOTION CURVES

Motion curves, originally developed by Alexander Truslit, provide another means for visualising musical motion. Here participants are asked to draw curves that characterise the dynamic motion perceived within music. Motion curves can tell us about motion perception consistency between individuals and overcome methodological issues associated with participant disengagement. Our current research uses motion curves and HRV to explore the psychological and physiological correlates of perceptions of motion in music. It is hoped that findings from this research will determine the reliability of motion curves as a method for visualising musical motion perception. In addition, findings will contribute to our long term aim of developing a fully integrated and multisensory method for visualising perceptions of motion in response to music.

4. REFERENCES

Berntson, G. G., Quigley, K. S., and Lozano, D. (2007) Chapter 8: Cardiovascular psychophysiology. In J.T. Cacioppo, L.G. Tassinary & G.G. Berntson (Eds.) Handbook of psychophysiology 3rd edition. (pp. 182-211). New York: Cambridge University Press.

Clarke, E. (2005) Ways of listening: An Ecological Approach to the perception of musical meaning. New York: Oxford University Press.

Repp, B. H. (1993) Music as motion: A synopsis of Alexander Truslit's (1938) “Gestaltung und bewegung in der Musik”. Haskins Laboratories Status Report on Speech Research, SR-111/112, 265-278.