Proceedings of the 12th International Conference on Music Perception and Cognition and the 8th Triennial Conference of the European Society for the Cognitive Sciences of Music, July 23-28, 2012, Thessaloniki, Greece
Cambouropoulos E., Tsougras C., Mavromatis P., Pastiadis K. (Editors)

Involuntary musical imagery and musical structure – do we get earworms only for certain tunes?

Sebastian Finkel[*1], Daniel Müllensiefen[#2]

[*]*Institute of Medical Psychology and Behavioural Neurobiology, University of Tuebingen, Germany*
[#]*Department of Psychology, Goldsmith College, University of London, UK*
[1]sebastian.finkel@uni-tuebingen.de, [2]d.mullensiefen@gold.ac.uk

ABSTRACT

Background

Involuntary Musical Imagery (INMI) or 'earworms' describes the prevalent phenomenon whereby tunes get stuck in one's head. INMI appears spontaneously and repeatedly, triggered by a variety of mental or environmental stimuli. It is hardly researched and has only attracted attention in psychology during the last few years (e.g. Beaman & Williams, 2010; Liikkanen, 2008; Williamson, 2012).

Aims

To our knowledge, this is the first study using computational analysis to investigate structural aspects of INMI tunes. Our aim is to develop a statistical model that can distinguish between songs that get frequently named as earworms and matched songs that never occur as INMI songs on the basis of unique musical features.

Method

We are using an exploratory design including computational statistical modelling techniques and musical feature analysis software (FANTASTIC, Müllensiefen, 2009) to investigate structural aspects of INMI. Musical features of songs named as INMI in a large internet sample (around 1500 respondents) as well as matched control songs were computed and then used in a logistic regression model. We controlled of popularity and recency of the INMI songs named using a chart database. As output the model classifies each song as either earworm or non-earworm tune.

Results

The procedure resulted in a model with two features: d.median (p=0.01**); a measure for the duration of note lengths and i.mode (p=0.03*); a measurement for the frequency of intervals. Comparing this model with the Null model, using a Wald's Chi-square test, revealed that the model is significant: χ^2 (2, N = 58) = 6.662, p = 0.0358 *. Our present modelling results have a prediction accuracy of 61%. We are currently improving the model by using a larger corpus of songs as well as employing more powerful classification techniques from the machine learning field (e.g. random forests).

Conclusions

The results of this study demonstrate that it is possible to use methods from computational musicology and statistical to detect the structural differences of songs that listeners frequently report as earworms. The present approach promises new insights into the cognition of music in everyday life using quantitative methods. We hope to address the role of memory and emotions on INMI in the future.

Keywords

Involuntary musical imagery, INMI, computational modelling, musical memory, earworms

REFERENCES

Beaman, C. P., & Williams, T. I. (2010). Earworms ("stuck song syndrome"): Towards a natural history of intrusive thoughts. *British Journal of Psychology*, 101(4), 637-653.

Liikkanen, L.A. (2008). Music in everymind: Commonality of involuntary musical imagery. *Proceedings of the 10th International Conference of Music Perception and Cognition*. Sapporo, Japan.

Müllensiefen, D. (2009). *FANTASTIC: Feature ANalysis Technology Accessing STatistics (In a Corpus)*. Technical Report v1.5, Goldsmiths, University of London.
URL:http://www.doc.gold.ac.uk/isms/m4s/FANTASTIC_docs.pdf.

Williamson, V., Jilka, S., Fry, J., Finkel, S., Mullensiefen, D. & Stewart, L. (2011). How do earworms start? Classifying the everyday circumstances of Involuntary Musical Imagery (Earworms). *Psychology of Music.*