

Towards a Better Understanding of Emotion Communication in Music: An Interactive Production Approach

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PhD research funded by the Tertiary Education Scholarship Scheme (TESS)

As a pianist and music composer, the fact that musicians are able to express emotions in music was always of interest to me. When one studies performance and music theory, one is instructed how certain things in the music affect the perception of the listeners. One classic example is the major/minor mode effect, which is inadvertently one of the first things that I learned in my music lessons when I was young, where a 'major' mode is attributed to happiness, whilst a 'minor' mode is attributed to sadness in Western music. Similarly, in music lessons, you learn how to play 'expressively' by following certain expressive markings in the score, without necessarily delving into the how and why certain features of the score and expressive markings help encode an emotional expression in the music. This interest led me to read for a PhD in Music Psychology at Durham University in the UK, where I set to determine how particular musical features and their combinations helped shape seven different emotional expressions in music.

Although it has been well established that composers and performers are able to encode certain emotions in music, which in turn, are generally and successfully decoded by listeners, there is still much to discover as to how musical cues combine to shape different emotions in the music, since previous literature has tended to focus on a limited number of cues and emotions. The work in my PhD research aimed to investigate how combinations of tempo, articulation, pitch, dynamics, brightness, mode, and instrumentation, are used to shape sadness, joy, calmness, anger, fear, power, and surprise in Western tonal music. In addition, I created new tools for music and emotion research with the aim of providing an efficient production approach to explore a large cue-emotion space in a relatively short time. Furthermore, I wanted to explore how both musicians and non-musicians think emotions sound like in music. To this end, I created a new interactive interface called *EmoteControl* which allows users to alter musical pieces in real-time through the available cues, without the need of any prior musical knowledge. I also specifically composed musical pieces to be used as stimuli in my research. Multiple empirical experiments were then carried out using the interface and musical pieces created, to determine how participants shaped different emotions in the pieces using the available musical cues. The emotions under investigation were shaped in the musical pieces using specific cue combinations. Findings revealed that overall, mode and tempo were the strongest contributors to the conveyed emotion whilst brightness was the least effective cue. However, the importance of the cues varied depending on the intended emotion. Calmness, sadness, and joy were the three emotions portrayed most consistently across experiments, which suggests that individuals have a rather specific idea of how these

emotions should sound like in music. Emotions with similar valence and arousal properties, such as fear and anger, tended to be mixed up. Cue combinations used to portray power and surprise had the most variation across experiments, potentially due to the possibility of perceiving these emotions as both positive- and negative-valenced. Finally, a comparative evaluation of production and traditional approaches was carried out which showed that similar results may be obtained with both methodological approaches. However, the production approach using the newly created *EmoteControl* interface allowed for a larger cue-emotion space to be navigated in a shorter time. In sum, the production approach allowed participants to directly show us how they think emotions should sound, and how they are shaped in music.

This research and my PhD journey at Durham University (UK) would not have been possible without the support and funding provided by the Tertiary Education Scholarship Scheme, for which I am immensely grateful. Apart from helping me increase my knowledge as an individual, the research supported by this funding was also published in international peer-reviewed journals and presented at international conferences, and most importantly, furthered the current literature in the music and emotion field, which, although being a relatively small one, is one of utmost importance as it has implications for multiple fields, such as that of music therapy, marketing, film and media, and other industries which utilise music as a tool for emotion communication.