

# QUANTITATIVE ANALYSIS OF TONE QUALITY IN RELATION TO ITS ROLE IN EXPRESSIVE MUSIC PERFORMANCE: A STUDY IN THE ACOUSTIC PROPERTIES OF INDIVIDUAL GUITAR SOUNDS

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## Background

There has been much research on different aspects of expressive musical performance, considering factors such as pitch, intonation, loudness (dynamics), articulation, timing (note onset and offset), and timbre. This paper concerns the study of timbre (or tone quality) in recordings of the acoustic guitar.

## Aims

The professional solo performer will have developed sufficient technical command to be able to produce a wide range of tone colours. Choices as to what sound will be produced at any given moment will be made according to context and the player's imagination and expressive and interpretative intentions. It follows that since tone production is an essential part of learning to play a musical instrument (at any level), a means of measuring the nature and variation of the sounds produced would be a valuable step towards greater understanding of the nature and potential of tone.

## Method

Using spectral analysis techniques (including Fourier transforms and filterbank techniques), this paper seeks to undertake a quantitative analysis of individual musical notes. The instrument considered

to be most appropriate for the experiments was the classical guitar, due to the clear onset of the sound, the direct nature of the player's control of that sound and the distinctive tonal qualities of different types of right hand articulations.

## Results

Novel filtering techniques were developed to separate the note onset (in this case, the stroke, or duration of right hand finger contact) from the subsequent decay. The acoustic properties of the onset were then parameterised and compared to the time-varying frequency components present during the decay.

## Conclusions

By modelling this individual aspect of expressive musical performance, this type of analysis allows the objective study of tone quality. Such measurements will enable an accurate analysis of the tonal elements of performance in a range of contexts.