Matthew Weisberg
Computational Musicology
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Annotated Bibliography for Final Project

Bradley, M. M. (2009). Natural selective attention: Orienting and emotion. *Psychophysiology*, *46*(1), 1-11.

The authors of this paper seek to describe the relationship between stimuli and attentional resource allocation in humans. The authors draw connection between stimulus novelty, physiological change and emotional motivation of behavior.

The authors claim that humans are very strongly oriented to novel stimuli, and that novelty primarily elicits *defensive* emotions in humans because the unknown stimuli bears the threat of danger. This is extended to known stimuli that differ from our expectations of how that stimulus should behave.

Chuen, L., Sears, D., & McAdams, S. (2016). Psychophysiological responses to auditory change. *Psychophysiology*, *53*(6), 891-904.

In this paper, the authors study the effects of changes in auditory features on measurable body characteristic such as heart rate, breathing rate and skin conductivity. This methodology is used in the psychopathological community to understand how humans physical state responds to changes in their environment. This paper seeks to explore those metrics to study responses to auditory changes, including timbre, pitch and tempo.

The authors found that many auditory features influenced these body responses. Within timbre, the authors began with a tone and changed one of three parameters: attack time, spectral centroid and spectral flux. The authors found that changes in spectral flux, or the amount of change in timbral content over time, led to the greatest changes in both heart rate and skin conductivity.

Jones, D., Alford, D., Bridges, A., Tremblay, S., & Macken, B. (1999). Organizational factors in selective attention: The interplay of acoustic distinctiveness and auditory streaming in the irrelevant sound effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *25*(2), 464.

The authors of this study seek to understand the effect of changing acoustical parameters on the ability of participants to memorize sequences of letters. In this way, the authors

seek to understand how changes in acoustical parameters are interplaying with participants attention apparatus.

The authors found that changing pitch while keeping timbre constant and changing timbre while keeping pitch constant both negatively impacted the ability of participants to memorize letter sequences. Interestingly, changing both parameters simultaneously produced less effect on the participants' memorization abilities.

Chon, S. H. (2013). *Timbre saliency, the attention-capturing quality of timbre* (Doctoral dissertation, McGill University Libraries).

The author here seeks to understand which qualities of timbre are best at capturing our attention. The author conducted many experiments to explore two descriptors of timbre: timbre saliency and timbre dissimilarity. The author determines that timbre saliency, or "prominence" is the defining attention-grabbing feature of a sound.

To test saliency, the author would play two samples of different instruments and the same time, and ask participants to tap along to the beat of the music. The author then tracked which instrument's beat was the beat that the participant would track in their tapping. Using this methodology, the author then compared various acoustic properties of the sounds to see which properties led to the greatest saliency. The result of this study showed that the most salient parameters were Odd-even harmonic ratio, Harmonic spectral decrease, Spectral amplitude rolloff and Harmonic kurtosis. Another experiment rating the 'blendedness' of two sounds identified percussiveness, spectral variation, and inharmonicity as contributing to timbral salience.

Goydke, K. N., Altenmüller, E., Möller, J., & Münte, T. F. (2004). Changes in emotional tone and instrumental timbre are reflected by the mismatch negativity. *Cognitive Brain Research*, *21*(3), 351-359.0.

This paper seeks the understand to assess changes in acoustic properties of a sound *preattentively*, or without the express attention of the listener. This type of reaction, known as mismatch negativity, occurs when the incoming stimulus (in this case, sound) deviates from the expected model of that sound in our brains. This mismatch can occur not just for a single moment of sound (spectral distribution) but for more complex evolutions of timbre within a longer sound, and occurs specifically while people are engaged with other tasks like reading.

The results of the experiments done in this paper show that changes in timbre evoke the MMN in the participants, indicating sensitivity to small auditory changes despite not allocating attention to the sound intentionally.