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## Influence of Psychoacoustic Roughness on Musical Intonation Preference

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### ABSTRACT

An experiment to compare the acceptability of three different music fragments rendered with three different intonations is presented. These preference results were contrasted with those of isolated chords also rendered with the same three intonations. The least rough renditions were found to be those using Twelve-Tone Equal-Temperament (12-TET). Just Intonation (JI) renditions were measured as the roughest and least preferred.

**Keywords:** Preference, Pleasantness, Roughness, Tuning, Intonation, Musical Consonance.

### 1. INTRODUCTION

The auditory attribute known as ‘roughness’ is associated with fast amplitude modulations. It grows rapidly in the transition between the perception of a single tone and the perception of two tones with different frequencies (Fastl and Zwicker 2007). Qualitatively, roughness has been related to musical dissonance (von Helmholtz 1954).

According to Terhardt (1976), roughness constitutes one of the most important psychoacoustic factors harming sensory consonance (a compound of auditory attributes including loudness, roughness, and sharpness—See Fastl

and Zwicker (2007) for a detailed description). In Terhardt’s study, sensory consonance and harmony (determined primarily by affinity of tones, tone compatibility, and root relationship) are related to the perception of musical consonance. For Terhardt, harmony dominates the acceptability of successive presentation of tones, whereas sensory consonance dominates the acceptability of their simultaneous rendition. Note that in music, melody is associated with the successive presentation of tones, and harmony with their simultaneous rendering, but in Terhardt’s discourse (2008), harmony “basically addresses the goals and methods of the conventional *the-*