MICRO-TIMING AS A FEATURE FOR INVESTIGATING MUSICALITY

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Background

New digital technologies and innovative tools provide the ability to research both the teaching and learning of music performance techniques. A survey of professional musicians indicated that musicality is a notable attribute for understanding the traits of professional musicianship. Musicality is a musician's ability to reveal an emotion or a personality characteristic by creating a musical experience. The ability to intrinsically express musicality is a desired talent for a young, promising professional musician. We discuss how timing events, with respect to musicality, can be a quantifiable aspect for studying music performance traits.

We implemented digital signal processing techniques to detect the low-level features, such as note onsets and rhythmic events, which are used to differentiate a professional musician's performance from a MIDI performance. Minor flexibility in tempo, or nuance, often directly relates to a musical phrase. This nuance includes, for instance, the tendency to slightly increase the tempo towards the peak of a musical phrase and to slightly decrease tempo towards the conclusion of a musical phrase. This internal tempo modulation, or *micro-timing*, is a feature that MIDI generally does not communicate. Studying *micro-timing* will help researchers understand the difference between MIDI and a professional musician. We can then convey this information to a music student to create a more intuitive understanding of one's musicality.

Aims

Our research posits that *micro-timing* relates to musicality and that studying *micro-timing* gives insight into how professional musicians perform.

Main contribution

MIDI iterates through the composition with exact rhythmic and metronomic accuracy, but this is not necessarily musically correct. Our research evaluated *micro-timing* events in order to study the rhythm aspect of musicality. Initial experiments identified that there are differences in the *micro-timing* between note onsets when comparing a professional to MIDI. A professional musician expresses phrasing through these temporal deviations.

We asked six professional flute players to perform selection Number 1 from Marcel Moyse's *24 Petite Etudes Mélodiques*. The work has 16 measures in total: one *large* musical phrase (from beginning to end), two *medium* musical phrases containing eight measures each, and eight *small* musical phrases of two measures each. The rhythmic form with respect to the small phrases is $A\ A\ A\ B$, $A\ A\ A\ B^1$. Each subsequent restatement of the A rhythm generates anticipation towards the end of each medium musical phrase. One natural tendency to convey this expectation is to mold the rhythmic feel using *micro-timing* techniques.

Each of the six professional flutists varied the tempo within these musical phrases, speeding up towards the peak of the musical phrase and slowing down towards the conclusion of the musical phrase. Apparent during an aural evaluation, this *micro-timing* variation was consistent amongst the five professional flutists. Digital signal processing revealed bell-like curves from the *micro-timing* of the professional versus the MIDI. This is an example of how *micro-timing* relates to musicality.

Implications

We can infer from this research that studying a measurable concept such as *micro-timing* with respect to musicality gives us a better idea of what makes a performance musical. We aim to discover how such a quantified metric can be communicated to musicians seeking to refine their technique towards a measured professional level. Performance education would benefit from a framework that reproduces the unique musicality of professional musicians.

Keywords

musicality; micro-timing; feature extraction; music structure; performance analysis