1 Abstract

- In this paper, we investigate whether experienced drummers can consistently represent and reproduce the rhythmic essence of a given drum pattern using only their two hands.
- To this end, we present TapTamDrum: a novel dataset of repeated dualizations from four drummers, along with preliminary analysis and tools for further exploration of the data.

2 Motivation

- Synchronization of movement to a musical pulse happens automatically, whether of the hand movements [1, 2], walking [3], or dancing [4], all involving two limbs.
- The ability to coordinate two limbs in a synchronized and precise manner is essential for playing musical instruments and dancing to music [5].
- Many complex rhythms in West African music can be represented with a bell pattern, which could usually be played with two-voiced percussion instruments [6].
- Subjective rhythmization [7]: perceiving a monotonous auditory stimuli as two streams: “tick-tick-tick-tick” instead of “tick-tick-tick-tick”
- Addition of a single instrumental component to a monotonic rhythmic pattern can greatly influence its perceived rhythm, while adding more has discernible impact only in certain instrumentation contexts. [8]
- Lartillot and Bruford argue that any rhythm can be reduced to an oscillation between two states: high and low [9].

3 Data Collection Sessions

<table>
<thead>
<tr>
<th>Age</th>
<th>Experience</th>
<th>Drum Layout</th>
<th>Repetitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>11</td>
<td>Left</td>
<td>0</td>
</tr>
</tbody>
</table>

Repeated 1116 Times between the Four Participants

The participants were allowed to continue their dualizations indefinitely until they felt confident in the accuracy of the dualization. All the drum patterns in all of the sessions were synthesized using a single sound source. Moreover, no auditory feedback from the dualized pattern was provided to the participants.

4 Source Drum Patterns

Steps 1 and 2:
- Only use 4-4 and 4-2 bar fills.
- Use drum patterns that have only 1 or 2 voices.
- From each recording, select a 2-bar segment with highest similarity to the rest of the segments.

5 Subset A

Three Random Repetitions

6 Summary of Dataset

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Repetitions Per Test</th>
<th>Total Dualizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three</td>
<td>24</td>
<td>288 (24x3x6)</td>
</tr>
<tr>
<td>Single</td>
<td>48</td>
<td>144 (48x3)</td>
</tr>
<tr>
<td>Simple</td>
<td>69</td>
<td>276 (69x3x2)</td>
</tr>
<tr>
<td>Complex</td>
<td>72</td>
<td>408 (240x2x1)</td>
</tr>
</tbody>
</table>

Total: 345 762 210 72 72 1116

7 Preliminary Analysis

Main Speculations that require further validation:
1. Experienced drummers have a consistent dualized interpretation of rhythms, however, these interpretations vary to some extent compared to other drummers.
2. Complex dualizations are generally more active that the simple dualizations.
3. Unless restricted, the drummers default to more active dualizations.