

## Reproduction of Western Music Rhythms by Cameroonian School Children

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### ABSTRACT

#### Background

Rhythm is present in all musical cultures, though its distinctive characteristics might be culture-specific, and even tapping to a beat might reveal the participants culture-specific biases or perception. Yet the design of experiments regarding rhythm perception and production are generally Eurocentric. Hence, participants from non-Western music cultures might be at an advantage for some tasks and at disadvantage for others. Developing a culture-neutral approach would be desirable.

#### Aims

This study was designed to identify patterns of rhythmic reproduction based on sensori-motor synchronization (SMS); we investigated strategies of Cameroonian (Nso) children to synchronize a rhythmic motor pattern (finger tapping) with externally perceived typical Western music stimuli. Cameroonian Nso parents typically establish rhythmic vocal and motor patterns characterized by crossmodal and interpersonal synchronicity with their infants (Demuth, Keller, & Yovsi, 2012; Keller, Otto, Lamm, Yovsi, & Kärtner, 2008). While some primitive forms of SMS appear to exist at birth (Provasi, Anderson, & Barbu-Roth, 2014), children of 11 years and above are recognized to exhibit stable SMS skills (Schlaug, 2001).

#### Method

Fifty-five (26 female) Nso children aged 11-15 years participated in this study, which was undertaken in the city of Kumbo (North Cameroon). An age-matched sample of German children is currently under investigation for comparison.

Following extant research by Hasselhorn and Lehmann (2015) and Kopiez, Langner, & Steinhagen (1999), rhythms with different meter (3/4, 4/4, 6/8) and different speeds (72 bpm, 80 bpm, 90 bpm, 110 bpm) were generated using Ableton (V. Live 8.0.9). Every sample was looped six times. In the experiment at least five stimuli were randomly selected from the item pool for each participant.

The stimuli were presented to each child via headphones, which were connected to a mp3-player with speakers. The children were instructed to reproduce the rhythm with their preferred hand (finger) or a pencil. The stimulus was first presented (participants might or might not tap along), then the children continued tapping after the presentation terminated.

Information about the children's musical behaviour (musical experience, musical background) was also collected.

The audio-visually recorded data were auditory analysed by two musically trained judges according to meter, speed and rhythm patterns.

#### Results

Different reproduction patterns of the 4/4- and 6/8-stimuli were observed and categorized:

1. At least one sample of the original rhythmic stimuli was reproduced.
2. Small variations in meter, speed or rhythm pattern were produced.
3. After reproducing the first bar, different variants of the subsequent rhythms followed.
4. Rhythm variations that occurred in at least two children.
5. Individual children's variations.

The reproductions of the 3/4 triplet (Bolero; see Figure 1) showed four different results:

1. No reproduction of at least one original sample was observed.
2. Several variations of individual children of all ages deviated from the original stimuli (Figure 1, red colour).
3. Furthermore, the Bolero rhythm was grouped according to different gestalt perceptions by 84% of all subjects (Figure 1, all colours but red and orange).
4. A variation of the presented rhythm, which was reoccurring in the reproduction of several children (Figure 1, orange colour)

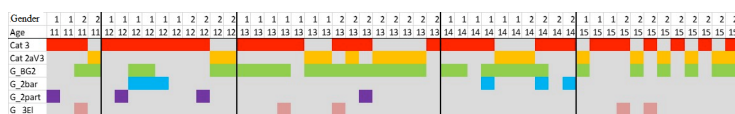


Figure 1. Variants of rhythm reproduction and grouping in the 3/4 triplet rhythm of every child.

**Key:** Gender: 1 = female; 2 = male; Age in years

**Red:** The reproduction patterns of individual children deviated from the original stimuli; **Orange:** A variation of the presented rhythm, which was reoccurring in the reproduction of several children; **Green:** Grouping: Reproduction started with a Group of two; **Blue:** Grouping: Reproduction of the second bar of the original rhythmic stimuli; **Violet:** Grouping: Reproduction of two different parts of the original stimuli: group of two and group of long-short-short-short/ group of shorts; **Pink:** Grouping: Reproduction of three different elements of the original stimuli: group of two, group of long-short-short-short and group of several shorts

#### Conclusions

Trying to apply a culture-neutral analysis, several versions of the original stimuli were observed independent of age

and/or musical experience. For the 4/4- and 6/8-stimuli a smaller inter-individual variability was observed compared to the  $\frac{3}{4}$ -triplet (Bolero) stimulus. Whether the observed patterns were caused by culture-specific experience can be ascertained once the comparison data of German pupils is collected (cf. poster presentation at conference). A quantitative temporal analysis of the performances is warranted to validate the judges' findings.

### Keywords

Rhythm, finger tapping, children, cross-culture, gestalt grouping

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