

# Can Children with Developmental Coordination Disorder Step-Clap to the Beat?



## An Online Motion Tracking Study

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### INTRODUCTION

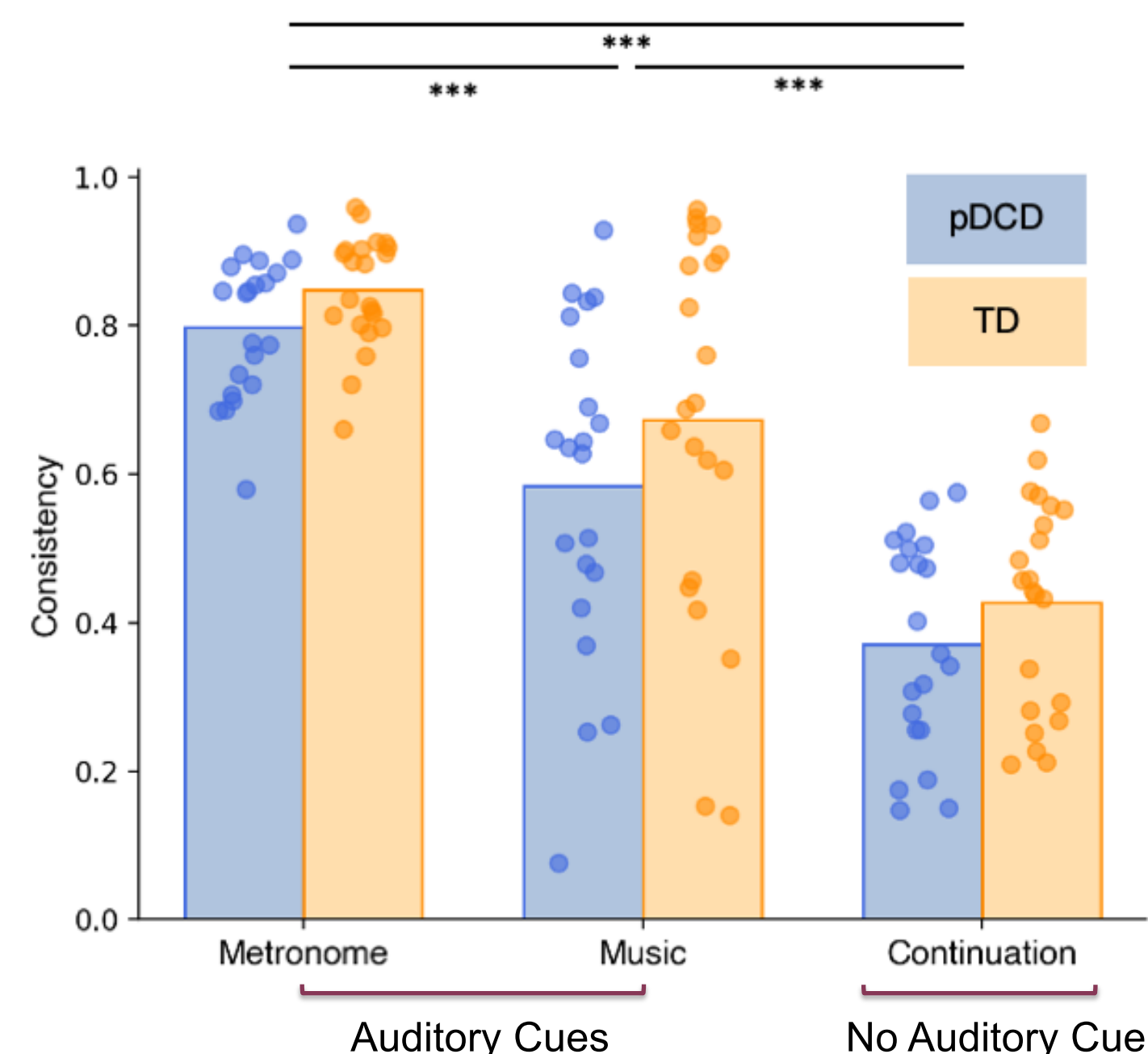
- DCD is a neurodevelopmental disorder defined as deficits in fine and/or gross coordinated motor skills.
- Previous research suggests that timing deficits may be a core characteristic of DCD.
  - Children with DCD show visual-motor and motor timing deficits.
  - Children with DCD have significantly higher thresholds for auditory rhythm and duration discrimination (Chang et al., 2021).
- Auditory-motor synchronization skills are largely unexplored in DCD.
- We hypothesize that children with DCD have deficits in both auditory timing perception and auditory-motor synchronization (Trainor, Chang, Cairney & Li, 2018).

### PURPOSE

1. Do children with DCD have deficits in more complex auditory-motor synchronization?
2. Can auditory rhythmic stimuli help children with DCD execute rhythmic motor skills?

### PREVIOUS FINDINGS

- Our previous study measured auditory-motor synchronization of simple hand tapping.
- **Participants:** 7- to 10-year-old children with probable DCD compared to typically developing children.
- Children with probable DCD tapped with significantly lower consistency to the auditory stimuli ( $p < .05$ ).
- Both groups tapped significantly more consistently when an auditory cue (metronome or music) was present ( $p < .01$ ).

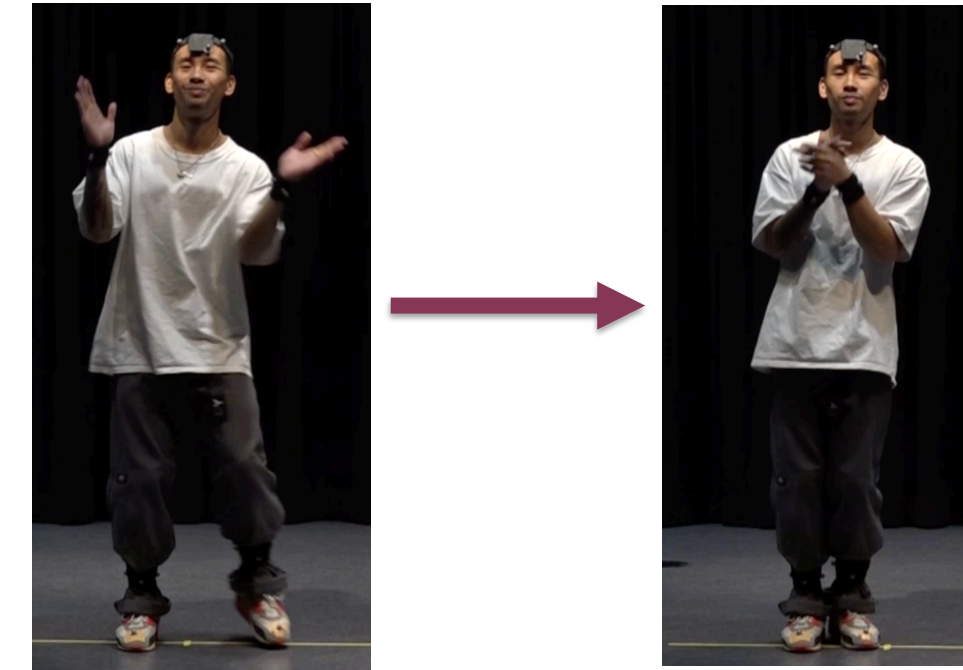


### EXPERIMENTAL DESIGN

#### PARTICIPANTS

- 9- to 12-year-old children with probable DCD (pDCD) and typically developing (TD) children
- $n = 24$  (10 in pDCD group)
- Data collected using recorded webcam videos through the platform LookIt

#### Step-Clap Motor Skill



#### CONDITIONS

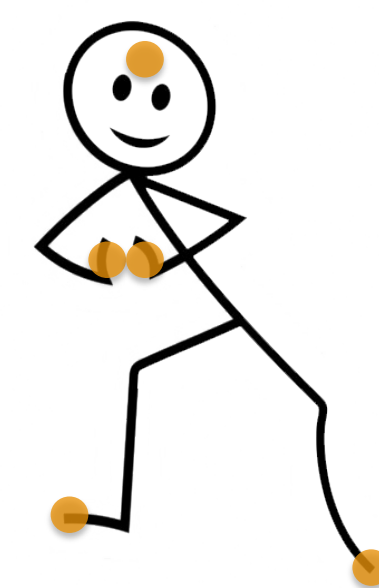
- Spontaneous Motor Tempo
- Metronome
  - 400, 600 ms inter-onset intervals
- Synchronization-Continuation
  - 400, 600 ms inter-onset intervals
- Music Excerpts
  - Happy – Pharrell (375 ms)
  - Uptown Funk – Bruno Mars (522 ms)
  - Love On Top – Beyonce (638 ms)

**TASK**  
Synchronize side-to-side steps and claps to the beat of an auditory stimulus

#### TASK SCHEMATIC

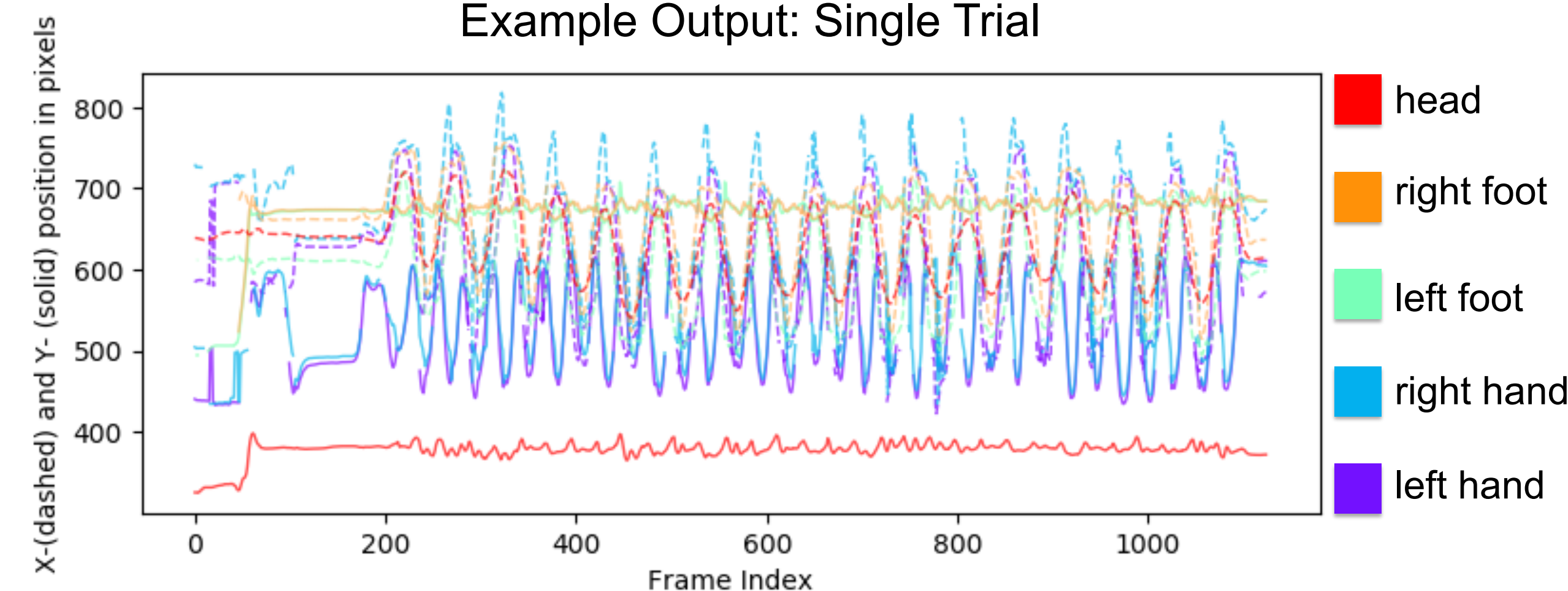


### DATA ANALYSIS



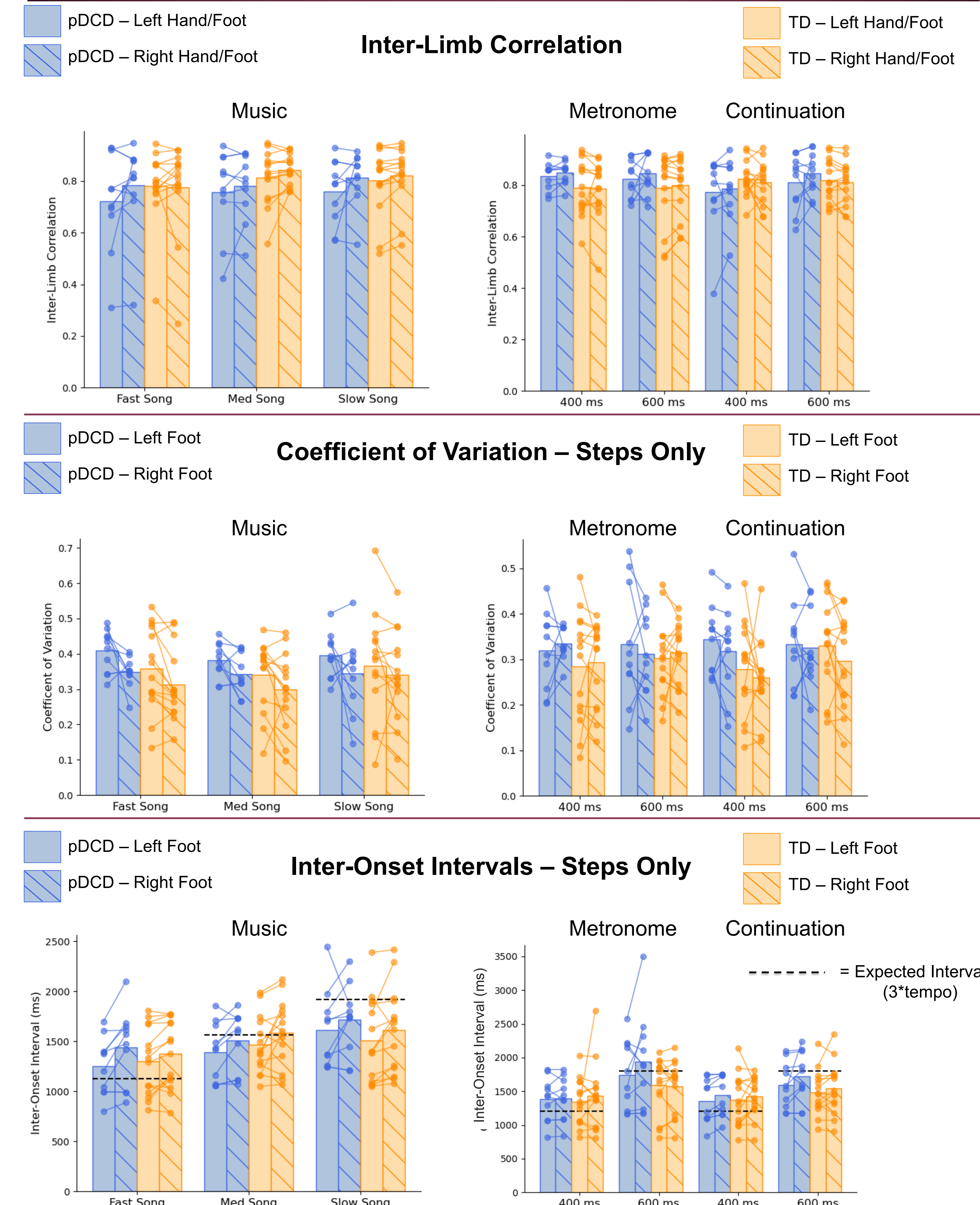
- Videos are being tracked using the 2D motion tracking software **DeepLabCut**
- Labelled body parts: hands, feet, and head

Example Output: Single Trial



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### PRELIMINARY RESULTS



### IMPLICATIONS AND FUTURE DIRECTIONS

- Preliminary data shows both groups have a high correlation between their hands and feet, suggesting strong inter-limb coordination during all conditions.
- Visual inspection of coefficient of variation shows the pDCD group to have slightly higher variability compared to the TD group.
- The next step will be to analyze the entire dataset ( $n=70$ ) and investigate the relationship between steps and claps to the beat of the auditory stimuli.
- The results of the study will help inform whether a dance intervention may be of benefit to children with DCD.