

# Complex Rhythmic Auditory-Motor Skills in Children with Developmental Coordination Disorder (DCD)

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## PREVIOUS STUDY

## UPCOMING STUDY

## INTRODUCTION

- DCD is a neurodevelopmental disorder defined as deficits in the acquisition and performance of 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 rhythm and duration discrimination (Chang et al., 2021).
- Auditory-motor synchronization skills are largely unexplored in DCD.
- We hypothesized 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 both auditory timing perception and auditory-motor synchronization?
2. Can auditory rhythmic stimuli help children with DCD to execute rhythmic motor movements?

## EXPERIMENTAL DESIGN

### PARTICIPANTS

- Children with probable DCD (pDCD) and typically developing (TD) children aged 7-10
- n = 43 (21 in pDCD)

### 1) Speech Perception Task

Identifying target words in rhythmically modified sentences

"Ready Baron go to green 2 now"

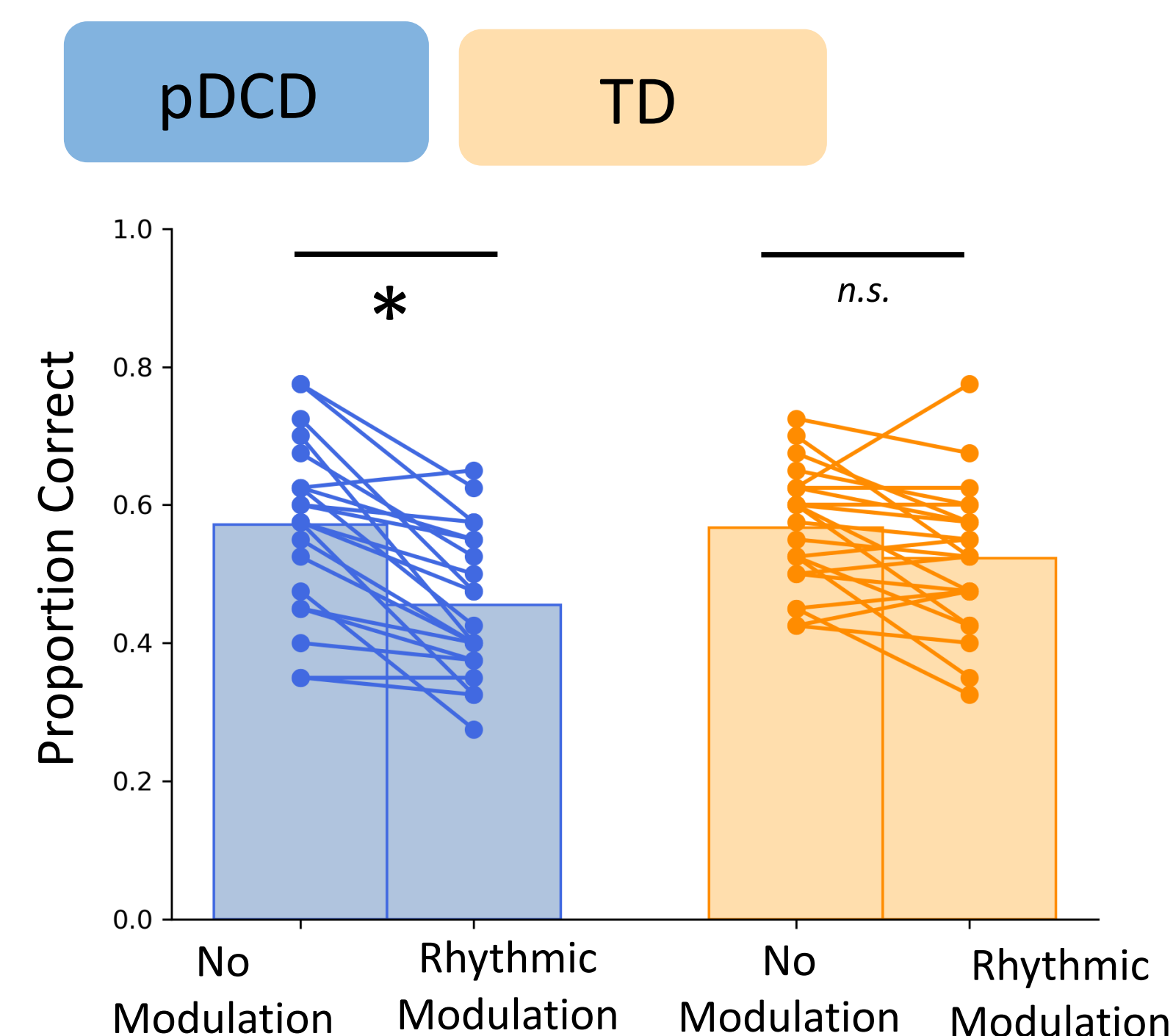
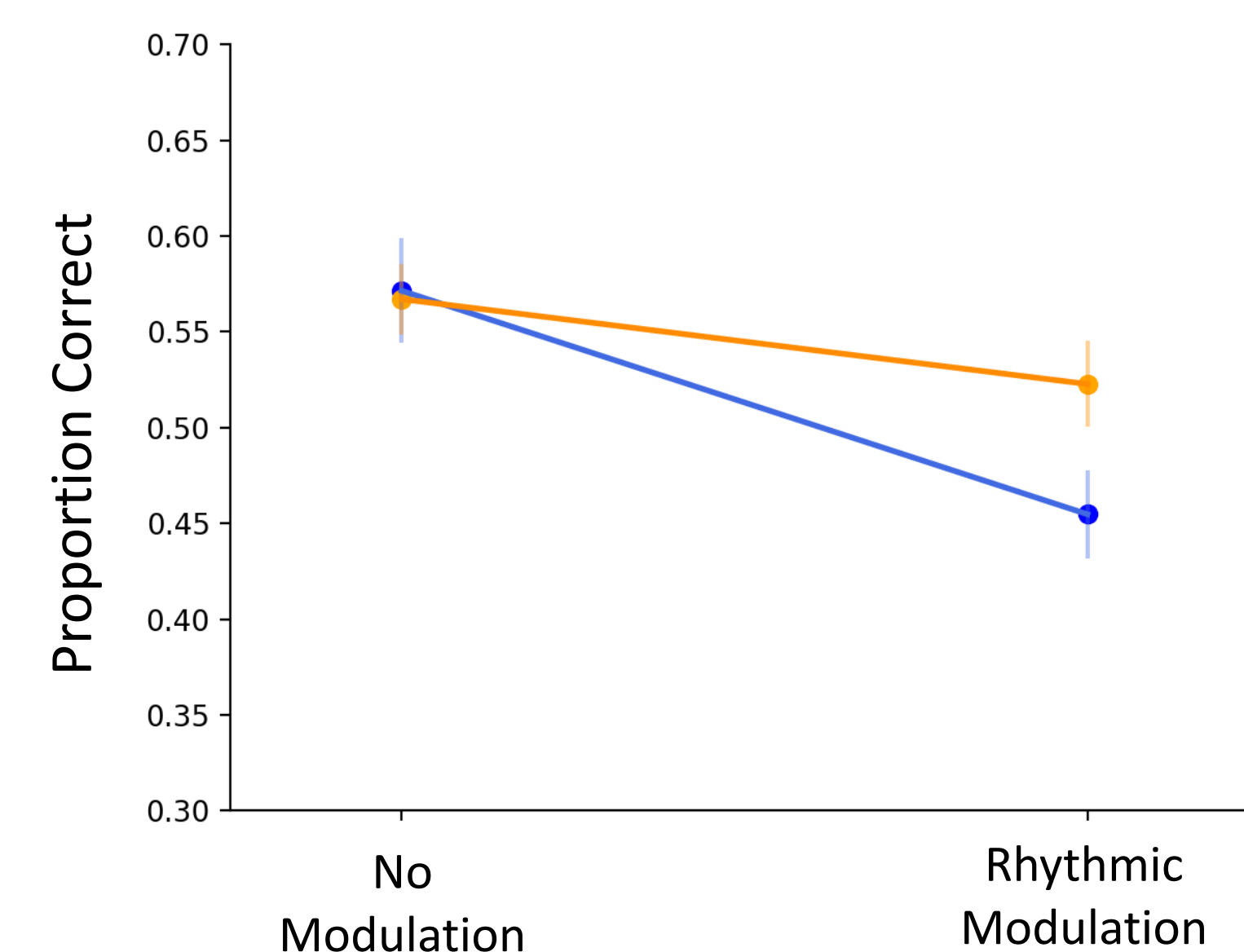
### 2) Production Tasks

- Free Tapping
- Metronome Tapping
- Continuation Tapping
- Music Tapping

3 tempi = 400, 550, & 700 ms IOI

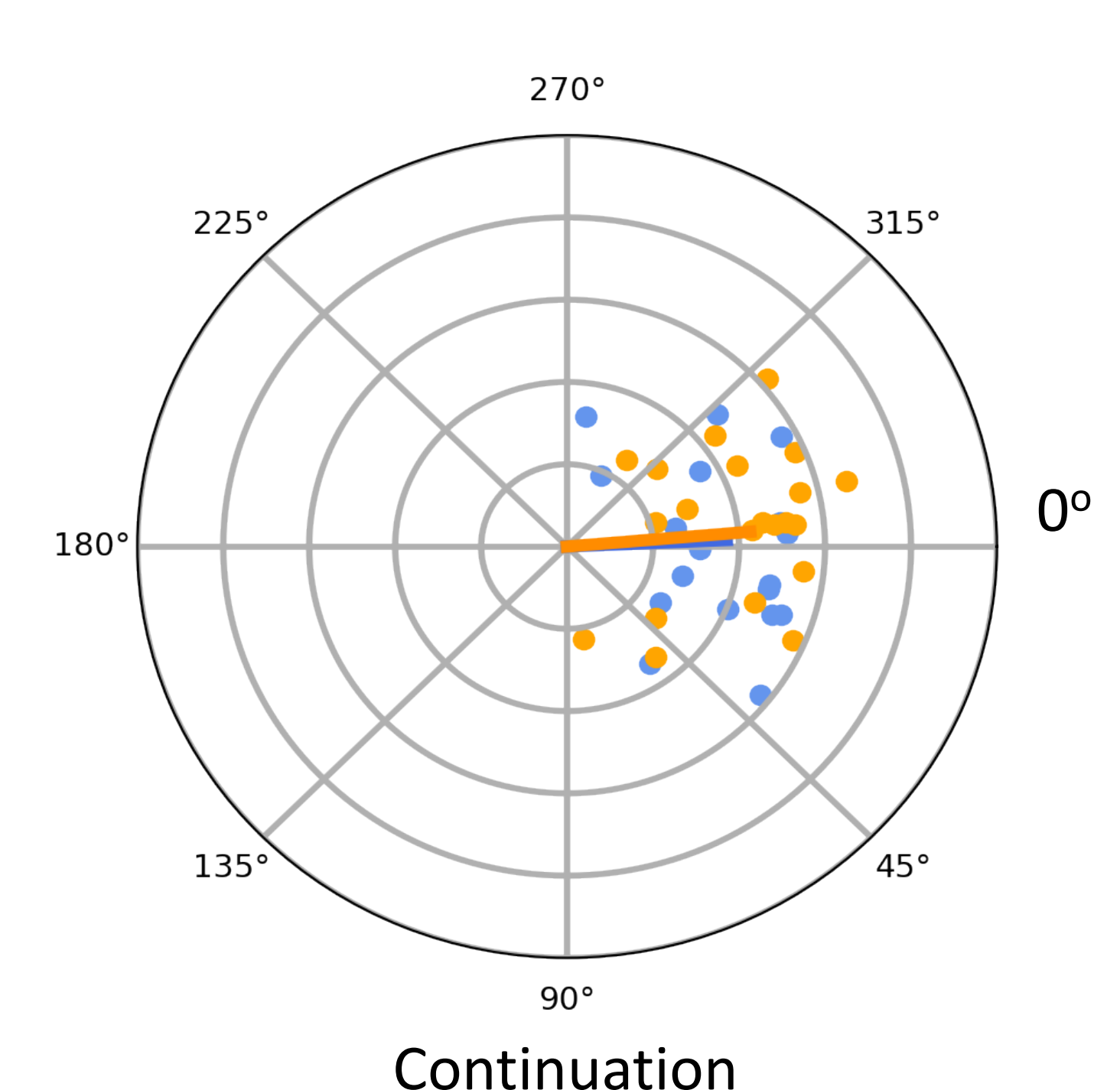
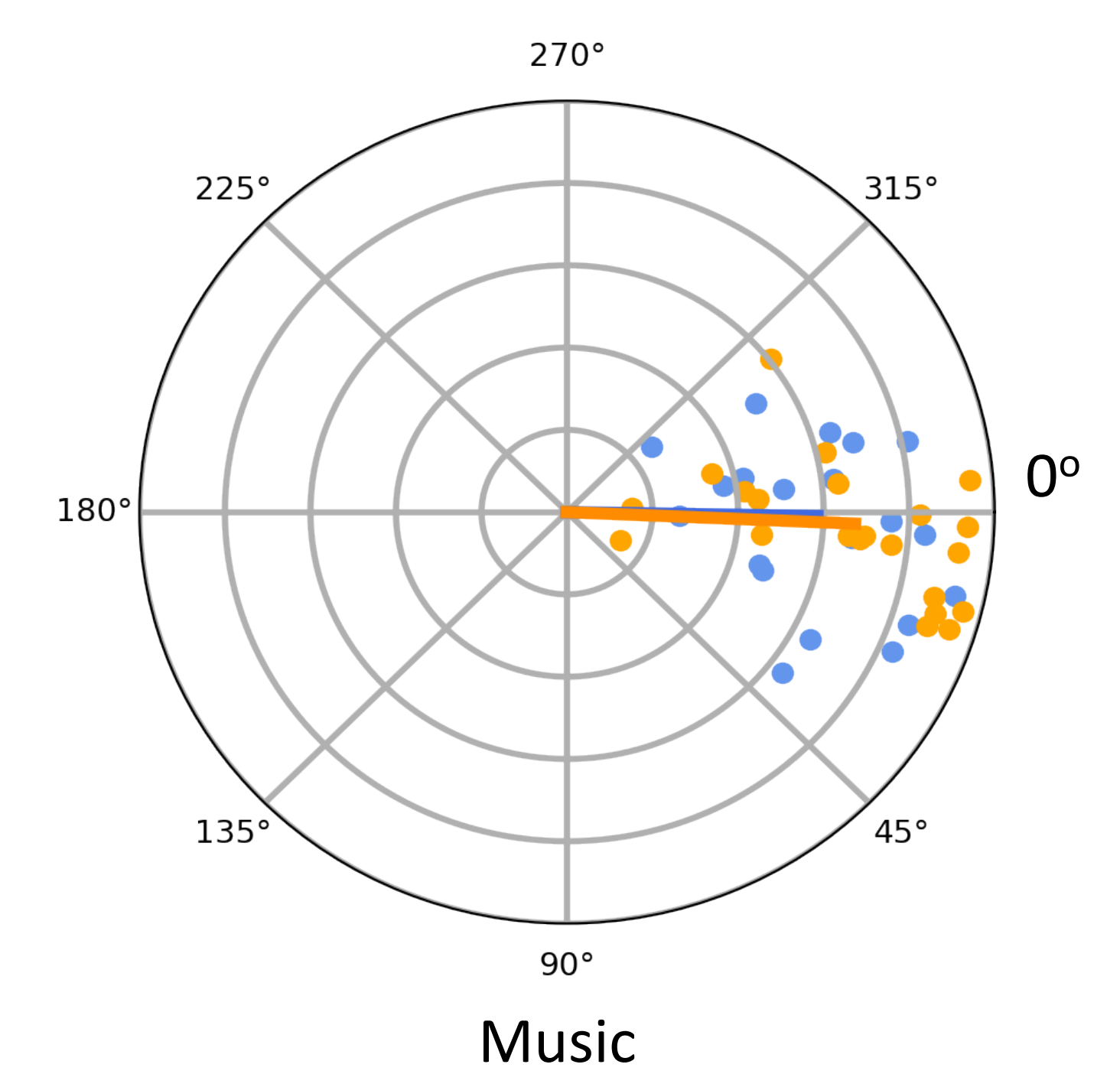
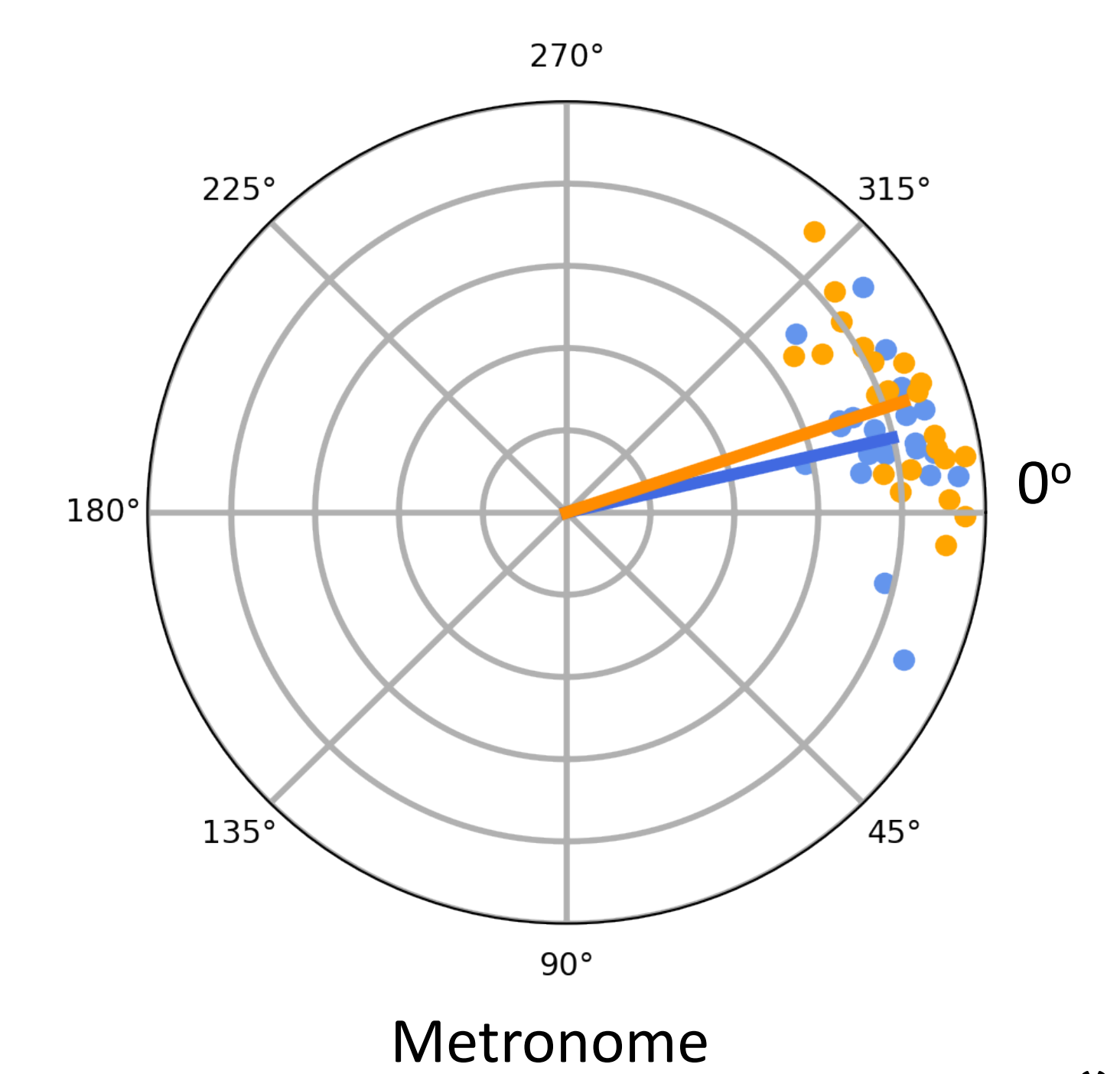
## RESULTS

### Speech Perception



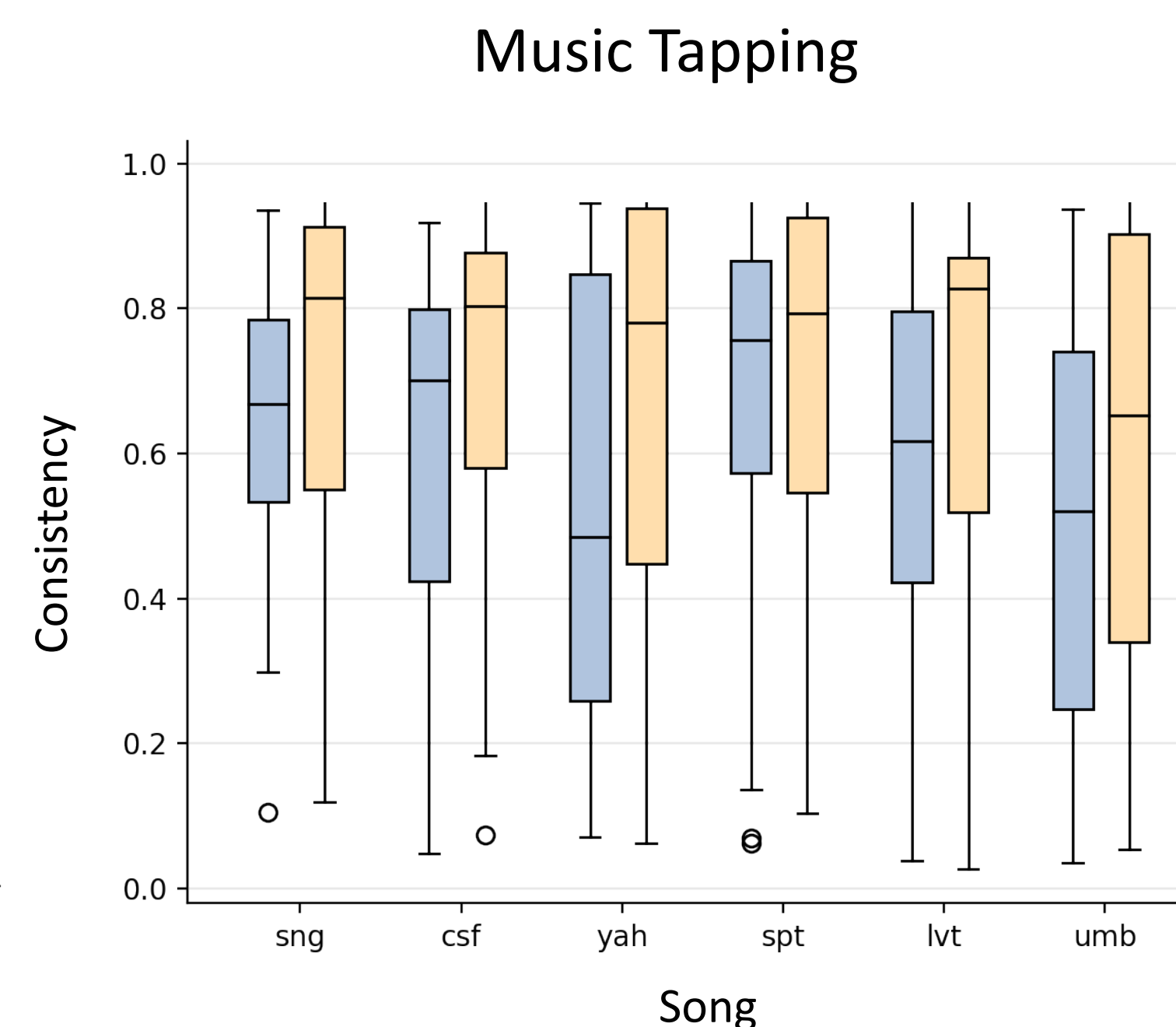
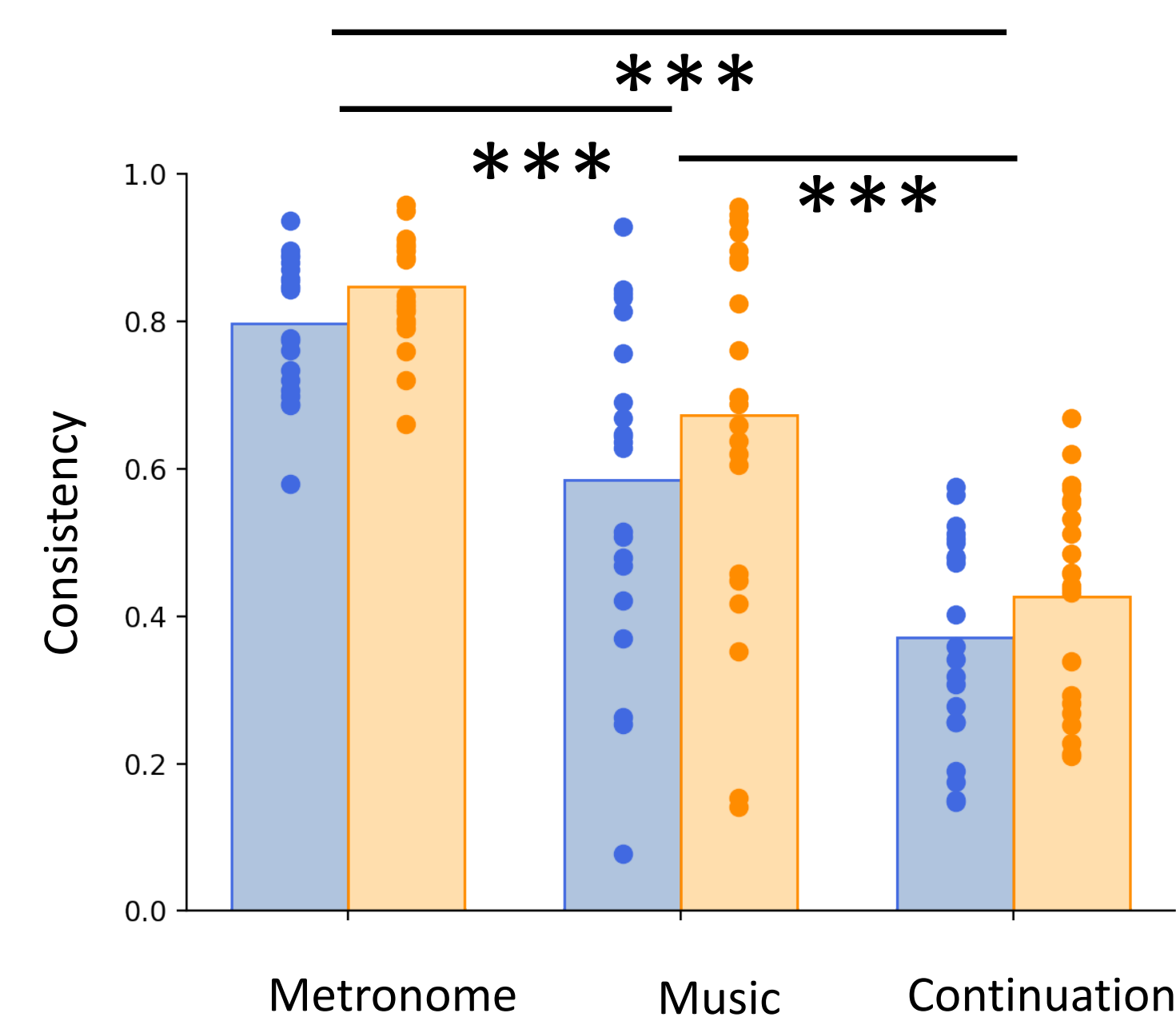
### Tapping Production: Phase

0° = perfect tap to beat alignment



### Tapping Production: Consistency

Main Effect of Group:  $p = .04$



## CORRELATIONS

Pearson Correlation Coefficients for pDCD and TD Combined

	MABC-2	AC	BAL	MD	MET	CONT	MUSIC	NORMAL	DISTORTION
	Percentile				Consistency			Proportion Correct	
MABC-2									
AC	0.63***								
BAL	0.74***	0.38*							
MD	0.7***	0.24	0.25						
MET	0.33*	0.1	0.27	0.37*					
CONT	0.25	0.26	0.05	0.19	0.29				
MUSIC	0.22	0.07	0.16	0.31*	0.65***	0.32*			
NORMAL	0.08	0.05	0.12	0.07	-0.27	0.14	-0.13		
DISTORTION	0.45**	0.37*	0.34*	0.35*	0.03	0.03	-0.03	0.63***	

Note. MABC-2: Movement Assessment Battery for Children  
 • pDCD = lower 16<sup>th</sup> percentile  
 • AC = Aiming & Catching  
 • BAL = Balance  
 • MD = Manual Dexterity

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## PURPOSE

Will there be a larger difference in synchronization between groups if we use a more complex movement?

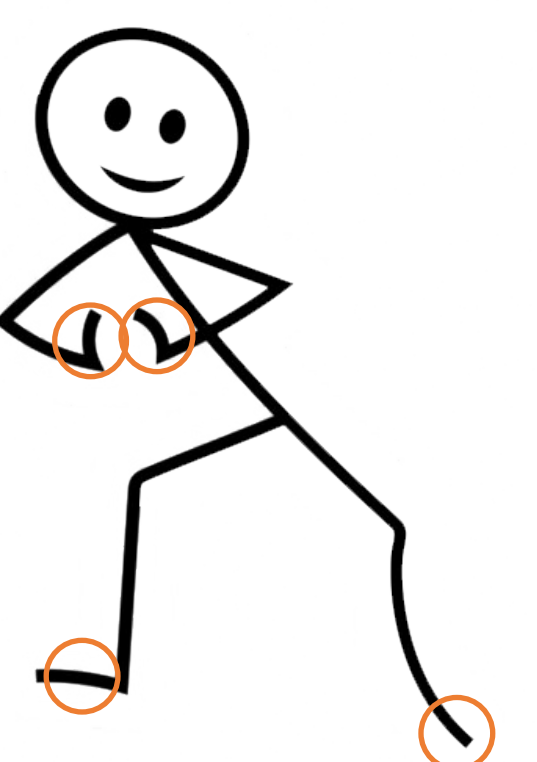
## EXPERIMENTAL DESIGN

### PARTICIPANTS

- Children with probable DCD (pDCD) and typically developing (TD) children aged 9-12

### TASK

- Step-Clap Movement
- Five Conditions
  - Spontaneous Motor Tempo
  - Metronome
  - Continuation
  - Music: Simple Step Clap
  - Music: Complex Step Clap



### DATA COLLECTION

- Online LookIt Platform
- Measure synchronization of hands and feet to the auditory stimuli

## HYPOTHESES

1. Children with DCD will have deficits in synchronization to the auditory stimuli compared to TD children
2. There will be a larger difference between groups compared to the simple tapping task
3. Inter-limb coordination will be lower in both groups without the presence of an auditory cue