



Timing Sensitivity in Vision and Audition: Performance Differences on Polyrhythmic and Isochronous Tempo Judgements



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Introduction

- ❑ Musicians and non-musicians alike have been shown to possess natural timing abilities that are superior in audition, with visual temporal judgements being significantly less accurate (Repp & Penel 2002)
- ❑ Iversen, Patel, Nicodemus, and Emmorey (2015) indicated that thresholds were comparable for aural and visual bouncing ball conditions, demonstrating that a ball in continuous motion could produce more precise sensitivity in participants in comparison to visual "clicks" that were not sustained on screen between beats
- ❑ Polyrhythm complexity has been shown as the crucial predictor for performance in detecting perturbations in rhythm (Fidali, Poudrier, & Repp, 2013), but observations of timing sensitivity have not been made between isochronous and polyrhythmic tempos concurrently

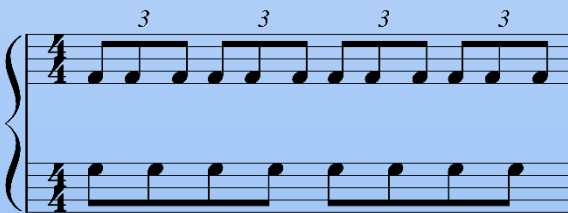


Figure 1. Musical notation of a three-against-two polyrhythm, "my name is Pat".

Hypotheses

1. If timing sensitivity is weaker in vision than audition, then participants' timing precision will be finer (thresholds will be lower) in all audition conditions
2. If tempo does not impact rhythmic sensitivity, then participants' timing precision will not differ significantly across fast and slow conditions
3. If polyrhythms affect vision and audition sensitivity differently, then participants' data will demonstrate an interaction between sensory mode (audition/vision), and type of task (polyrhythm/singular beat)

Methodology

- ❑ 3 x 2 within-subjects design (Task, Sensory Mode), demographic data such as musical expertise was collected
- ❑ Auditory stimuli were amplitude-modulated sine waves that were combined for polyrhythm conditions
- ❑ Visual stimuli included amplitude-modulated gratings (singular beat conditions) or plaids (polyrhythm conditions)
- ❑ Was the tempo faster or slower than average? (Left/Slower or Right/Faster)

Results

A 3 x 2 within-participant ANOVA indicated a significant main effect of Task, where Slow Isolation Tempo conditions generated significantly lower (better) timing thresholds than did Fast and Polyrhythm Tempo conditions ($F(15, 2) = 18.596^*$, $p < .001$, $partial \eta^2 = .718$, $power = .999$).

Figure 2. Correlation matrix of mean delta values across conditions (* represents significance at $p = .05$)

	FPV	FPA	FIV	FIA	SIV	SIA
FPV						
FPA		.20				
FIV			-.15			
FIA				-.08		
SIV					.29	
SIA						.52*

Discussion

- ❑ Future research should focus on analyzing sensitivity differences between musical groups, following the example set forth by Matthews, Welch, and Festa (2018)
- ❑ Was the 3:2 polyrhythm too simple to act as a distractor?
- ❑ The present study will continue data collection throughout the semester to gather more demographic and music-related survey data

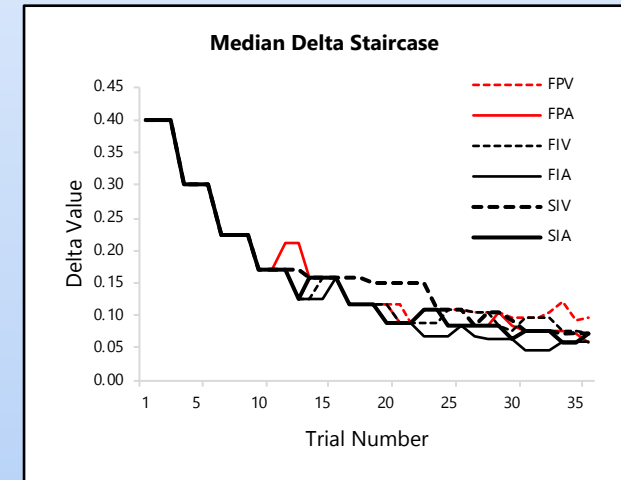


Figure 3. Graph of median delta values across participants for all 36 trials of each condition

References

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