Synchronization of Timing and Motion in Piano Duet Performances

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Introduction
Music ensemble playing
• Realizing a common musical goal
• Synchronizing timing, expression, and movements

High cognitive & motor demands
• Auditory imagery, prioritized integrative attention, adaptive timing (Keller, 2007)
• Synchrony better within a pianist than between pianists (Shaffer, 1984)
• Body movements used to communicate at structurally important locations (Williamson & Davidson, 2002)

Research Questions
How does auditory feedback influence synchronization?
• Timing between pianists
• Finger movements (sound-producing or “effective gestures,” Delalande, 1988)
• Body movements (“ancillary gestures”)

How does note density between parts influence synchronization?
• Is it easier to synchronize to more notes than to fewer?
• “Subdivision benefit”? (Repp 2003)
Do musicians adopt strict roles as leader and follower?
*“Hunting” vs. “Cooperation” (Goodman, 2002)

Method
Independent Variables
(Fully crossed within-subjects design)

I) Auditory Feedback
1) alone
2) full
3) oneway
4) self

II) Note Ratio (Upper : Lower)
1:1
2:1
3:2
4:3

III) Musical Role (Instruction)
“Upper part leads, lower follows”

Timing Results
Playing together hurts follower
• Indicative of more error correction

Note ratio affects asynchrony
Larger note ratio effect with reduced auditory feedback: 1/8-note part leads

Musical roles constrained by feedback
• Cross correlations between parts

Finger Motion
Finger movements determined by task (note ratio, part)

References

Participants & Equipment
16 skilled pianists (8 duets)
14.4 years of lessons (10–27)
21.9 years old (18–32)
Auditory feedback manipulation
• Controlled by computer software (ftap)
• Presented via closed headphones

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