



ROCKING IN SYNCH: EFFECTS OF MUSIC ON INTERPERSONAL COORDINATION

Alexander P. Demos, Roger Chaffin, Alexandra Lewis, Kristen T. Begosh, Jennifer Daniels, & Kerry Marsh
 Department of Psychology, University of Connecticut, Storrs, CT USA

INTRODUCTION & RESEARCH QUESTIONS

- Music is often used to help individuals intentionally synchronize with one another (e.g., dancing, marching).
 - Music may also provide a means for two people to spontaneously and unintentionally synchronize in a task.
 - We measured spontaneous synchronization in rocking chairs with different types of auditory information and visual information (Richardson et al., 2007).
- Does ambient music strengthen the spontaneous coordination of rocking behavior?
- Does the addition of matching or mismatching visual information to the auditory signal change the degree of spontaneous synchronization?

METHOD

- **Participants:** 25 pairs of University of Connecticut undergraduates .
- **Musical Experience of Participants:** Participants were asked if they currently played a musical instrument:

Dyad Type	n	Yrs of Musical Exp
Non-Musician Pair	10	
Mixed Pair	11	M=8.6, SD=2.8
Musician Pair	4	M=5.8, SD=2.6

- **Materials:** 2 Rocking chairs with magnetic motion tracking system (Polhemus Fastrak) processed by 6-D Research System software (Skill Technologies)
- **Research Design:** Two **Visual** directions and three **Auditory** conditions were counterbalanced. Listeners completed two sets of trials.
 - Two Visual Directions:
 - 1) Rockers looking **Away** from each other
 - 2) Rockers looking **Toward** from each other
 - Three Auditory Conditions:
 - 1) **Greek Music** ("If it were only [18]21" by Yorgos Dalaras) in common time with a steady tempo of about 64 BPM
 - 2) **No Sound**
 - 3) The **Sound of the Other Person** rocking, accomplished by placing sandpaper under the rocking chairs.

- **Cover story:** Participants were asked to rate landscape pictures, viewed at the start of each trial, on several measures. **They were always instructed to rock at a comfortable pace.**
- **Dependent Measure:** A cross-spectral analysis was used to assess the coordination between the two rocking chairs. The analysis provided a measure of **Weighted Coherence** (Porges et al., 1980), which ranged from 0 to 1 (see Richardson et al., 2007).

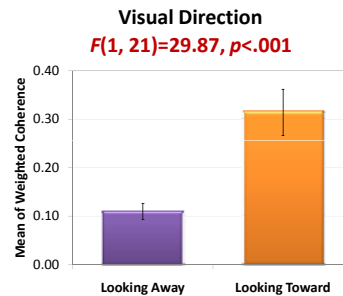
Weighted Coherence:

- 0 = No Synchrony
- 1 = Perfect Synchrony between the chairs

RESULTS & DISCUSSION

- A square root transformation was used on the data which were then were analyzed using a 2 (trial sets) X 2 (Visual directions) X 3 (Auditory Conditions) X 3 (Musical Experience) mixed-design ANOVA with Musical Experience as the between factor.

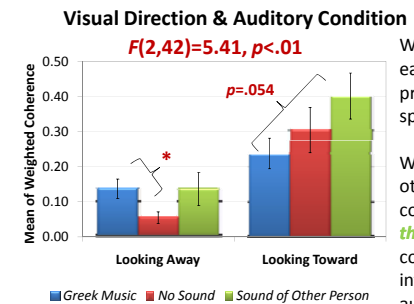
1. Main Effects



Overall, there was more coordination when looking **Toward** than when looking **Away**. Visual information was more effective than auditory.

There were no main effects of Auditory Condition or Musical Experience.

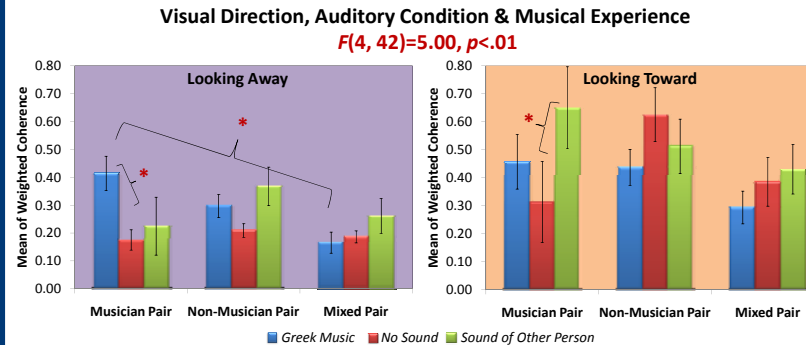
2. Two-Way Interaction



When rockers **could not see** each other, the **Greek Music** provided a medium for spontaneous coherence.

When rockers **could see** each other, the music reduced coherence while the **Sound of the Other Person** increased coherence. Here the visual information matches the auditory information.

3. Three-Way Interaction



As in the two-way interaction, when rockers **could not see** each other, the **Greek Music** provided a medium for spontaneous coherence. This occurred most strongly for Musician pairs. Further, Musician pairs had significantly higher coherence in the **Away** direction than Mixed pairs. The low coherence in Mixed pairs, suggests that musicians may attune to different aspects of the auditory stream than non-musicians.

When rockers **could see** each other, the **Sound of the Other Person** increased coherence over the **No Sound** condition, but only for musicians. This suggests that when the auditory information is in synchrony with the visual information, musicians are driven to change their natural movements to cohere with one another.

- Pairwise comparisons with the Bonferroni correction. * indicates p-values <.05.

CONCLUSIONS

- Ambient music affected spontaneous synchronization of rocking but the effects were not those expected (i.e., that music would increase coherence for all participants in all conditions).
- Music increased synchronization only for musician pairs.
- When rockers could see each other, music reduced coherence because of the conflicting visual information.
- Auditory information increased coherence when it was consistent with visual information (Hearing the sound of the other person rocking while also seeing them rock).
- The limited effect of music on spontaneous synchronization may have been due to the choice of an unfamiliar musical genre, Greek folk music.

REFERENCES

- Porges, S. W., Bohrer, R. E., Cheung, M. N., Drasgow, F., McCabe, P. M., & Keren, G. (1980). New time-series statistic for detecting rhythmic co-occurrence in the frequency domain: The weighted coherence and its application to psychophysiological research. *Psychological Bulletin*, 88,580–587.
- Richardson, M.J., Marsh, K.L., Isenhower, R.W., Goodman, J.R.L., & Schmidt, R.C. (2007). Rocking together: Dynamics of intentional and unintentional interpersonal coordination. *Human Movement Science*, 26(6), 867-891.