

Consequences of ‘music to one’s ears’: Structural Integration Priming from Music to Language

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1. Introduction

- Language and music share a number of characteristics (e.g. Besson and Schön 2001; Maess et al. 2001, Patel 2003, 2008, Koelsch 2009).
- Relation between musical and language processing? Divergent views:
 - View #1: Language and music share similar processing mechanisms:** Evidence from neuro-imaging and syntactic unexpectancy violations. (Koelsch 2000, Patel 2003, 2008).
 - View #2: Language and music use different processing mechanisms:** Musical deficits and amusics (Peretz and Colheart 2003, Peretz 2006).
- According to View #1, if shared resources are activated across the two domains, one would expect to see priming effects from one domain to the other.
- Our study: **priming experiment** investigating relation between language and music

2. Existing Work

- Structural priming occurs within, across langs
- Structural priming also occurs across domains (Scheepers et al 2011, see also Kaiser 2009 for related work), across structures (Loncke et al. 2011).
- Structural priming between **language and music** (Van de Cavey 2012, van de Cavey & Hartsuiker 2012)
 - Used **sine tones** to create musical structures
 - Priming paradigm, participants completed relative clause attachments in Dutch.
 - Result:** Musical structures influence RC completions

3. Research Questions

- Do language and music have shared representations and can they be activated across domains? More specifically:
 - Explicitly musical stimuli:** Do musical notes played on *piano* (easily recognized by listeners as being part of the *domain of music*) also prime linguistic structures?
 - Effect of pauses:** Can potential priming effects be strengthened by pauses (given that RC attachment is sensitive to prosodic information)?
 - Crossling extensions:** Testing English, which has a low attachment RC bias—unlike Dutch with a high attachment bias (e.g. Mitchell/Brysbaert’98)—also allows us to check for potential asymmetries in the ‘primability’ of low attach. vs. high attach. languages.

4. Our Study

- Method:** Cross-domain priming study
 - Targets:** 30 ambiguous English relative clauses
 - Primes:** 30 primes in 5 conditions.
 - Fillers:** 60 language fillers and 60 musical fillers.
- On critical trials, participants (n= 20) heard a musical prime and completed an ambiguous relative clause fragment
- Also rated musical primes (1- least melodious, 5- very melodious).
- Example continuations:** (plural/singular nouns counterbalanced)
 - Low attachment:** Jessica worked with the doctors of the supermodel who... [was pretty].
 - High attachment:** Emily met the niece of the florists who... [was busy reading].

5. Musical primes

Musical primes: created using the Circle of Fifths. Sequences of 8 notes (piano on Mac’s Garage Band).

CONDITION	Musical Notes
Musical High Attachment (MHA)	GCGBF#EGC
Musical Low Attachment (MLA)	DADC#BF#C#F#
Musical High Attachment Pause (MHP)	CGCEBE <pause> FC
Musical Low Attachment Pause (MLP)	ADAC#G#F# <pause> C#G#
Musical Baseline (MB)	FCFFCFFC



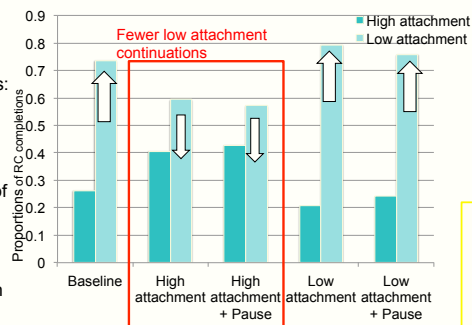
6. Results

Baseline and low attachment prime conditions: Rate of low attachment RCs is higher than chance (p’s<.01)

High attachment prime conditions: rate of low attachment RCs **doesn’t** differ from chance

Effect of Musical Attachment Height (p’s<.001) => Structure of musical primes influences RC completions.

No main effect of absence/presence of pause, no interaction



- Closer look at effects of pause:**
 - Low attachment w/ and w/o pause: No sig difference
 - High attachment w/ and w/o pause: No sig difference
- Having a pause that coincides with attachment boundary **does not** strengthen the priming effect
- Timing/rhythm does not matter?

- Priming from music:** Explicitly musical primes (piano notes) with a high attachment structure weaken default low RC attachment preference in language

7. General Discussion

- We used musical structures resembling low and high attachment to test if language and music make use of overlapping representations. Our results are in line with van de Cavey and Hartsuiker’s (2012) findings. Furthermore:
 - We found that:
 - (i) the structure of **explicitly musical stimuli** influences **people’s structural choices in language**
 - (ii) **Pauses** in musical stimuli did *not* strengthen priming effect (though RC attachment in language has prosodic effects): Priming from structure, independent of timing/rhythm? Implications for our view of syntax/prosody interface?
 - Future work:** How musical is music? Can other (non-musical) structures also influence language? (cf. Scheepers et al 2011)
- As a whole, our findings provide further evidence for a domain-general level of abstraction in the representation of hierarchical structural information, and pose challenges to domain-specific theories of syntactic processing.

Selected References: Kaiser, E. 2009. Effects of Anaphoric Dependencies and Semantic Representations on Pronoun Interpretation. *Anaphora Processing and Applications* Heidelberg: Springer. • Patel, A.D. 2008. *Music, Language, and the Brain*. NY: Oxford University Press. • Scheepers et al. 2011. Structural priming across cognitive domains: from simple arithmetic to relative-clause attachment. *Psychological Science*, 22, 1319-1326. • van de Cavey, Joris. 2012. Are Syntactic Processes in Music and Language Domain Specific? M.A Thesis, Universiteit Gent. • van de Cavey, Joris and Robert Hartsuiker. 2011. Syntax in Music and Language: Structural Integration Priming. aMLAP presentation.