



Association between musical and linguistic abilities at the beginning of schooling

A preliminary study with first-grade children

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Music – language – movement



- Engagement in musical activities influences language skills (Anvari et al., 2002; Overy et al., 2003; David, 2007; Forgeard et al., 2008; Loui et al., 2011; Degé, Kubicek, Schwarzer, 2015)
- Musical rhythm specifically related to language (Douglas, Willats, 1994; Overy, 2000; David et al., 2007; Moritz et al., 2013)
- **Movement-based music education** (Rohwer, 1998; Ferguson, 2005)
 - Developing a new teaching methodology
 - Special context: elementary school education



Active Music Learning

New educational model



- Creative movement-based vocal games in a group setting
- Improving musical abilities through singing, music listening, and directed movements
- Integration of music, movement, and visual experience
 - Concepts of Kodály and Dalcroze
 - **Solfege**, ear-training
 - **Rhythmics** („body-rhythm”)
 - **Improvisation** (movements, voice, instruments)



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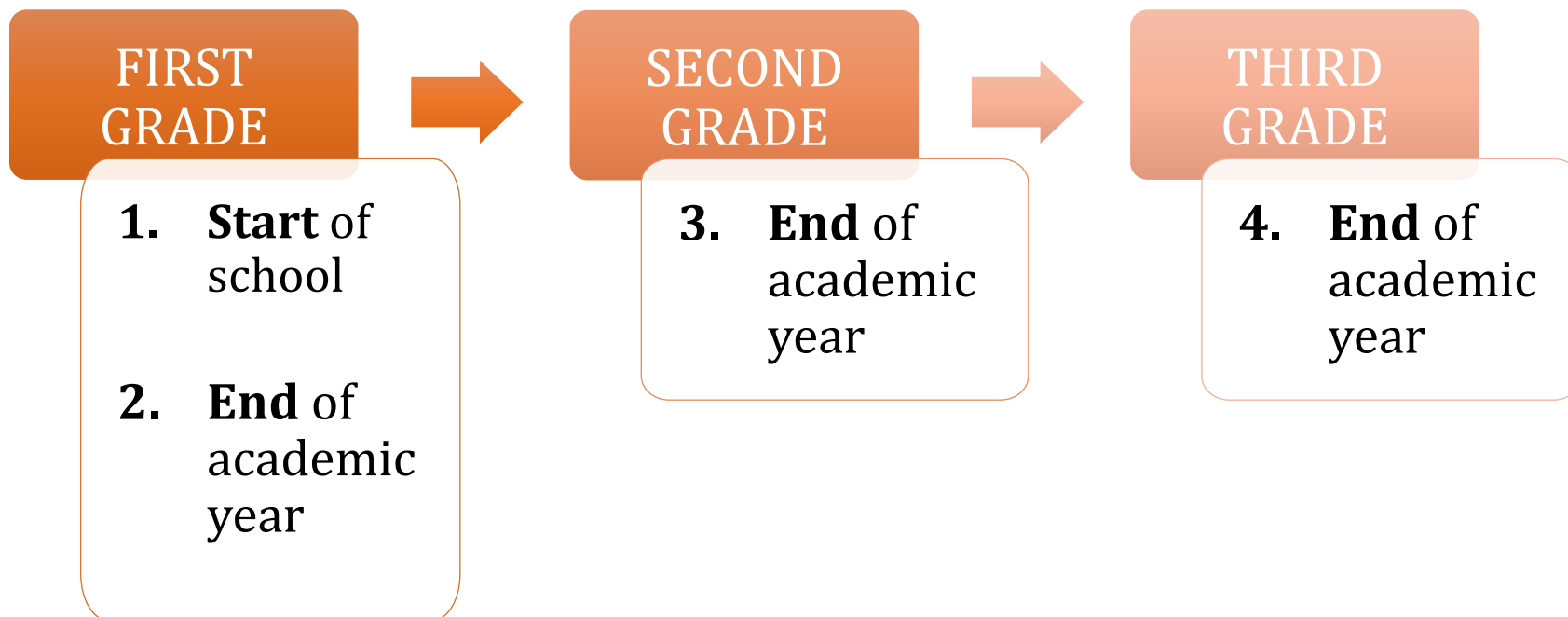
Psychological aims of the study



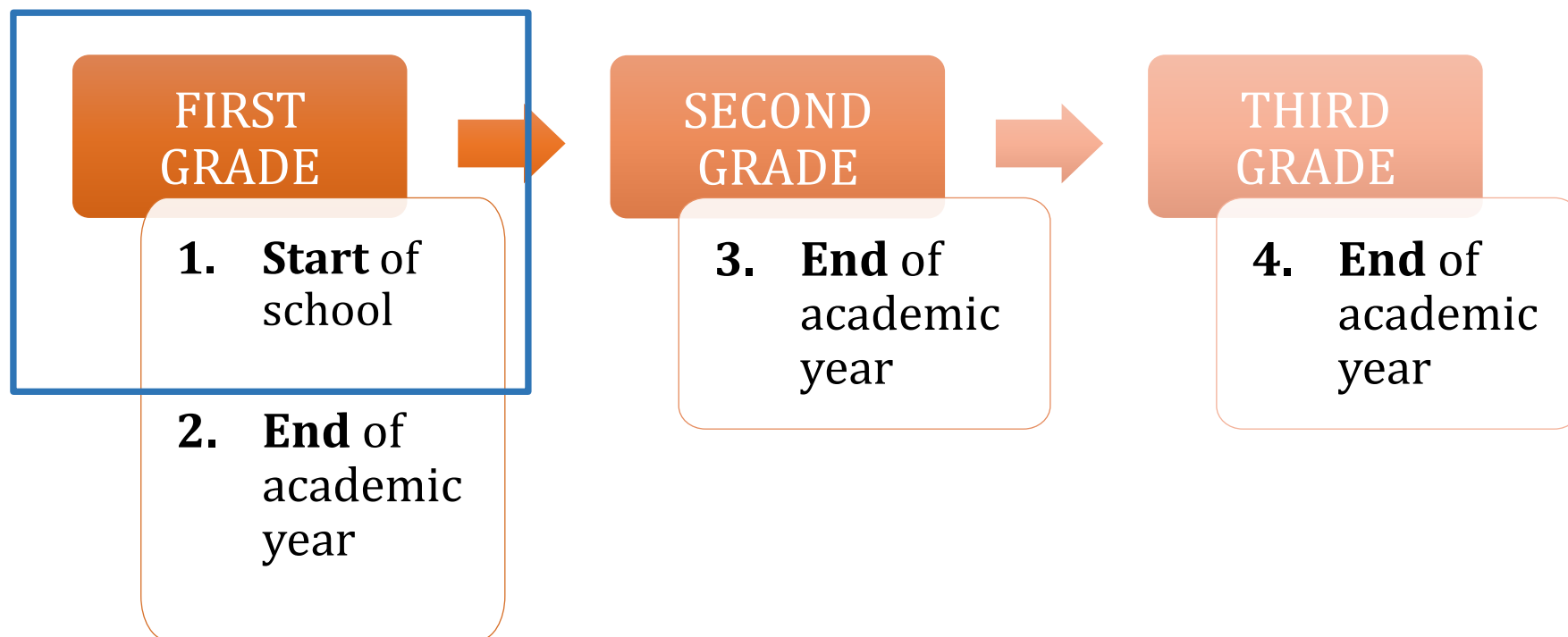
- Investigation of the **behavioral transfer effects** of music education from first to third grade
 - Music perception and production
 - Entrainment
 - Language abilities
 - Executive functions
 - Intellectual abilities
 - Creativity
 - Empathy
- Exploring **neurocognitive changes** in auditory processing
 - Music and speech perception
 - Entrainment



Longitudinal design



Longitudinal design





Participants

- 58 elementary school children
- 6- to 7-year-old first graders
- Two groups with different curriculum

Class	Girls	Boys	Mean age (years)	SD (years)
Music	20	12	6.89	0.32
Mathematics	8	18	6.95	0.34
Σ (N = 58)	28	30	6.92	0.33



Measurements

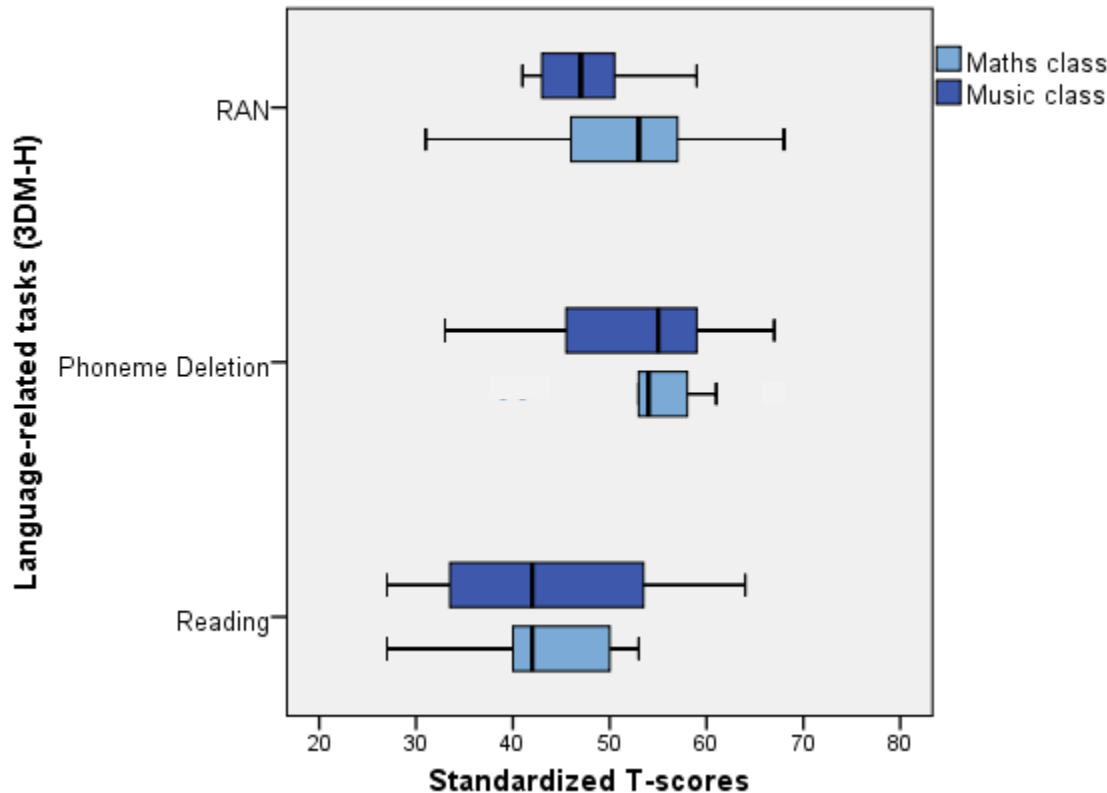


- **Intellectual abilities** (WISC-IV)
 - Block Design
 - Digit Span
 - Vocabulary
- **Language abilities**
(3DM-H; Tóth, Csépe, Vaessen, Blomert, 2014)
 - Reading
 - Phoneme Deletion
 - RAN
- **Executive functions**
 - Counting span
 - Verbal fluency
 - Fruit Stroop
- **Entrainment** (Maróti, 2015)
- **Music perception** (Asztalos, 2016)
 - Melody
 - Pitch
 - Rhythm
 - Harmony
 - Tempo
 - Visual connection
- **Music production** (Asztalos, 2016)
 - Singing
 - Clapping
- **Creativity** (Wallach, Kogan, 1965)
- **Empathy** (Bryant, 1982)



Preliminary results

Linguistic abilities

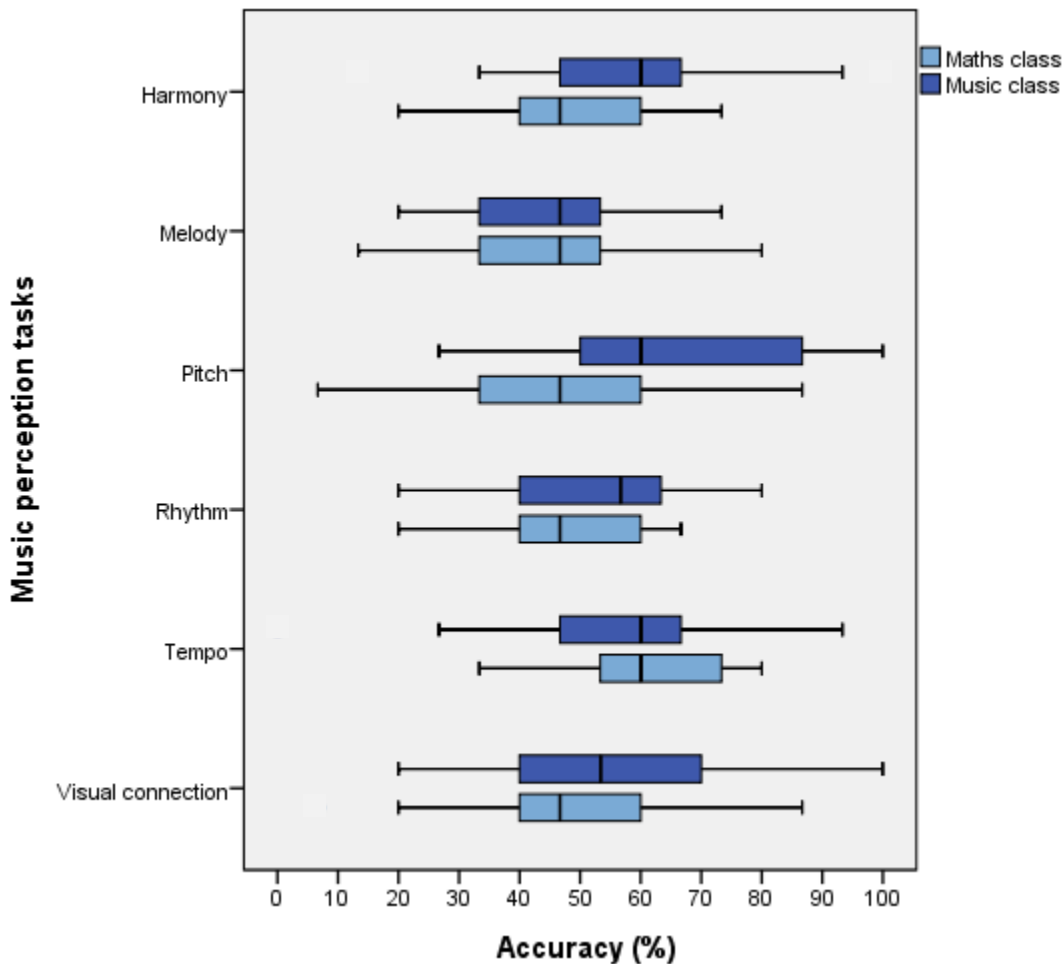


- **RAN:** $t(53) = 1.41$,
 $p = .163$
- **Phoneme Deletion:**
 $t(33) = 1.20$,
 $p = .239$
- **Reading:** $t(16.607) = 0.32$,
 $p = .757$



Preliminary results

Musical abilities



Significant interaction:
music × class

$F(4.20, 280) = 4.06, p = .003$



Associations between music and language

Math class



	Reading	Phoneme Deletion	RAN
'Paced' entrainment variance			-0.43
'Unpaced' entrainment variance			
Melody			
Pitch			
Rhythm			
Harmony			
Tempo			
Visual connection			

$p < .01$

$p < .05$



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Associations between music and language

Music class



	Reading	Phoneme Deletion	RAN
'Paced' entrainment variance			-.50
'Unpaced' entrainment variance		-.64	
Melody			
Pitch			.42
Rhythm			
Harmony			
Tempo			.47
Visual connection			

$p < .01$

$p < .05$



Conclusion



1. The music class performed better on musical tests compared to the maths class, but there was no difference in language-related abilities
2. Associations between linguistic skills, synchronization and tempo perception were present in the music class
3. No association was found between reading and musical abilities – assessments were conducted at the beginning of the school year!

Future plan: extended sample

- Control class
- Kokas music class (Kokas concept)





Thank you for your attention!

MTA – LFZE Research Group on Active Music Learning

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EEG research

- **Entrainment**
Beta and gamma band synchronization
- **Music perception**
Multifeature MMN
- **Speech perception**
Multifeature MMN

