REFERENTIAL ICONICITY IN MUSIC AND SPEECH: A COMPARATIVE STUDY WITH SWEDISH AND CHINESE SPEAKERS

VERÓNICA GIRALDO & JORDAN ZLATEV

Division for Cognitive Semiotics

Lund University, Sweden

ILL-12 Lund
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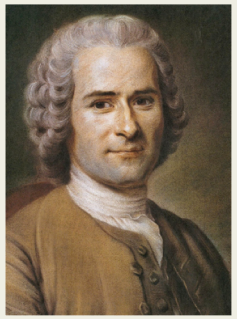
Outline

- Theoretical background and general hypotheses
- Design of the empirical study
  - Tasks
  - Procedure
  - Participants
  - Specific hypotheses
- Results
- Discussion
- Conclusions

Meaning making in language and music?

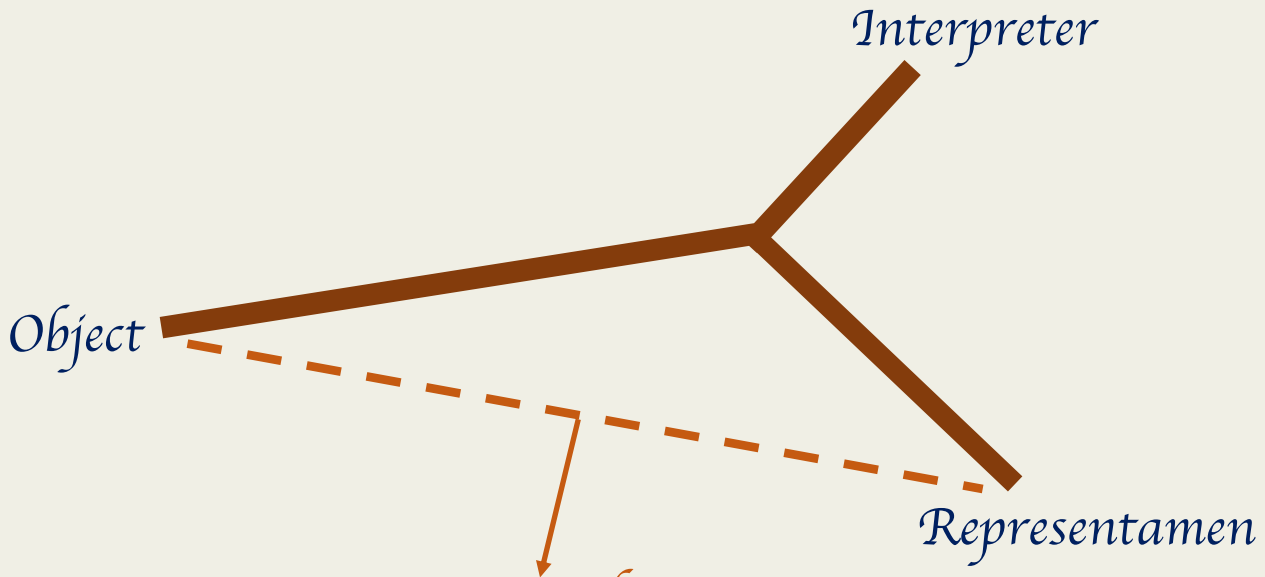


Speculated that the origins of language and music are interconnected (Rousseau, 1781).

"The central role of music and language in human existence, and the fact that both involve complex and meaningful sound sequences naturally invite comparison between the two domains" (Patel, 2008: 3).

"Semiotics is the theory of signs. Since music seems meaningful – it is more, apparently, than its physical sounds – many have taken it to be a sign" (Monelle, 1991: 1)

Signs and grounds



Iconicity

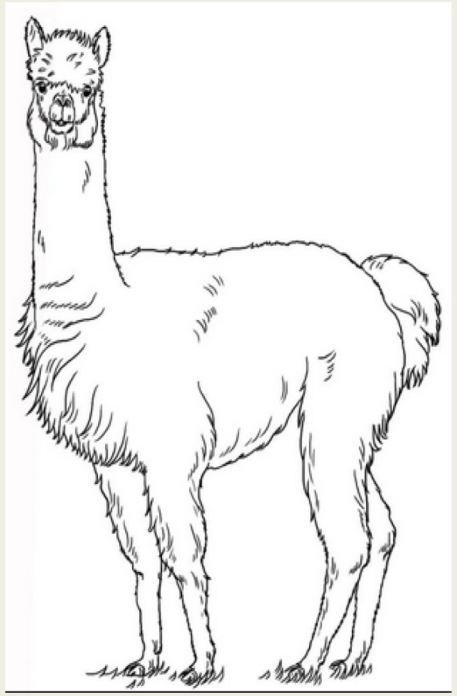
Similarity: “a sign which refers to the *object* that it denotes merely by virtue of characters of its own” (Peirce, 2003: 110).

Indexicality

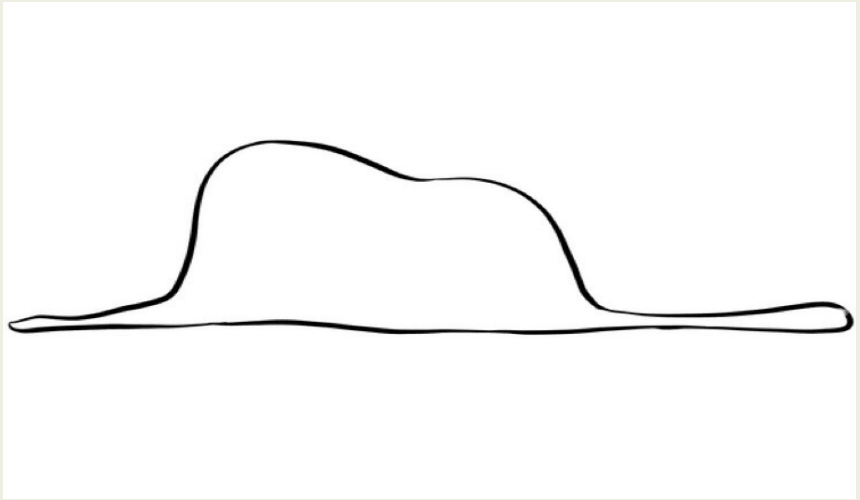
“the ground is not based on similarity, but on contiguity in time and space” (Ahlner & Zlatev, 2010: 314).

Symbolicity

Conventionality: it is based solely on general cultural agreement, by “virtue of law” (Peirce 2003: 111).



Primary Iconicity



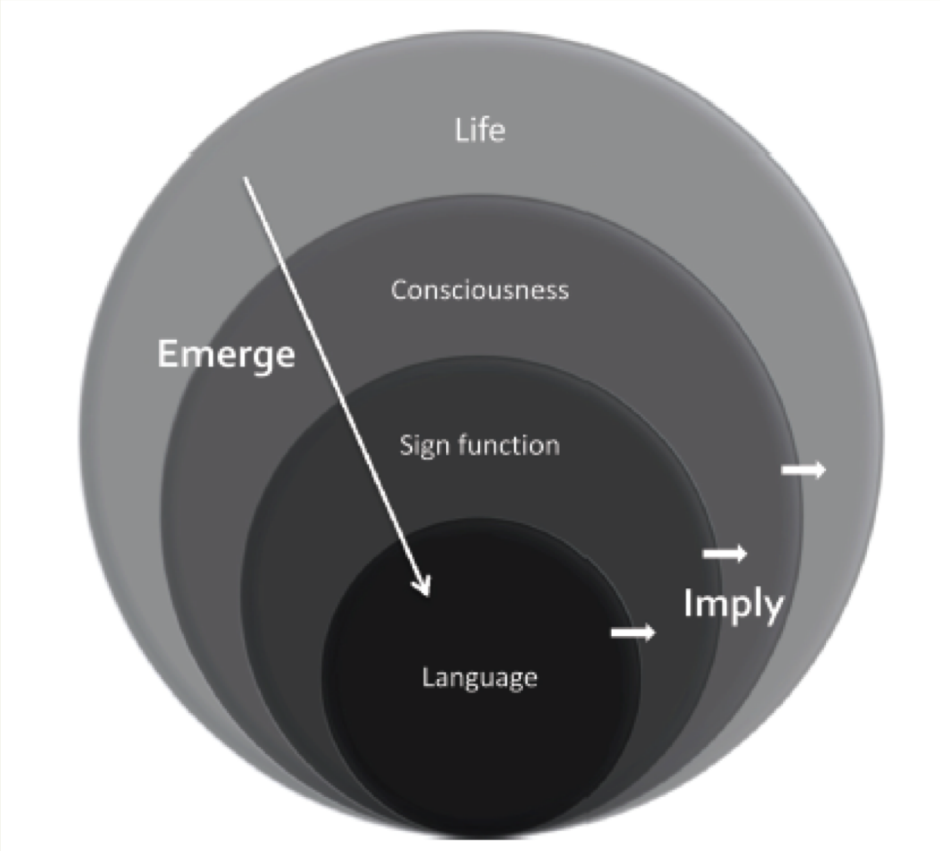
Secondary Iconicity

"the **perception** of an iconic ground obtaining between two things is one of the reasons for positing the existence of a sign function joining two things together as expression and content"

"the **knowledge** about the existence of a sign function between two things functioning as expression and content is one of the reasons for the perception of an iconic ground between these same things"

(Sonesson 1997: 741)

The Semiotic Hierarchy and Mimesis



(Zlatev, 2009)

Stage	Species/Period	Novel forms of representation	Manifest change	Cognitive governance
EPISODIC	Primate	Complex episodic event-perceptions	Improvised self-awareness and event-sensibility	Episodic and reactive, limited voluntary expressive morphology
MIMETIC (1st transition)	Early hominids, peaking in H. erectus: 4M-0.4Mya	Non-verbal action modelling	Revolution in skill, gesture (including vocal), nonverbal communication, shared intention	Mimetic increased variability of custom cultural "archetypes"
MYTHIC (2nd transition)	Sapient humans, peaking in H. sapiens sapiens: 0.5 Mya-present	Linguistic modelling	High-speed phonology, oral language, oral social record	Lexical invention, narrative thought, mythic framework of governance
THEORETIC (3rd transition)	Recent sapient cultures.	Extensive external symbolization, both verbal and nonverbal	Formalisms, large scale theoretic artifacts and massive external memory storage	Institutionalized paradigmatic thought and invention

(Donald, 1998: 14)

"sound symbolism"

"marked words depictive of sensory imagery found in many of the world's languages […] they are WORDS, that is, conventionalized items with specifiable meaning, as opposed to 'simple sounds'."
(Dingemanse 2012: 654-655)

Ideophones

Cross-Modal

mappings that go across sensory modalities, e.g. from sound to movement or sound to shape

Unimodal

mappings that stay within the same sensory modality (in this case, hearing)

Sound Symbolism

"the existence of a motivated, non-arbitrary relation between the sound patterns and the meaning of words" (Johansson & Zlatev, 2013: 3).

Frequency Code

where high frequencies are associated with small things, whereas low frequencies are associated with big things (Ohala, 1994).

”Programmatic music”

”Instrumental music that carries some extra-musical meaning, some “program” of literary idea, legend, scenic description, or personal drama”

(Editors of Encyclopedia Britannica, 1998)

Musical melodies whose aim is to refer to extra-musical elements: worldly objects and events on the basis of iconic (and indexical) grounds.
(cf. Monelle 1991)

Camille Saint-Saëns. “Volière”. *Le Carnaval des Animaux, 1886.*

General Hypotheses

1. It will be easier for people to recognize the referential iconicity through unimodal, rather than cross-modal stimuli.
2. In both programmatic music and speech, there will be a combination of primary and secondary iconicity.
3. Given that there is a high degree of conventionality in music, which is linked to one's culture, there will be differences in how participants, belonging to two different cultures (Sweden, China) will associate the sound stimuli to the visual one, in both music and speech tasks.

Design

21 Swedish and 21 Chinese native speakers were asked to match different representamina (musical and linguistic) to a number of objects shown on the screen.

Tasks

T1: Music Representamina with **Images** as Objects

T2: Music Representamina with **Words** as Objects

T3: Fictive Words with **Images** as Objects.

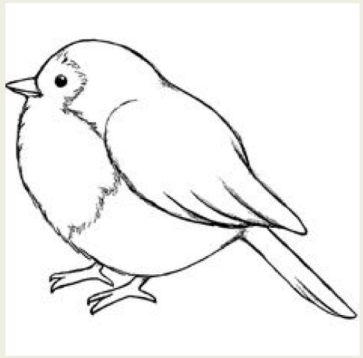
T4: Ideophones with **Words** as Objects.

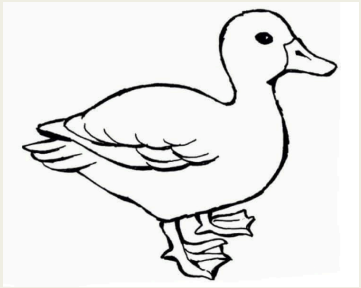
All of the four tasks above had two conditions:

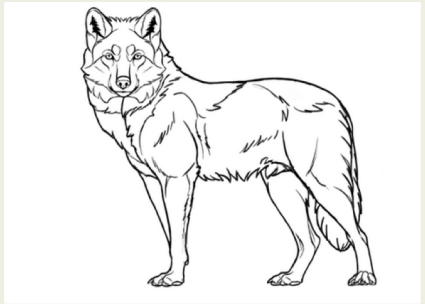
- Less-Contrastive → 1 Representamina (Audio) | 4 objects (1 target + 3 foils)
- More-Contrastive → 2 Representamina (Audio) | 2 objects

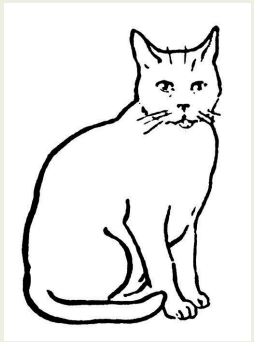
T1-T2 Music Tasks Materials

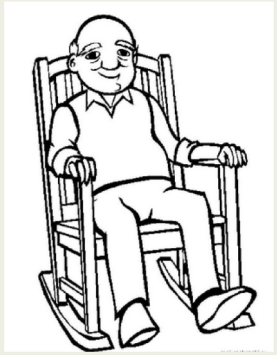
Peter and the Wolf (Prokofiev, 1936)











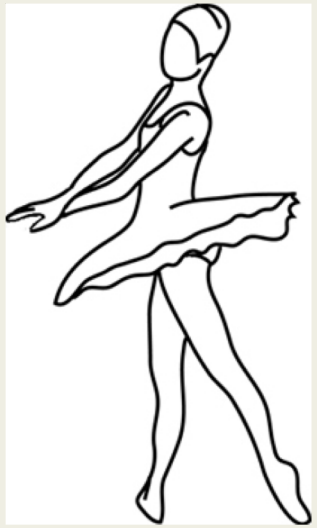
Details of Musical Stimuli

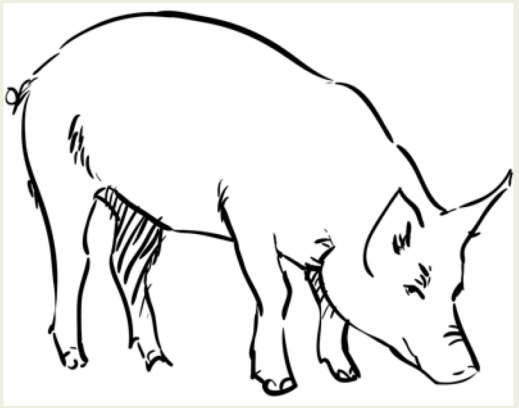
Higher Frequency

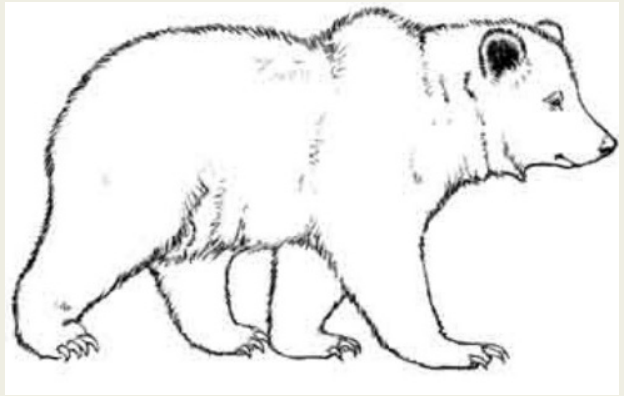
Character	Instrument	Pitch Range	Duration	Iconicity
Bird	Flute	E4-G6	13 seconds	Unimodal
Duck	Oboe	C4-D5	16 seconds	Cross-modal
Cat	Clarinet	G3-F4	10 seconds	Cross-modal
Hunter	Timpani	E2-C3	7 seconds	Unimodal
Wolf	French Horns	G2-F4	19 seconds	Cross-modal
Grandfather	Bassoon	B1-G3	23 seconds	Cross-modal

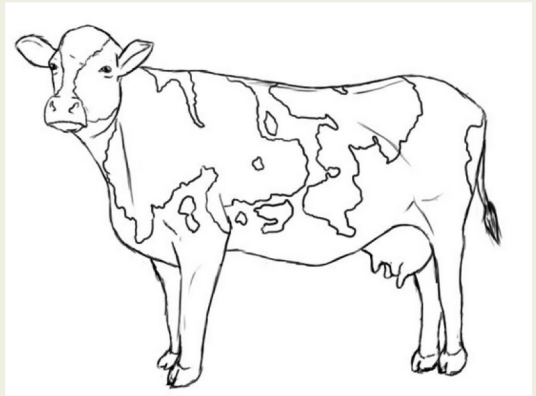
Lower Frequency

Foils



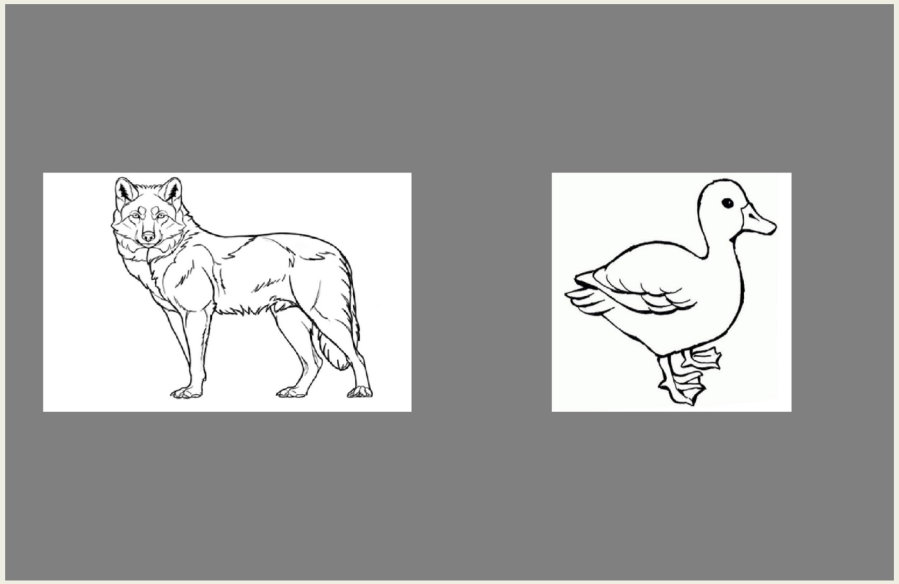




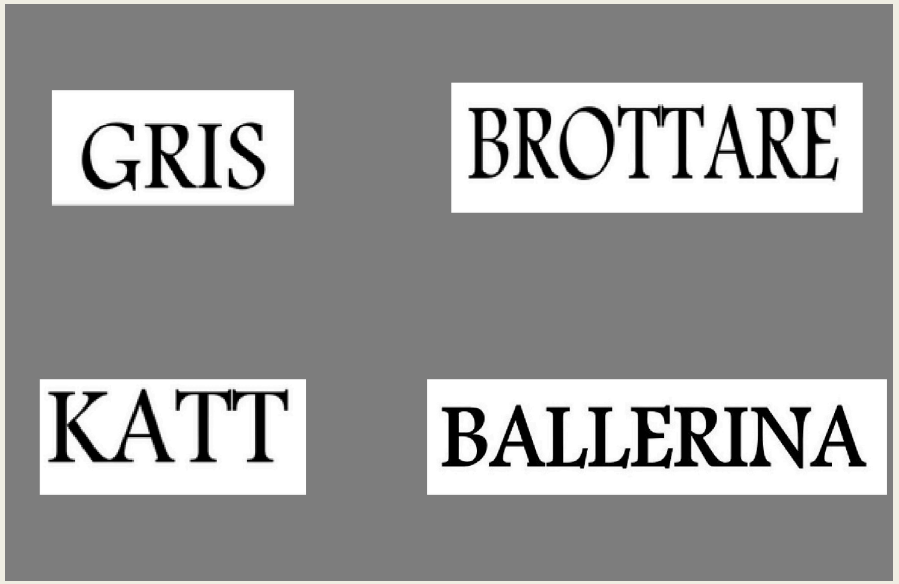


Example of Less-Contrastive & More-Contrastive Music Tasks

T1: More-Contrastive Music Task with Images as Objects



T2: Less-Contrastive Music Task with Words as Objects (Swedish)



(Pig, Fighter, Cat and Ballerina)

T3 Fictive Words Tasks

Representamina

Six two-syllabic CVCV non-words were created, following criteria provided by Ahlner & Zlatev (2010: 324)

<u>Consontants:</u>

Voiceless obstruents (‘sharp’ & ‘pointy’)
Vs.
Voiced sonorants (’soft’ & ‘smooth’)
[tʃ, t k] *vs.* [m, l, n]

<u>Vowels:</u>

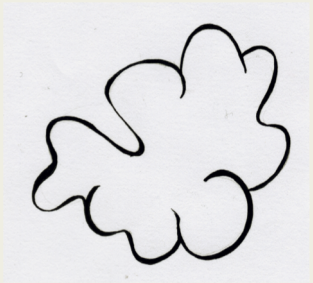
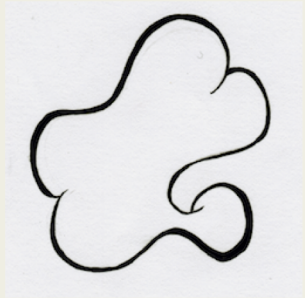
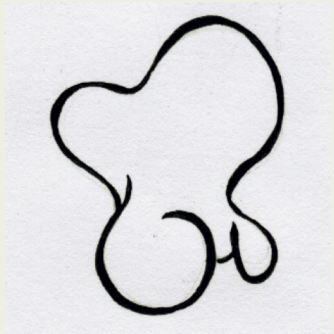
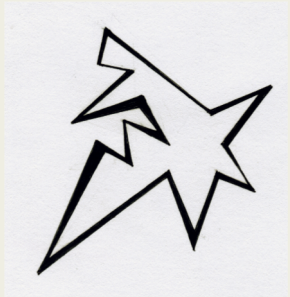
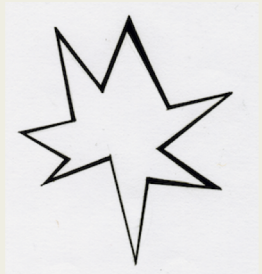
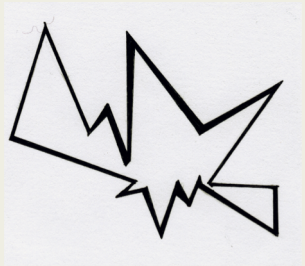
Front closed unrounded (‘sharp’)
Vs.
Back open (‘round’)
[i, e] *vs.* [a, u]

Keti	Nalu
Kitʃi	Lulu
Tike	Lamu

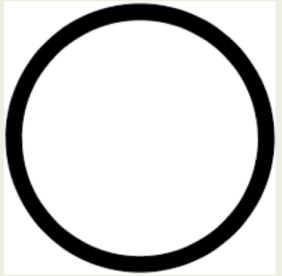
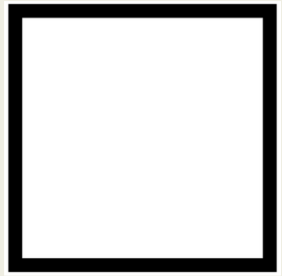
T3 Fictive words

Objects

Six shapes: 3 with soft, round contours and 3 with sharp contours. For the less-contrastive condition, two foils were used.

Foils

T4 Ideophones Tasks

Representamina

Six *ideophones,* in an unfamiliar language (Basque) were used, all chosen from Ibarretxe's (2017) wide compilation of Basque ideophones.

Criterion 1: The ideophone had to be reduplicated.

Criterion 2: The ideophone had to be unimodal (mapping from sound to sound).

Criterion 3: The ideophone could not resemble any word in either Swedish or Chinese.

- *Draka-draka* 'horse galloping'
- *Grik-grak* 'to crackle'
- *Pil-pil* 'sound of boiling water'
- *Trinkili-trankala* 'move noisily, with difficulty'
- *Zirris-zarraz* 'sound of sawing'
- *Zorro-zorro* 'snoring'

T4 Ideophones

Objects

The objects for the ideophones tasks consisted on the translations of the ideophones to both Chinese and Swedish. Also, three foils were used for the less-contrastive tasks.

Draka-Draka
'Horses Galloping'

Zorro-zorro
'snoring'

Grik-Grak
'to crackle'

Zirris-Zarraz
'Sound of sawing'

Pil-Pil
'Sound of boiling water'

Trinkili-Trankala
'Move noisily'

Participants and Procedure

Participants

- 21 L1 Swedish speakers
- 21 L1 Chinese speakers

- None of the participants had previously heard Peter and the Wolf.

- None of the participants spoke Basque.

- All experiments were conducted in Malmö/Lund (Sweden).

Design of the experiment

- Each participant was presented with **eight tasks**: a more-contrastive and a less-contrastive conditions for each of the 4 tasks presented above. The order of the tasks was randomized, as well as the position of the objects on the screen

- **Three versions** of the experiment were made, to minimize combination patterns (of both representamina and objects)

- **Debriefing:** After the participants underwent the experiment, they were asked to go through their answers and motivate their choices.

Specific Hypotheses

1. Throughout Tasks 1-4, **more-contrastive tasks** will more often matched to the expected target than **less-contrastive tasks**.

2. For the music tasks (T1 and T2), the **unimodal conditions** (BIRD, HUNTER), will be matched to the expected target more often **cross-modal conditions** (CAT, DUCK, WOLF, GRANDFATHER).

3. For the **music tasks** (T1 and T2), Swedish L1 speakers will perform better than L1 Chinese speakers due to **conventionality**.

4. a) For the **fictive words tasks** (T3), Chinese speakers are expected to have similar results to Swedish speakers (“universal sound symbolism”).

   b) For the **ideophones tasks** (T4), Chinese speakers expected to have similar results to Swedish. (“conventionalized sound symbolism")

5. Participants of both languages are expected to perform **better in the fictive words tasks** (T3) than in the ideophones tasks (T4).

Results H1 (Contrastiveness): Supported

	ANSWER		Percentage
	0	1	
Less-Contrastive	99	69	41%
More-Contrastive	36	132	78.5%

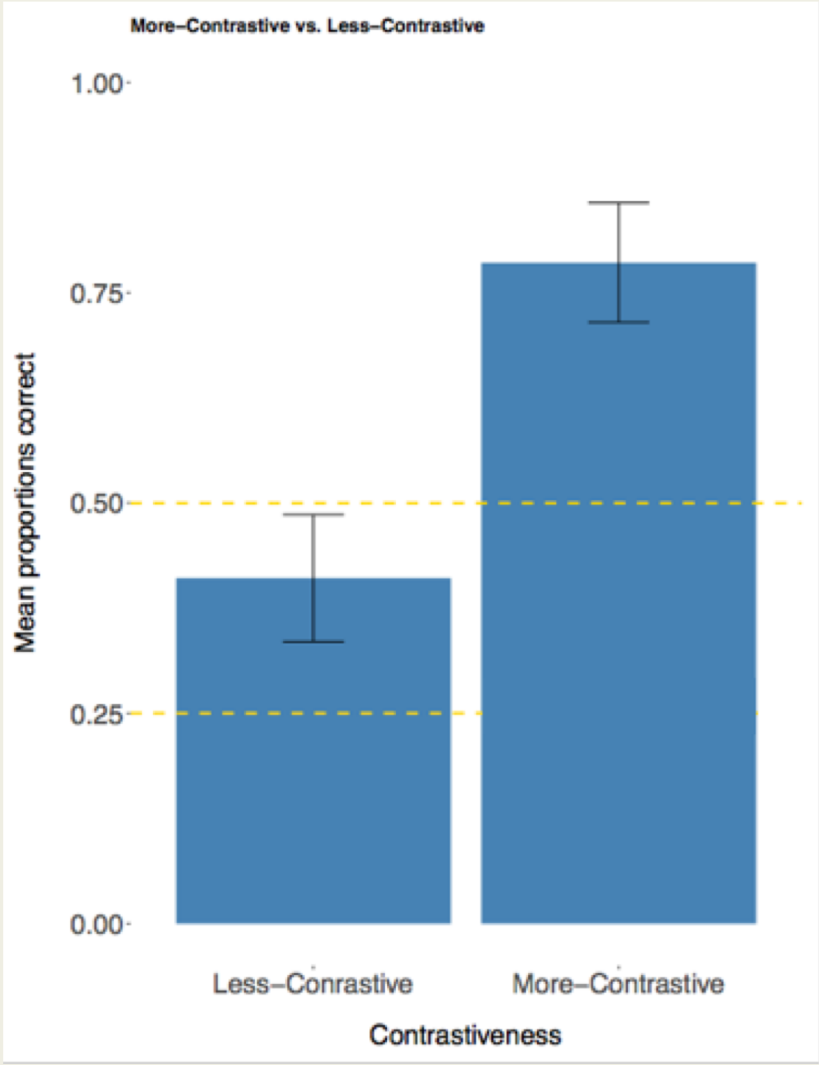
ßConditionContrastiveness = 2.0500, z = -0.4116, *p* = 2.32e-11

EBTLessC > 0.25
EBTLessC = 3.61e-06

Above Chance Significance

EBTMoreC > 0.5
EBTMoreC = 2.215e-14

Above Chance Significance



Results H2 (Modality): Not supported

	ANSWER		Percentage
	0	1	
Cross-Modal	43	69	61.6%
Unimodal	29	27	48.2%

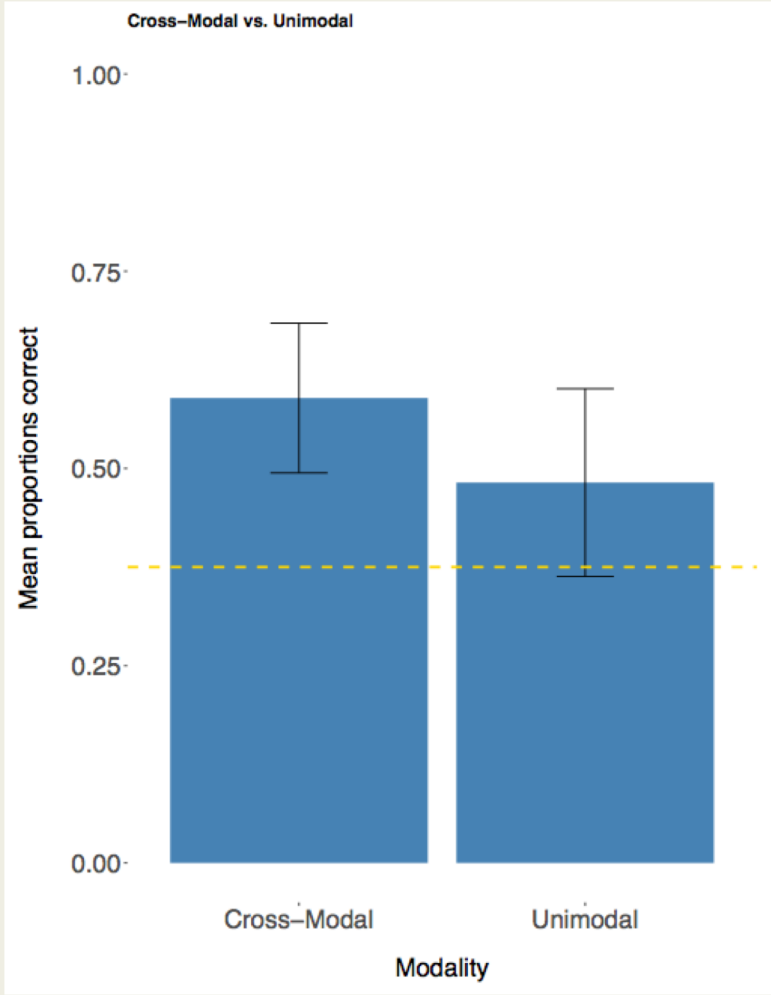
ßConditionModality = -0.5481, z = 0.4763, *p* = 0.1288

EBTCrossModal > 0.375
EBTCrossModal = 2.026e-07

Above Chance Significance

EBTUnimodal > 0.375
EBTUnimodal = 0.06595

Below Chance Significance



Results H3 (Music): Not supported

	ANSWER		Percentage
	0	1	
Chinese L1	38	46	54.7%
Swedish L1	34	50	59.5%

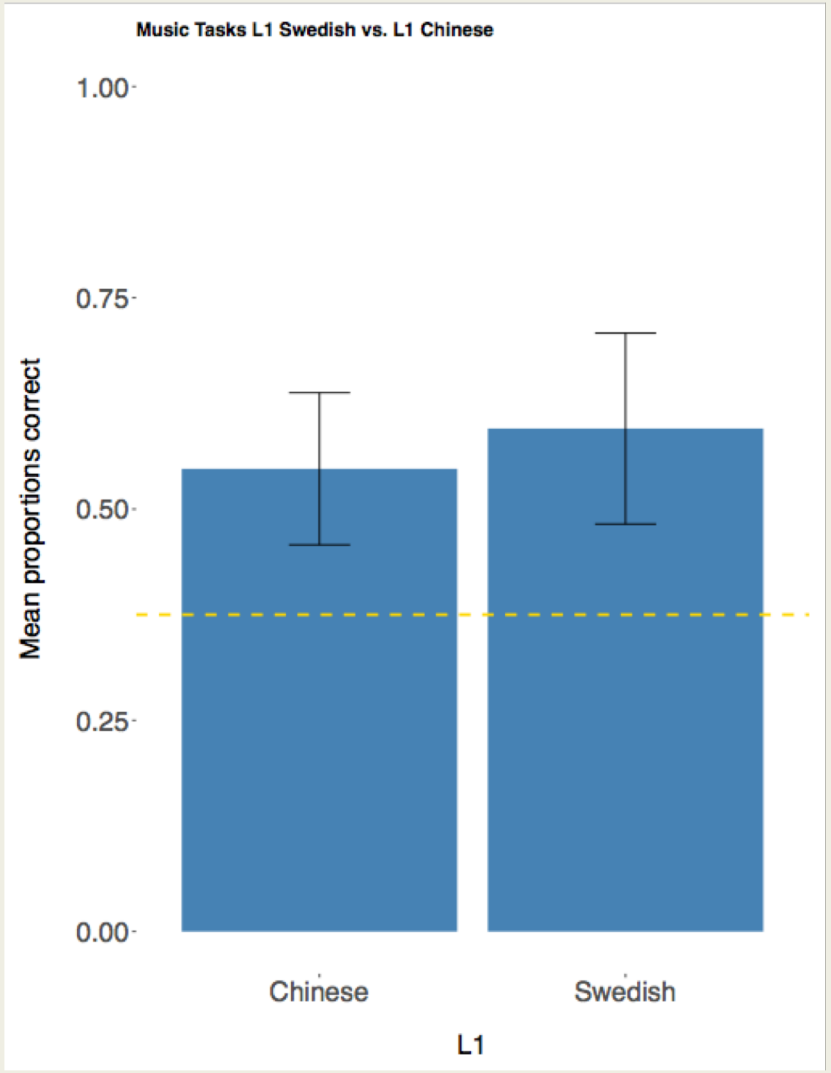
ßCondition L1 = 0.1992 , z = 0.1966, *p* = 0.528

EBTChinese> 0.375
EBTChinese = 0.0009627

Above Chance Significance

EBTSwedish> 0.375
EBTSwedisn = 3.485e-05

Above Chance Significance



Results H4a (Fictive Words): Supported

	ANSWER		Percentage
	0	1	
L1 Chinese	17	25	59.5%
L2 Swedish	11	31	73.8%

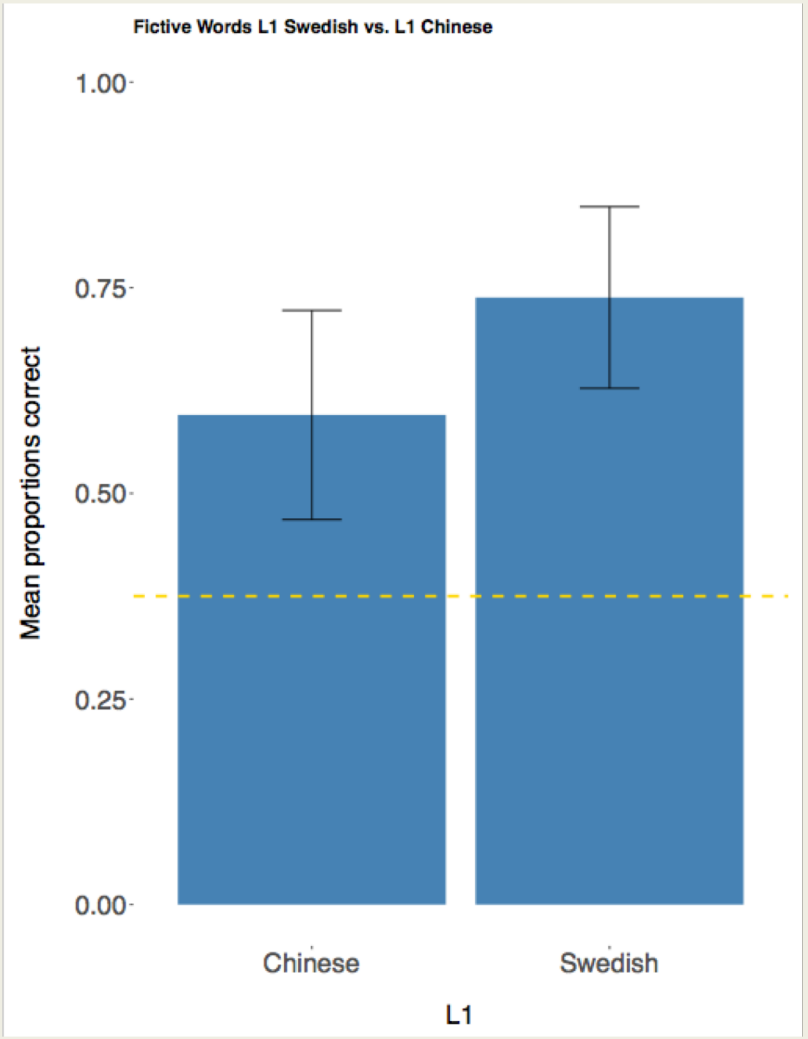
ßConditionL1 = 0.7139 , z = 0.6808, *p* = 0.148

EBTChinese> 0.375
EBTChinese = 0.003085

Above Chance Significance

EBTSwedish> 0.375
EBTSwedisn = 1.898e-06

Above Chance Significance



Results H4b (Ideophones): Supported

	ANSWER		Percentage
	0	1	
L1 Chinese	18	24	57.1%
L1 Swedish	17	25	59.5%

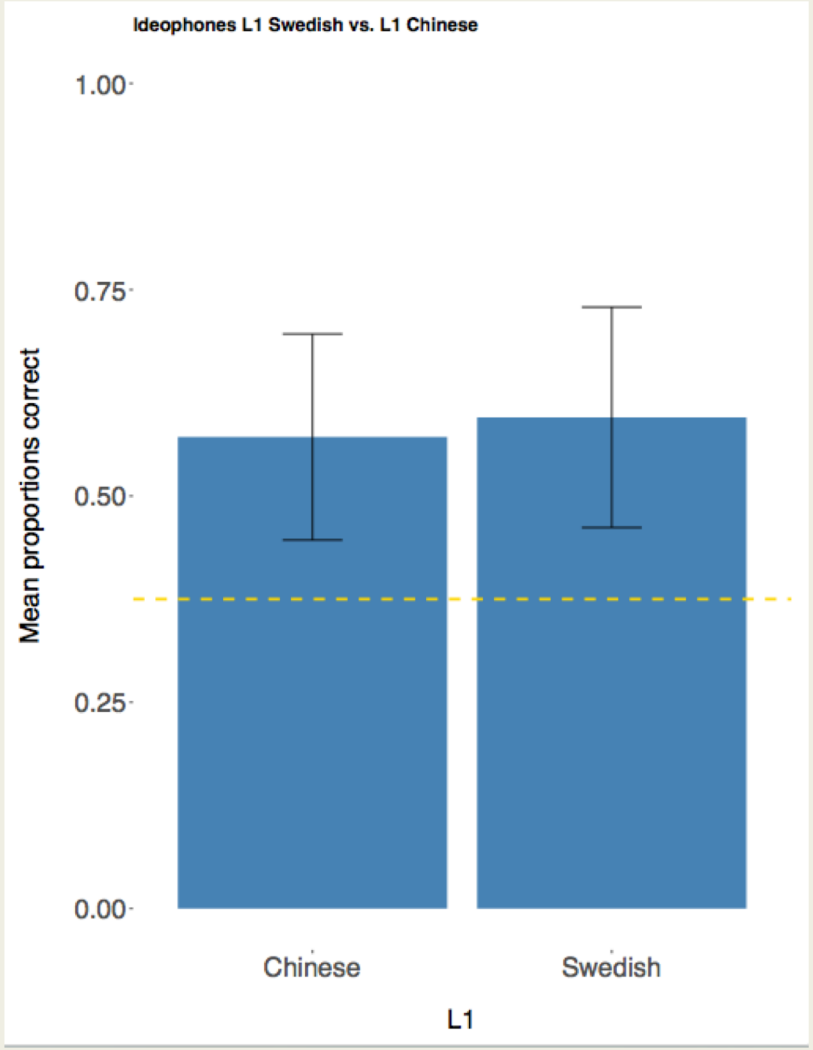
ßConditionL1 = 0.2269 , z = 0.5071, *p* = 0.717

EBTChinese> 0.375
EBTChinese = 0.007564

Above Chance Significance

EBTSwedish> 0.375
EBTSwedisn = 0.003085

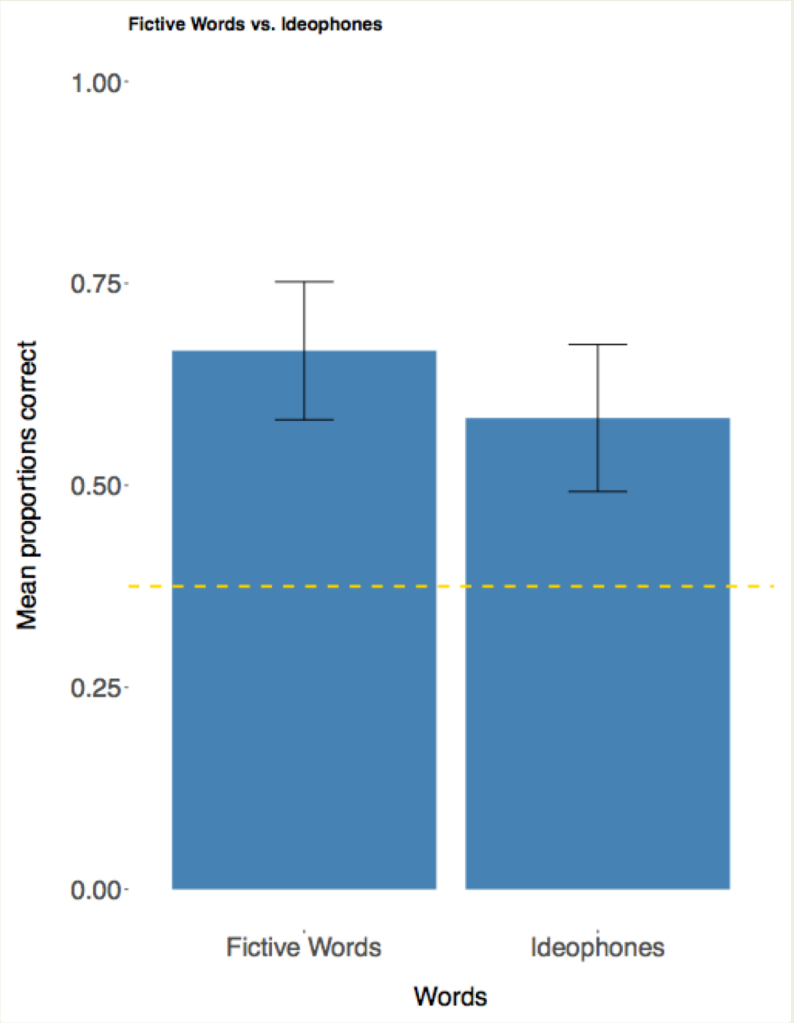
Above Chance Significance



Results H5 (Fictive > Ideophones): Not Supported

	ANSWER		Percentage
	0	1	
Fictive Words	28	56	66.6%
Ideophones	35	49	58.3%

ßConditionLinguistic = -0.6568 , z = 1.1503, *p* = 0.484



EBTFictive> 0.375
EBTFictive = 5.791e-08

Above Chance Significance

EBTIdeophone> 0.375
EBTIdeophone = 8.56e-05

Above Chance Significance

Discussion

- Both musical and linguistic stimuli involve primarily secondary iconicity: More contrastive tasks obtained higher success rates!
- All, except for unimodal representamina, are significantly above chance, hence a degree of primary iconicity.
- Cross-modal iconicity is not necessarily less transparent than unimodal iconicity.
- For this particular piece of programmatic music, there were no cultural differences: universal human life world?
- No cultural differences found in either Ideophones or Fictive Words.
- Even though fictive words tasks showed better results than ideophones tasks, as expected, the difference was not statistically significant.

Conclusions

- There were no significant differences in the way participants performed on the linguistic tasks compared to music tasks: **the psychological processes involved are domain-general. i.e. not limited to language.**
- Higher success rates in more-contrastive tasks: **perceiving iconicity in both programmatic music and speech involves a combination of both primary and secondary iconicity, but with a considerable role for the latter.**
- No significant differences between cross-modal and unimodal representamen-object mappings: **perceiving cross-modal iconicity is not more difficult than unimodal iconicity.**
- No significant differences were found in the ways music or linguistic representamina were perceived by members of the two different cultures: **we are tapping into universal human cognitive-semiotic capacities.**

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