

Exploring Emotional Prosody Recognition in Children: Familiar vs. Unfamiliar Languages

Lola Terny¹, Véronique Delvaux^{1,2}, Virginie Roland¹, Kathy Huet¹, Myriam Piccaluga¹

¹Metrology and Language Sciences Department, University of Mons, Belgium,

²National Funds of Scientific Research, Belgium

5th International Symposium on Monolingual and Bilingual Speech (ISMBS 2025)

June 17th

TABLE OF CONTENTS

01 INTRODUCTION

- 1.1. Who am I?
- 1.2. PhD Project

02 THEORETICAL FRAMEWORK

- 2.1. Literature review
- 2.2. Research question & hypotheses

03 METHOD

- 3.1. Construction & validation of the corpus
- 3.2. Data collection

04 PRELIMINARY FINDINGS

- 4.1. Sample characteristics
- 4.2. Global results
- 4.3. Detailed results

05 DISCUSSION AND PERSPECTIVES

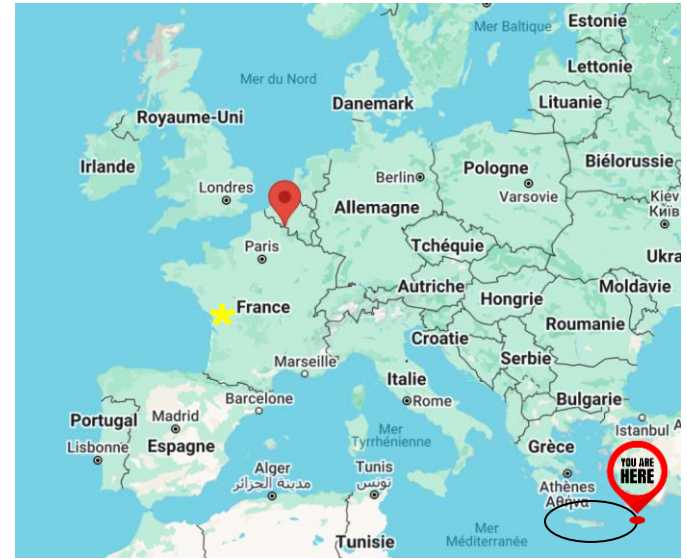
- 5.1. Discussion
- 5.2. Perspectives



1. INTRODUCTION

1.1. Who am I?

- Currently working in Mons (Belgium), Faculty of Psychology and Educational Sciences, department of Metrology and Language Sciences
- Born in France. Bachelor and master degree in Poitiers (France)
- Various stays in Spanish-speaking countries (Spain, Chili...)
- Interests: bilingualism, child development, prosody, LX acquisition (first, second or foreign languages)



1.2. PhD Project



perception



emotions



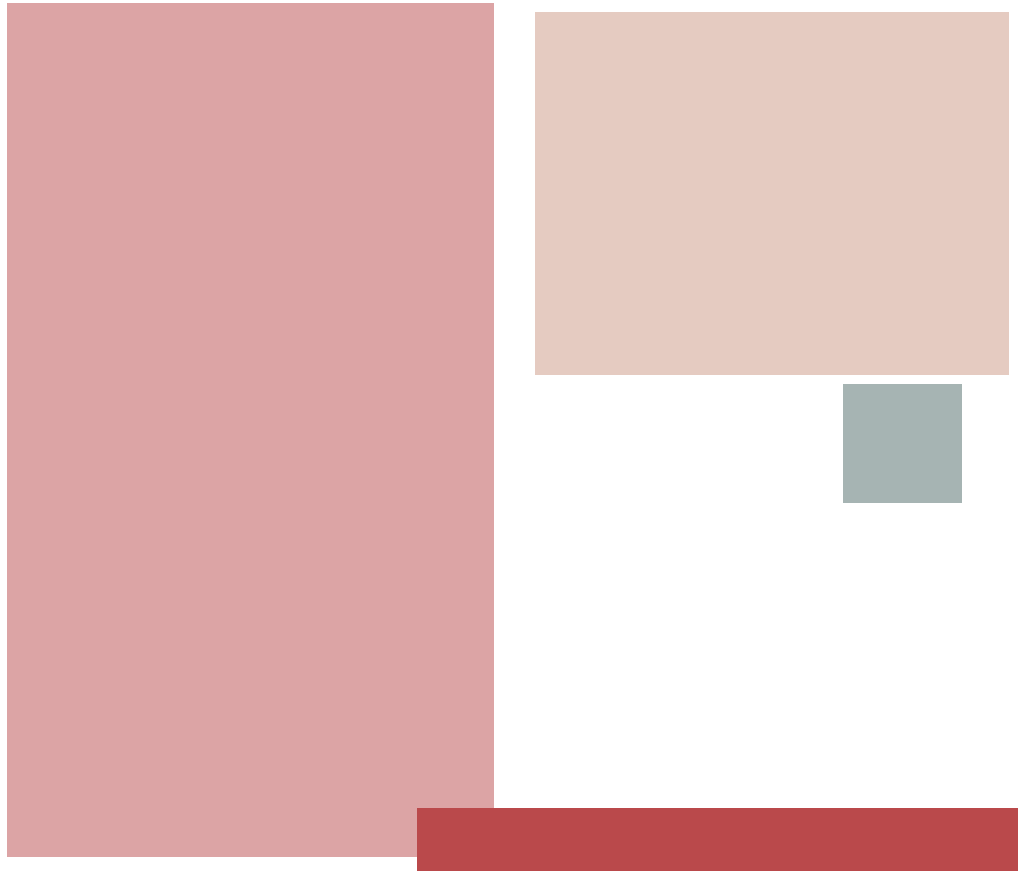
emotional
prosody

- In a population of children (French monolinguals, Spanish monolinguals and French-Spanish bilinguals)
- **Objective:** to determine the developmental trajectory of emotion recognition based on emotional prosody in children with varied language profiles



02

THEORETICAL FRAMEWORK



2. THEORETICAL FRAMEWORK

2.1 Literature review

About emotion recognition through emotional prosody in children...

- A few studies among monolinguals in their **native language** (Filippa et al., 2022; Amorim et al., 2021; Neves et al., 2021; Griffiths et al., 2020; Grosbras et al., 2018; Chronaki et al., 2018; Gil et al., 2016; Zupan, 2015; Aguert et al., 2013; Sauter et al., 2010; Quam & Swingley, 2012; Morton & Trehub, 2001) and 3 studies in **“unknown” languages** (Ma et al., 2022; Chronaki et al., 2015; Nelson & Russel, 2011)

Some results:

- **Emotion:** some emotions are better recognized than others (e.g., Filippa et al. 2022)
- **Type of stimuli:** non-verbal vocalizations are better recognized than pseudo sentences or sentences → different types of processing mobilized (Neves et al. 2021; Castro and Lima, 2010)
- **Language of stimuli:** between 3 and 5 years old, emotions are recognised equally in all languages (Ma et al. 2022) and from the age of 8, subjects perform better when the stimuli are in their mother tongue than in an unknown language (Chronaki et al. 2018)
- **Participants' language:** children ability to perform the same task linked to prosody (emotional or linguistic) reaches a level of mastery at different ages depending on their mother tongue (Filippe et al. 2017; Peppe et al. 2010)
- **Sex:** depends on the study (no consensus in the literature)
- **Age:** developmental trajectory of vocal emotion recognition (Amorim et al. 2021)

2.2. Research question & hypotheses

The developmental trajectory depends on the **type of stimulus**, the **target emotion** and the participants' **mother tongue**.

Literature gap: No studies have been conducted on bilingual subjects, except for Roseberry-McKibbin and Brice (1999).

Research question

What is the developmental trajectory of emotion recognition based on emotional prosody in 4- to 8-year-old children with varied language profiles (bilingual and monolingual)?

Hypothesis 1: results would vary in terms of emotion type

Hypothesis 2: results would vary in terms of stimulus type

Hypothesis 3: results would vary in terms of stimulus language

Hypothesis 4: performances would improve with age



03

METHOD



3.1. Construction & validation of stimuli corpus

(inspired by Castro and Lima, 2010)

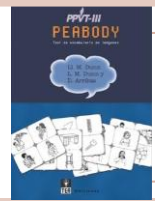
- Creation of sentences and pseudosentences in French and Spanish
- Recording and selection of various stimuli in Spanish (N=136) and French (N=126)
- Francophone (N=37) and hispanophone (N=33) judges made a forced-choice recognition task
- Audios with >80% of accuracy were selected for the final corpus of audios

8 sentences and 8 pseudosentences in French
8 sentences and 8 pseudosentences in Spanish
8 non-verbal vocalizations (Montreal Affective Voices, Belin et al. 2008)

Frases () número de sílabas CV VVC combinación fonotáctica	Pseudofrases () número de sílabas () combinación fonotáctica
El gato come carne (7) /el yato kome kame/ VC CVCV CVCV CVCCV	El tago come parne (7) /el tavo kome parne/ VC CVCV CVCV CVCCV
El neucoptero es negro (9) /el elikoptero es nevro/ VC VCVCCVCVCV VC CVCCV	El nekaptore es nagro (9) /el ilekaptore es navro/ VC VCVCCVCVCV VC CVCCV
Toca el tambor (5) /toka el tambor/ CVCV VC CVCCVC	Teka el pambor (5) /teka el pambor/ CVCV VC CVCCVC
La escoba está en la cocina (11) /la eskoba está en la kookina/ CV VCCVCV VCCV VC CV CVCCV	La espos está en la cinoka (11) /la espos está en la ðinoka/ CV VCCVCV VCCV VC CV CVCCV

Phrases	Pseudophrases V2
Le ballon est sous l'échelle (7) /la balɔ̃ ɛ su ʁeʃel/ CV CVCV ⁿ V CV C VVCV	Le lonba est sous chélé CV CV ⁿ CV V CV CVCV
Le train est jaune (4) /la trɛ̃ ɛ ʒon/ CV CCV ⁿ V CVC	Le jain est kraune CV CV ⁿ V CCVC
Le canard mange du pain (6) /la kanaʁ mɑ̃ʒ dy pɛ/ CV CVCVC CV ⁿ C CV CV ⁿ	Le nacar mange du quain CV CVCV CV ⁿ C CV CV ⁿ
La lune est dans le ciel (9) /la lyn ɛ dɑ̃ la sjel/ CV CVC V CV ⁿ CV CGVC	La suné est dans le miet CV CVCV CV ⁿ CV CVCGVC
Il dessine un vélo (6) /il desin ɛvelo/ VC CVCV ⁿ V ⁿ CVCV	Il sédine un lévo CV CVCVC V ⁿ CVCV
Le chien est devant la maison (8) /la ʃjɛ̃ ɛ davɑ̃ la mezɔ̃/ CV CVGV ⁿ V CVCVC ⁿ CV CVCV ⁿ	Le fien est devant la taizon CV CVGV ⁿ V CVCVC ⁿ CV CVCV ⁿ

Le canard mange du pain (6) /la kanaʁ mɑ̃ʒ dy pɛ/ CV CVCVC CV ⁿ C CV CV ⁿ	Le nacar mange du quain (6) /la nakaʁ mɑ̃ʒ dy kɛ/ CV CVCV CV ⁿ C CV CV ⁿ
---	--

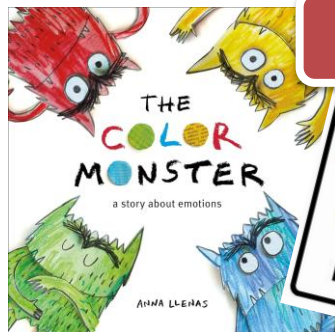


Based on receptive vocabulary (PEABODY III; EXALANG)
 Lexical frequency
 Phonotactic combination

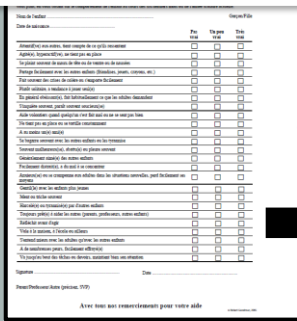


3.2. Data collection

1. Familiarization



2. Parental information



Anamnesis

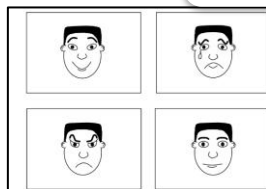


Figure 1. Example of emotional outcreek (Eutectic) 1. Recognition.

1. While showing a given cartoon scenario, the experimenter reads the accompanying story about the depicted character(s). The face(s) of the characters in the cartoon were left blank. The situations were described in an emotionally neutral fashion with the experimenter attempting to remove verbal and non-verbal emotional cues.
2. After hearing the story, the child was asked to make an emotion attribution to the character(s) depicted in the cartoon. The response was coded as positive or negative. The child was then asked to draw a picture of the character(s) below the scenario and spontaneous, unelicited emotions (sad, scared, angry, happy, surprised, etc.) were noted. The child was then asked to draw a picture of the character(s) below the scenario and spontaneous, unelicited emotions (sad, scared, angry, happy, surprised, etc.) were noted. Two versions of the cartoon scenarios were used: one for boys and girls. One version was for boys and girls. One version was for boys and girls. One version was for boys and girls.



Our task: emotion identification through audios

3. Tasks

Control of overall emotional competence
(*Test of Emotion Comprehension, TEC, Pons & Harris, 2000*)





04

PRELIMINARY FINDINGS



4.1. Sample characteristics (French-speaking group)

Table 1: descriptive characteristics of the French-speaking group (sex and age)

	Sexe	N	Age (in years)		
			Age range	Mean	S-D
French-speaking (N=46)	Girls	24	5-8	6,68	0,974
	Boys	22	4,9-7,9	6,58	0,828

Table 2: descriptive characteristics of the French-speaking group (sex, age and level of education)

Characteristics			Age (in years)			
Level of education	Sex	N	Mean	S-D	Min	Max
M2	Girl	4	5.13	0.09	5	5.2
	Boy	1	4.9	NA	4.9	4.9
M3	Girl	3	5.77	0.45	5.3	6.2
	Boy	7	5.76	0.32	5.5	6.2
P1	Girl	10	6.82	0.17	6.5	7.1
	Boy	10	6.91	0.24	6.5	7.3
P2	Girl	7	7.76	0.32	7.2	8
	Boy	4	7.63	0.26	7.4	7.9

M2: second year of preschool

M3: third year of preschool

P1: first year of primary school

P2: second year of primary school

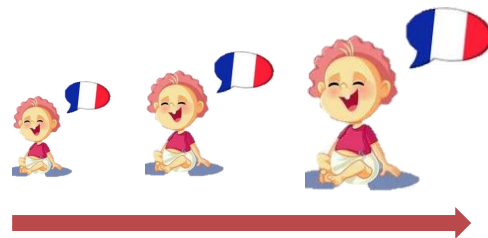
4.2. Global results



Age (age group)	S ($p < .001$)
Language	S ($p < .001$)
Types of stimuli	NS
Emotion	S ($p < .001$)
Language*Age	S ($p = .011$)
Types of stimuli*Age	NS
Emotion*Age	S ($p < .001$)
Language*Emotion	S ($p < .001$)
Language*Types of stimuli	S ($p < .001$)
Types of stimuli*Emotion	NS

Performance improves significantly with age

Significant differences between 5 and 6, 5 and 7 and 6 and 7 years old ($p < .001$) regarding **emotion** and **language** but not **types of stimuli**



4.3. Detailed results

Emotion effect per age group

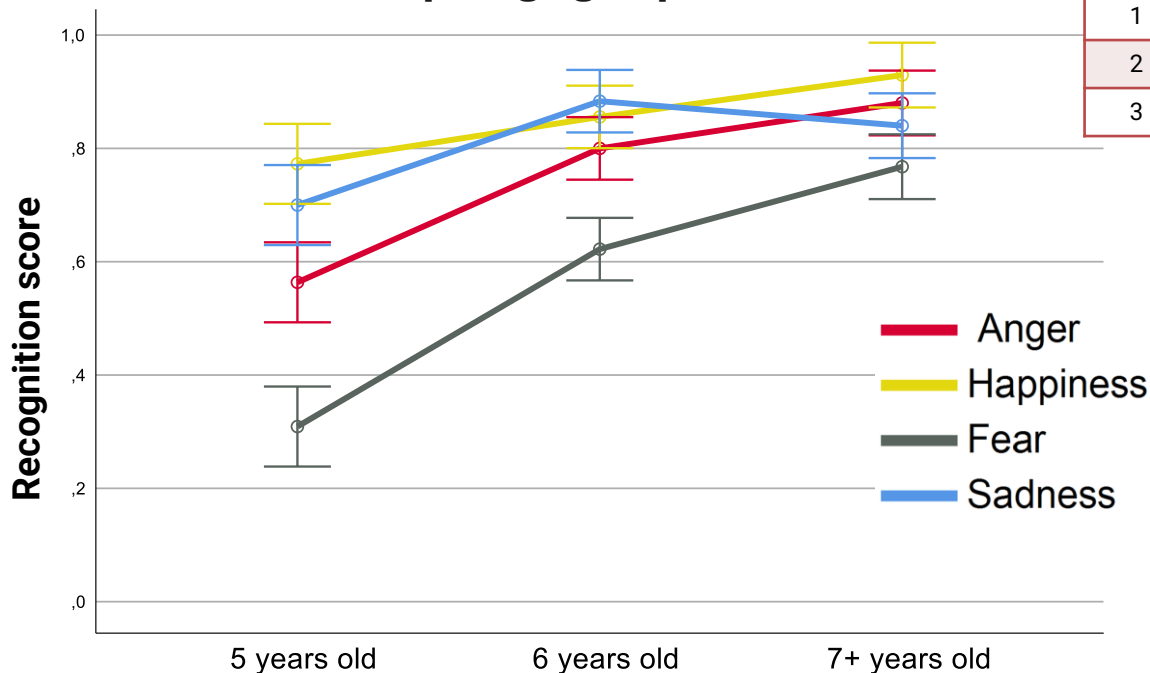


Figure 1: Line graph with error bars showing the recognition score for each emotion per age group (all languages and types of stimuli together)

Table 3: Characteristics of age groups for statistic analysis

Age (in years)					
Group	N	Mean Age	S-D	Min	Max
1	11	5.32	0.268	4.9	5.8
2	16	6.58	0.299	6	6.9
3	19	7.44	0.406	6.9	8

- Differences between 5 and 6, 5 and 7 and 6 and 7 years old ($p < .001$)
- Happiness: better recognized
- Fear: less well recognized

4.3. Detailed results

Language and types of stimuli (all emotions included)

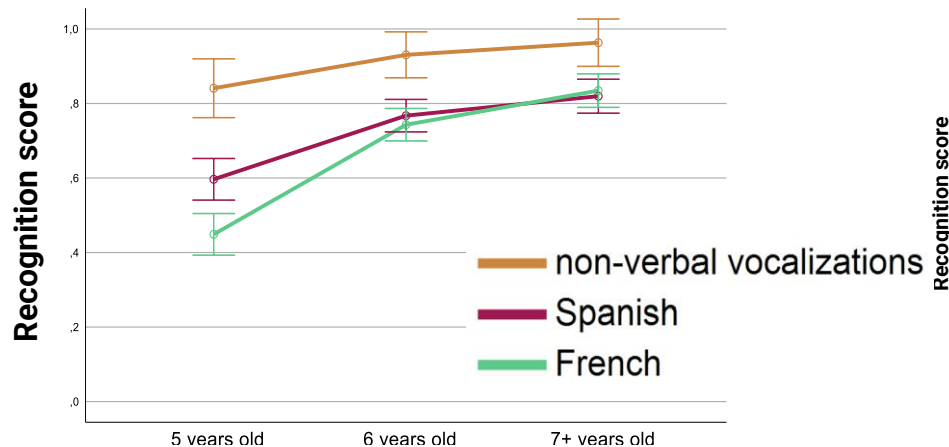


Figure 2: Line graph with error bars showing the recognition score for each language per age group (all emotions and types of stimuli together)

- Interaction between age and language ($p = .011$)
More specifically, regardless the age groups...
- Significant differences between **non-verbal vocalizations** vs. Spanish ($p = .018$) vs. French ($p = .003$)
- No significant differences between French vs. Spanish

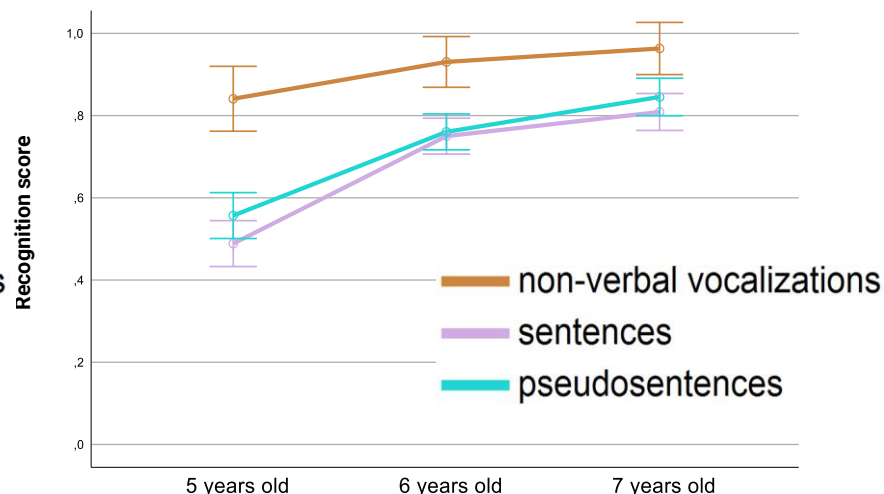


Figure 3: Line graph with error bars showing the recognition score for each type of stimuli per age group (all languages and emotions together)

- No interaction between age and type of stimulus
More specifically, regardless the age groups...
- Significant differences between **non-verbal vocalizations** vs. sentences ($p = .010$) vs. pseudosentences ($p = .006$)
- No significant differences between sentences vs. pseudosentences

4.3. Detailed results

Emotion*language and emotion* types of stimuli

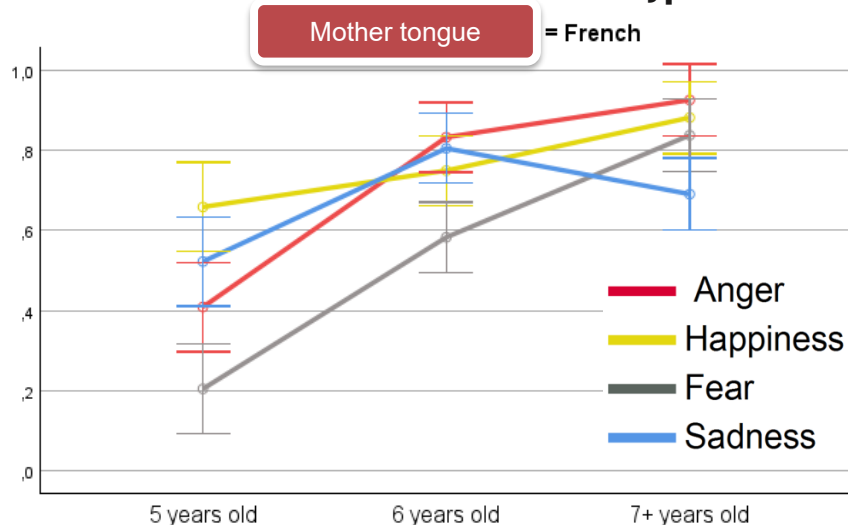


Figure 4: Line graph with error bars showing the recognition score for each emotion in French stimuli per age group

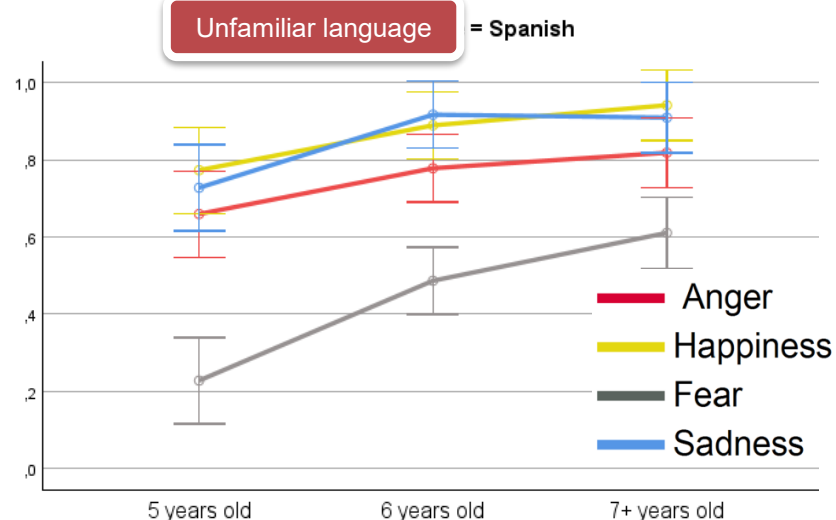


Figure 5: Line graph with error bars showing the recognition score for each emotion in Spanish stimuli per age group

Types of stimuli (sentences vs. pseudosentences)	NS
Language	S ($p=.015$)
Age*types of stimuli	NS
Age*language	S ($p=.011$)



After removing
non-verbal
vocalizations

Emotion*language ($p=.014$)

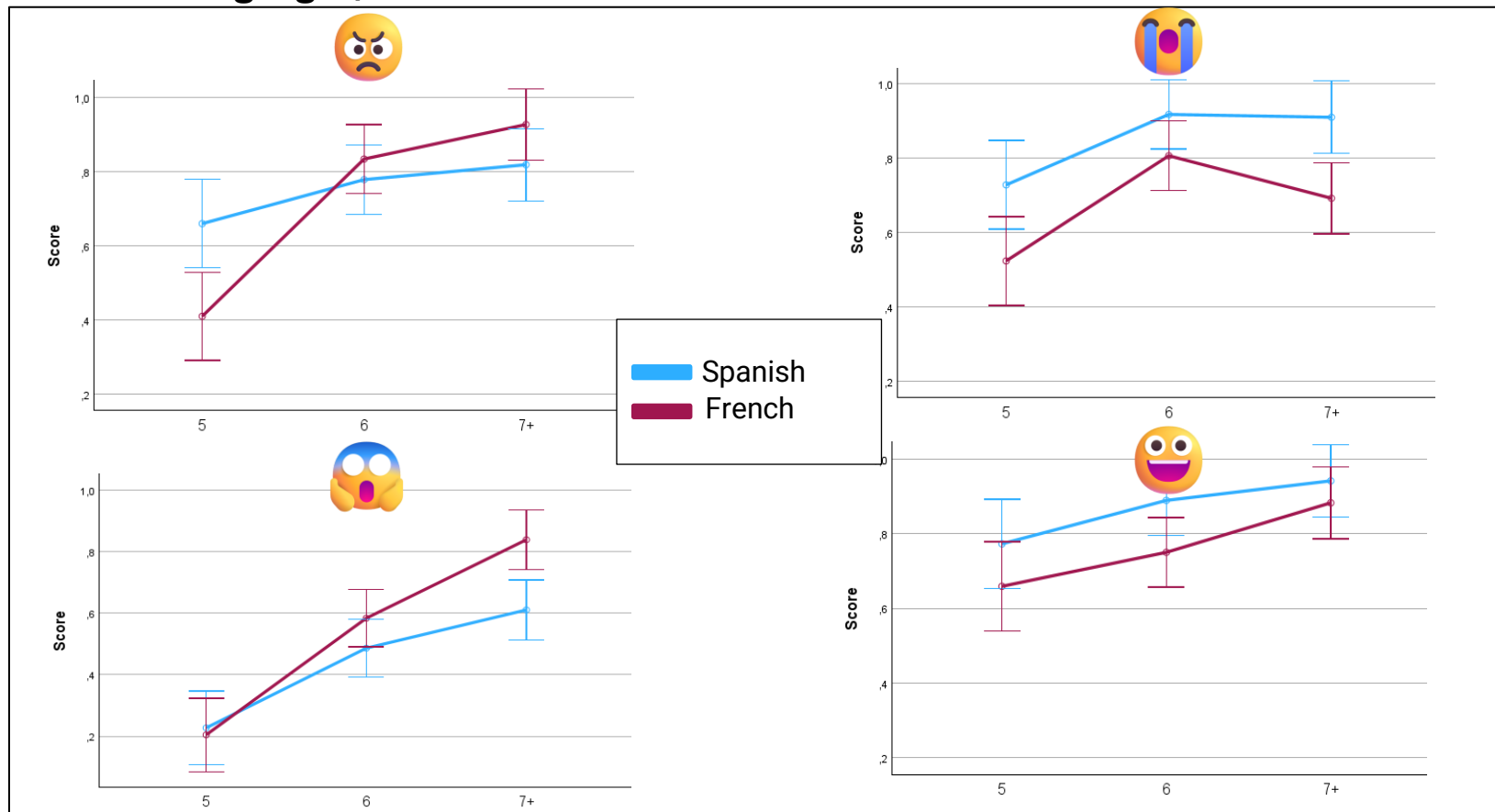


Figure 6 : Line graph with error bars showing the recognition score for each emotion in each language per age group (sentences and pseudosentences together)



04

DISCUSSION & PERSPECTIVES

4.1. Discussion

- Participants' performance improved with **age** (Amorim et al. 2021)
- Younger children tend to be **more variable** but gradually become **more accurate**
- There is an emotion effect (*fear* less well recognized and *happiness* better) and emotion recognition improved for all emotions (in Filippa et al. 2022 and Chronaki et al. 2018, anger is the best recognized)
- Emotions conveyed by vocalizations are better identified than those conveyed by sentences and pseudosentences (Neves et al. 2021)
- At this stage, **no in-group advantage** regarding languages (contrary to Chronaki et al. 2018, but in line with Ma et al. 2022)

4.2. Perspectives

1. Conduct an in-depth study of **the developmental trajectory** of emotional prosody in relation to **stimulus-related variables** and **data collected from parents**
2. We have tested 14 Spanish-speaking children, but we would like to increase the sample size of and vary their ages to investigate **cross-effects** in more detail, such as certain emotions being recognized more easily depending on the **language** and **type of stimulus**
3. Data collection is underway on French–Spanish **bilingual children**
4. Conduct **acoustic analyses** to determine whether emotions that are better or less well recognized have acoustic 'patterns' that predict their recognition. Distinguish between perception and acoustic reality to determine a profile for each emotion depending on the language.

THANK YOU!

langage

INSTITUT DE RECHERCHE EN SCIENCES
ET TECHNOLOGIES DU LANGAGE
DE L'UMONS

fnrs
LA LIBERTÉ DE CHERCHER

Métrologie
du
Sciences
Langage



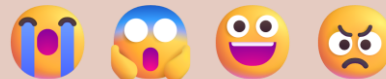
Faculté
de Psychologie
et des Sciences
de l'Education

lola.terny@umons.ac.be

Faculté de Psychologie et des Sciences de l'Education
Service Métrologie et Sciences du Langage

Université de Mons (Place du Parc, 18, 7000 Mons,
Belgique)

CREDITS: This presentation template was created by
Slidesgo, including icons by **Flaticon**, and infographics &
images by **Freepik**



UMONS
University of Mons

