Impact of positive affect and language familiarity in ID speech and singing on infant attention

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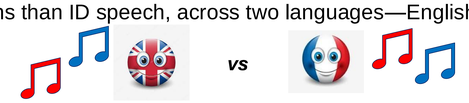
BACKGROUND

- Emotion, particularly positive valence, plays an essential role in how caregivers communicate with infants through both speech and song.[1,2]
- While some studies show that infants may respond more to ID singing than speech,[3,4] others find no significant differences.[5,6]
- However, happy and expressive sounds, including familiar melodies, are known to capture infants' attention and influence their emotional responses.[6,7,8]
- **Research aims:** This study explores whether expressive, positively-valenced ID singing holds infants' attention better and elicits more positive facial expressions than ID speech, across two languages—English and French.



- ***Hypothesis:*** The study hypothesizes that infants will sustain attention longer and display more positive facial expressions during expressive, positively-valenced ID singing, especially in English, compared to ID speech in both English and French.

METHOD

- *Participants:* 26 infants (M_{age} = 268 days, range = 177 – 348 days, 11 females)
- *Design:* A 2 x 2 x 2 x 2 mixed design:

Within-subjects factors:

⇒ Stimuli type: ID speech and ID singing

⇒ Emotional valence: happy-lively and neutral

⇒ Language: English and French

Between-subjects factor: Age groups

⇒ 6-8 months (n = 12, M_{age} = 218.75 days, range 177-271 days)

⇒ 9-11 months (n = 14, M_{age} = 310.07 days, range 274-348 days)

Procedure

- A preferential looking paradigm was used, in which infants' visual attention was measured to examine their interest in the stimuli.
- Each session consisted of two blocks, with 8 trials per language condition.
- During each trial, audio recordings of ID speech or singing were played. The audio continued until the infant looked away for two seconds, showing disengagement.

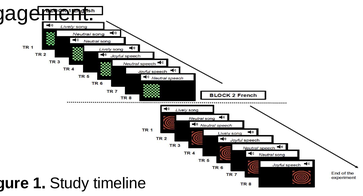


Figure 1. Study timeline

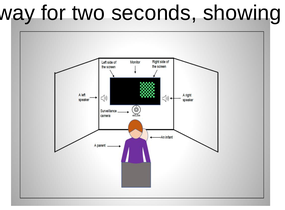


Figure 2. Experimental scene

Stimuli & PRAAT Acoustic Analysis

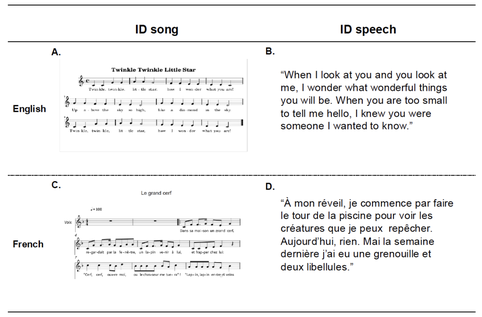
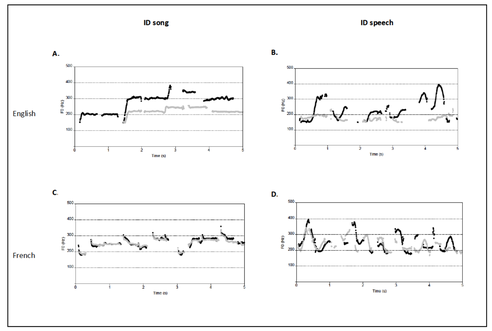


Figure 3. Stimuli

Table 1. Acoustic Measures Across Both Language Stimulus Sets

	Stimulus Set	Lively ID song	Neutral ID song	Joyful ID speech	Neutral ID speech
F0 mean (Hz)	English	269.14	207.14	225.27	176.94
	French	255.55	247.60	250.51	236.81
F0 SD (semitones)	English	4.16	3.92	5.06	2.21
	French	2.50	2.39	4.49	3.00
F0 range (semitones)	English	18.81	13.74	18.89	21.89
	French	11.57	10.86	32.12	21.47
Overall Duration(s)	English	33	34	16	15
	French	23	23	14	13



- The analysis compares pitch contours across languages and affective conditions by examining fundamental frequency (F0) using PRAAT software (Boersma, 2001).
- A 5-second excerpt was taken from each affective condition (lively and neutral) across both speech and song stimuli types.

⇒ F0 Contours:

- The bold line represents the lively-playful affect, while the grey line represents the neutral affect.

Behavioural Analysis

Objective: Analyse infant facial responses based on affective cues (lively, neutral), stimulus type (speech, song), and language familiarity (native, foreign).

Method:

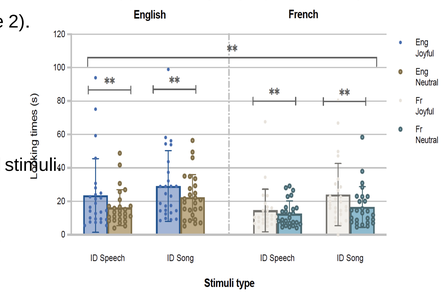
- Video recordings of 12 infants (45% of the data) processed using DaVinci Resolve 18.0.3.
- Silent clips of the first and last 8 seconds of each trial were created (32 clips per infant), following Cirelli & Trehub (2020).
- A trained, blinded assistant evaluated infants' facial pleasure (e.g., smiling).

Positive Affect Assessment:

- Each 16-second clip was coded for positive affect, with a score of 1 for smiling, 0 for no smile (Cirelli & Trehub, 2020).
- 20% of clips rated independently by a second coder for reliability. $ICC_{2,1}$ = .860 (.791 to .907), p < .001.

RESULTS

- Age-related effects:
  - No significant age-related differences in responses to affective cues, stimulus type, or language (all ps > .39)
  - Younger infants tended to have longer listening times (*see* Table 2).
- Preference for songs:
  - Infants showed a significant preference for **songs** over speech.
- Attention to affective cues:
  - Infants paid more attention to **joyful** stimuli compared to neutral stimuli.
- Language preference:
  - Infants focused more on **English** stimuli than on French stimuli.
- Interaction effects:
  - No significant **interaction** effects found among affective cues, stimulus type, or language.



** p < .01 for all factors.

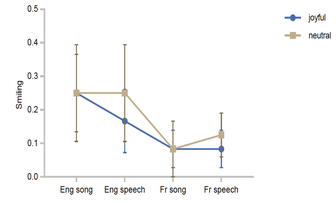
RESULTS II

Table 2. Infants looking times to stimuli

	Familiar language (English)				Unfamiliar language (French)			
	ID speech		ID song		ID speech		ID song	
Age group	joyful	neutral	joyful	neutral	joyful	neutral	joyful	neutral
Younger N = 12	34.05 (28.80)	18.19 (12.43)	33.12 (25.52)	25.19 (16.70)	17 (17.07)	15.22 (9.36)	25 (21.52)	20.75 (14.71)
Older N = 14	14.42 (6.33)	14.65 (9.30)	25.75 (16.90)	20.03 (10.47)	12.49 (7.38)	10.23 (5.32)	23.20 (16.50)	12.99 (8.44)

➔ Visual responses to stimuli - Smiling

- Smiling behaviour was analysed in 12 infants during 16-second trials using a 2-way repeated-measures ANOVA.
- **No** significant effect of affective cue, stimulus type, or language on infant smiling behaviour.



Key findings & Implications

- **Songs *vs.* Speech:** The study found that infants preferred songs over speech, with music playing a more powerful role in capturing attention and regulating emotions[3,4].
- **Familiarity's Impact:** Infants showed a preference for joyful stimuli and focused more on familiar, English-language songs. Familiar melodies, such as those sung by caregivers, were particularly effective in soothing and calming infants[7,10].
- **Familiarity Beyond Caregiver's Voice:** Even when familiar songs were sung by voices other than the caregiver's, infants still experienced a calming effect[8]. This suggests that the melody itself, rather than the specific singer, is key to infants' emotional comfort[7,8,9].

Conclusion and Future directions

- In conclusion, the study demonstrates that infants show a preference for **song** over speech, with **familiar melodies** playing a key role in emotional regulation, highlighting the importance of music in early caregiving interactions[11,12].
- Further exploration is needed to understand how emotional valence, affect, and arousal interact with familiarity.

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