

Six-month-olds expect synchrony between face and voice in mother and stranger

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Abstract

A good test of an early integration of vision and audition in social partners is how young infants react to a partner who uses only one modality of interaction (here voice) or appears to be a perceptually incoherent partner. Additionally, the comparison between responses to mother versus stranger allows to test the role of familiarity in the integration process.

To explore this question, we used our live-replay-live teleprompter design to present to 16 six-month-olds three conditions of interaction with the mother and with a stranger: 1) a condition where only the voice is available; 2) a condition where mother/stranger's contingent voice is matched with the non contingent face of another stranger; and 3) a condition where voice and face of the mother/stranger are contingent.

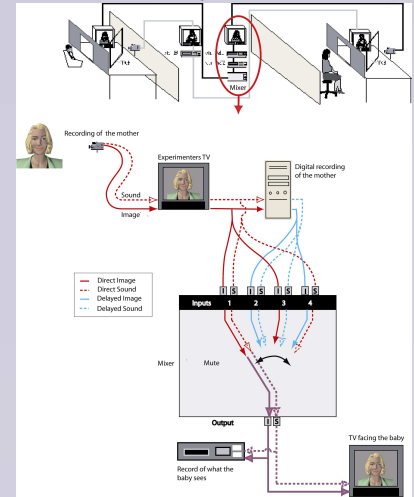
Comparing the emotional state of the infant interacting with mother as opposed to interacting with stranger, frowning appeared to be far less frequent with mothers. This confirms the comforting role of mother's voice, already underlined by several authors. However, frowning during the final contingent episode did not differ for stranger and for mother while it differed highly during episode 2, thus suggesting that infants felt comfortable when stranger's A face and voice were coupled and detected a mismatch during episode 2 where the voice did not correspond to the face. These results account for the early development of an integration of audition and vision in familiar partners as well as in unfamiliar ones.

Experimental procedure

Mother			Stranger A		
1	2	3	1	2	3
1 sensory modality only	2 Co-occurring sensory modalities coming from 2 different sources	2 Co-occurring sensory modalities coming from the same source	1 sensory modality only	2 Co-occurring sensory modalities coming from 2 different sources	2 Co-occurring sensory modalities coming from the same source
Contingent voice	Contingent voice Female Stranger's face	Contingent voice and contingent face	Contingent voice	Contingent voice Female Stranger B's face	Contingent voice and contingent face

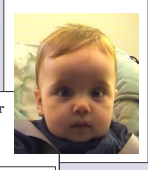
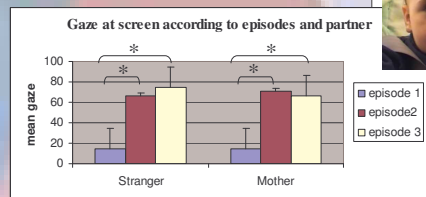
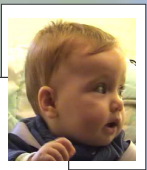
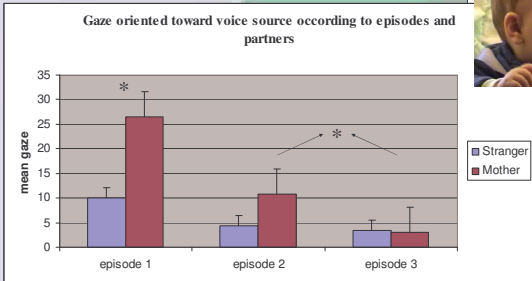
Experimental setting

Equipment and connections allowing to manipulate video image and sound



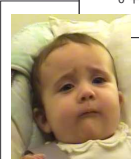
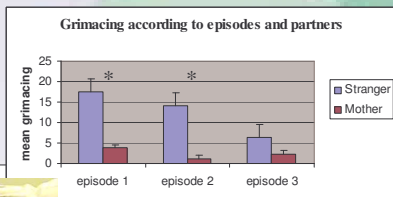
- ② independent rooms for infant and partner
- ② Infant and partner seating in front on a black tunnel with hidden camera recording voice and face at eye level
- ② Infant face and voice always contingent
- ② Partner's voice always contingent throughout episodes and face contingent only in episode 3

Results

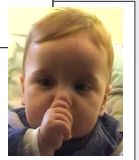
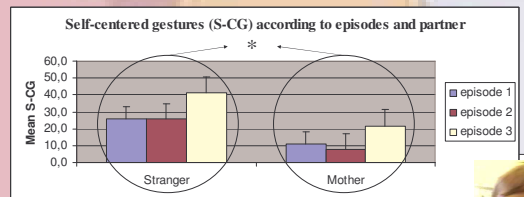


Concerning **GAZE TOWARD VOICE SOURCE**, a significant effect of partner was found. When the screen was blank, infants gazed longer in the direction of voice source when mother was speaking than when stranger was speaking. We found a significant episode effect. With mother, infants looked more in the direction of mother's voice when facing the non-contingent stranger (2nd episode) than when facing their contingent mother (3rd episode). This shows that they identified the different sources of the sensory signals. Such effect was not found with stranger.

Concerning **GAZE TO SCREEN**, episode 2 when mother (or stranger)'s voice does not correspond to face seen is explored as much as episode 3 when mother (or stranger)'s voice is synchronized with mother (or stranger)'s face.



SELF-CENTERED GESTURES (S-CG) and GRIMACING were significantly more numerous with stranger than with mother. Infants grimaced more when interacting with a stranger during blank screen and during the coupling of voice with another face but not during the third episode when voice and face were matched.



This altogether with other results of this study supports the idea that they have detected the mismatch as well as the final matching between stranger's face and voice. Although further research is needed, it is thus suggested that 6-month-olds have formed the concept of persons as multimodal agents whose signals are co-occurring synchronously.

Concluding comments

Taken together, results suggest that 6-month-olds detect easily if co-occurring visual and auditory signals do not come from the same source when mother is concerned. When stranger is concerned, they appeared to detect a mismatch between a non-familiar voice and a non-familiar face since they looked worried during the experimental episode like other 6-month-olds did when they watched maternal mismatch between voice and face (see poster by Prépın *et al*). This suggests that 6-month-olds expect a human being to be a coherent intermodal entity