Effects of Cleft Lip and Palate on Visual Scanning And Neural Processing of Infant Faces

Juergen Riedelsheimer[1], Rachael Kee[1], Zoë Royer[1], Rhiannon Crimmins[1], Jeff Frederick[1], Bernd Huber[1], David Harris[1], KJ Jantzen[2], & Amanda Hahn[1]

[1]Cal Poly Humboldt State University [2]Western Washington University

Background

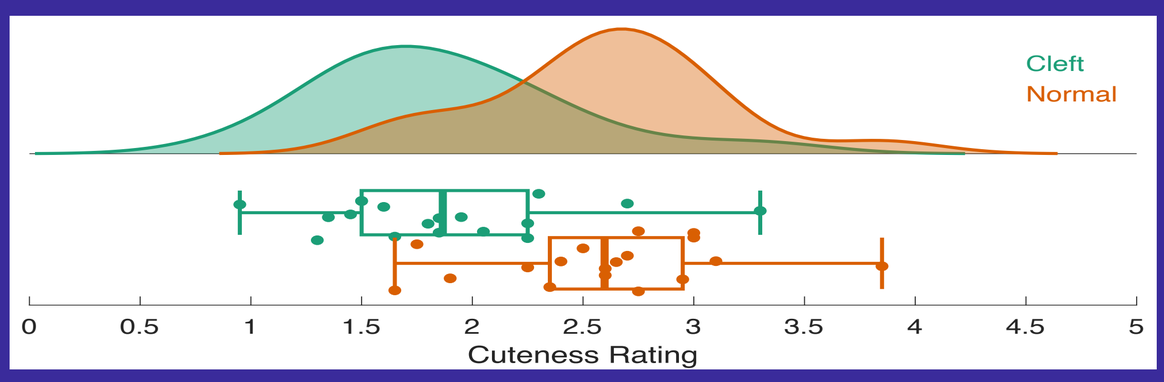
Infant faces rapidly capture our attention❶ and elicit enhanced neural processing❷ compared to adult faces, likely due to their evolutionary significance. Infant facial cues, and 'cuteness' in particular, are critical for eliciting caretaking behavior, and cues of poor health are associated with a lower degree of parental investment❸. Cleft lip/palate is estimated to affect 1 in 700 live births worldwide❹ and is associated with difficulties in early caregiver interactions. Behavioral studies have shown that cleft lip/palate reduces perceptions of cuteness❺; however, the underlying neural and perceptual mechanisms governing responses to cleft lip/palate remain relatively understudied. The current study uses eye tracking and electroencephalography (EEG) to explore visual scanning patterns and neural responses to infant faces with cleft lip/palate in a sample of nulliparous adults (N=18) aged 18-32 (M = 22.4, SD = 3.2).

Infant Faces

20 healthy infant faces

20 infants with cleft lip/palate

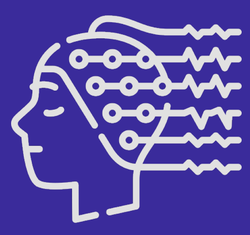
Perceived Cuteness



Study 1: Visual Scanning

The GazePoint GP3 infrared eye-tracker recorded visual scanning patterns. Each face was displayed on the screen for 10sec (preceded by a fixation cross). Participants rated the cuteness of each face (1 = not cute to 5 = very cute) after the 10sec viewing.

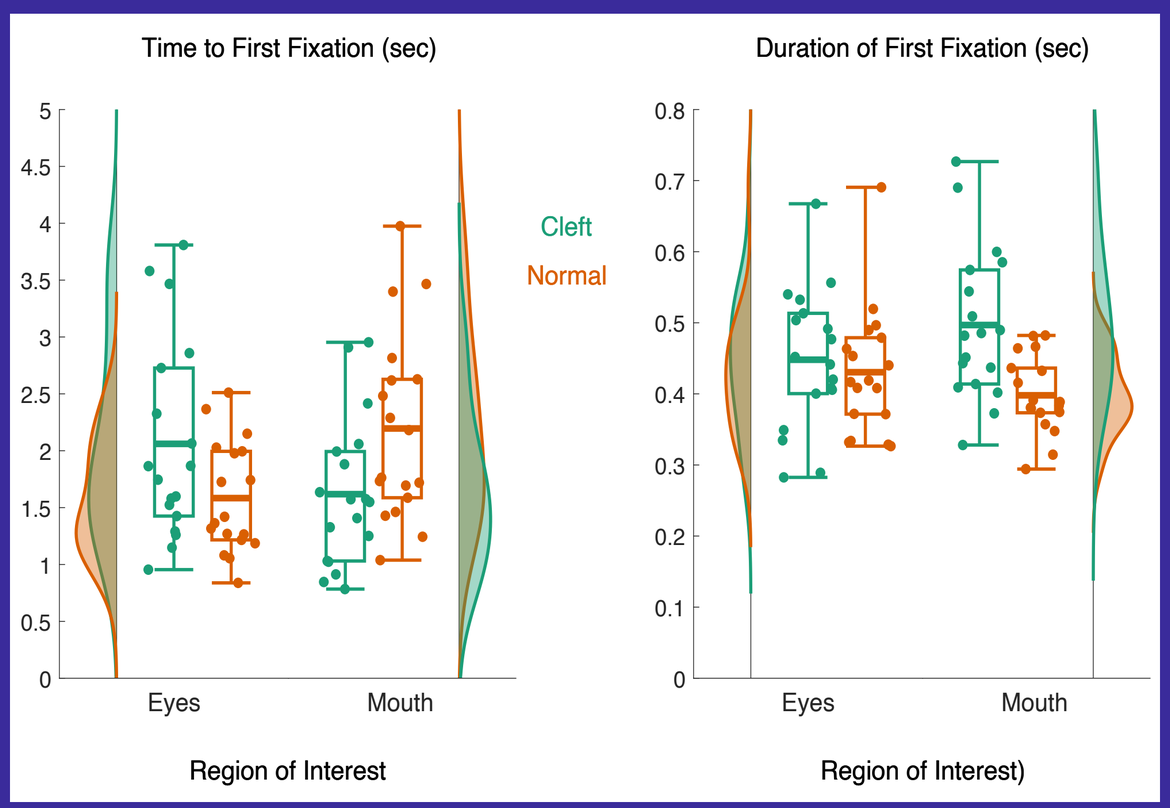
Study 2: Neural Responses



EEG was continuously recorded from 64 scalp sites, using BioSemi ActiveTwo Ag/AgCl electrodes with 10-5 placement. Each face was shown twice in both the upright and inverted orientation for 500ms during a passive viewing task.

Results

A 2x2 ANOVA was run with ROI (eyes/mouth) and palate (cleft/ normal) as within-subject factors. Variables of interest were the time to first fixation at each region (attention capture) of interest and the duration of that first fixation (attention holding).

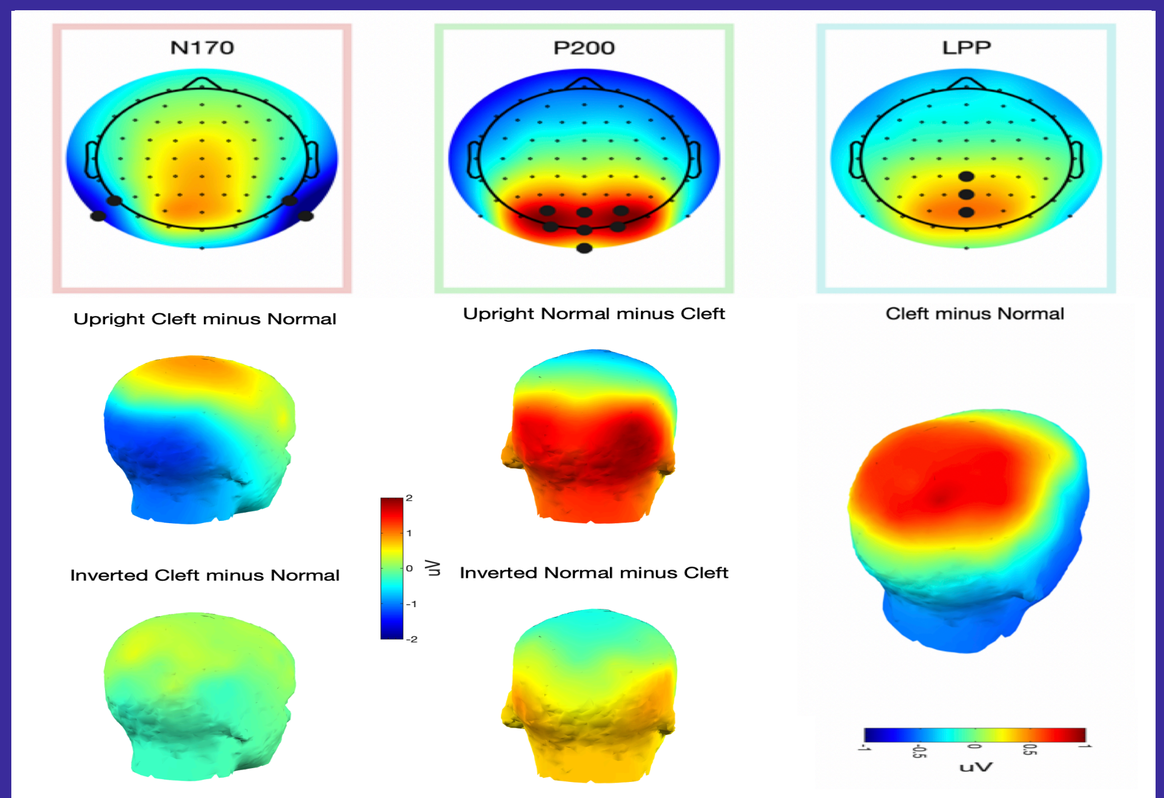


Discussion

Participants were quicker to view the mouth and slower to view the eyes for faces with cleft lip. They also spent more time viewing the mouth for faces with cleft lip. These data suggest altered visual scanning patterns for faces with cleft lip/palate.

Results

A 2x2x2 ANOVA was run with cerebral hemisphere (left/right), face orientation (upright/ inverted), and palate (cleft/normal) as within-subject factors. The data presented below are collapsed across hemispheres (no significant effects of hemisphere).



Discussion

Enhanced N170 responses for cleft lip faces suggests the recruitment of additional processing mechanisms, while a reduced P200 suggests the cleft faces are less 'face typical'. Enhanced LPP responses suggest cleft faces have heightened emotional salience.

References

❶ Brosch et al (2007) Emotion ❷ Kringelbach et al (2008) PLoS one ❸ Monterosso et al (2012) J of Pediatric Psych ❹ Mossey et al (2009) Lancet ❺ Lewis et al (2017) PLoS one