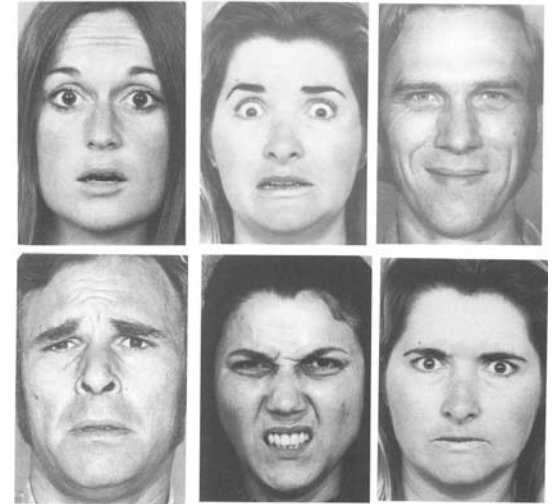


The Eyes Have It – Anticipating Difficulty in Facial Emotion Cue Perception



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Our work on aging and emotion recognition

- Multi-method approach including simple judgments and sometimes measures of brain activity
- Driven to better understand where there are deficits in emotion perception and where there may not be
- Applied, hands-on science in the lab with our students

We acquire emotion categories early on

- Many measurement techniques
 - See face → Tell story to account for expression
 - See face → Sort into piles/categories
 - Hear story → Select face or select label
- Early in life, label use emerges for basic emotions in the first 4 to 5 years (Widen & Russell, 2008)
 - From broad to more specific
 - Maps on to language development

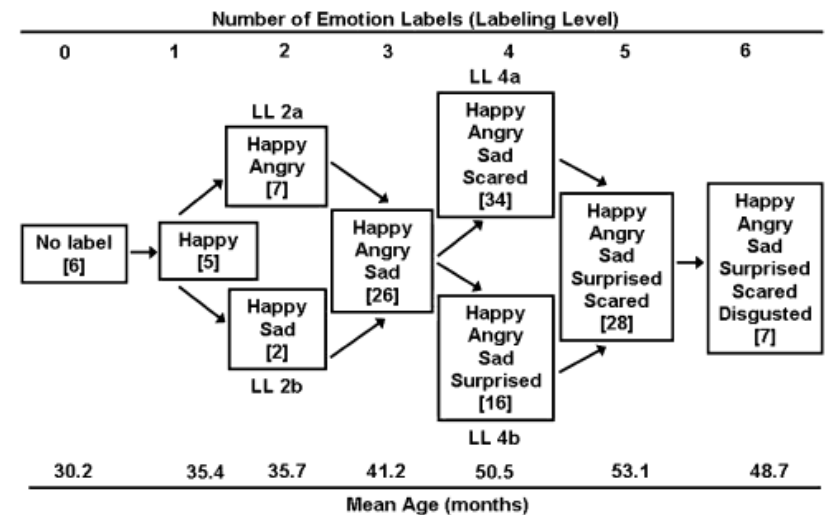


Fig. 2. Systematic emergence of emotion labels. The number of children who used the specified set of labels is given in brackets [n].

- Many focus on 6 basic emotions

Universal categories

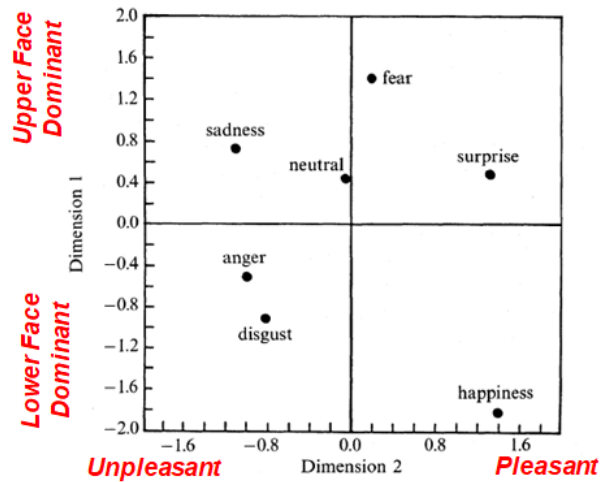


Figure 1. Two-dimensional MDS outcome for the photograph stimuli.

Katsikitis (1997)
– two dimensions



Ekman & Friesen (1975)
– six distinct categories

Aging and emotion perception

- Aging linked to reduced ability to decode some emotions (Hayes et al., 2020)
 - Anger
 - Fear
 - Sadness
- What accounts for this?
 - **Cognitive demands** (Orgeta, 2010)
 - **Perceptual sensitivity** (Mienaltowski et al., 2013, 2019)
 - **Where we look** (aka gaze patterns; Chaby et al., 2017)

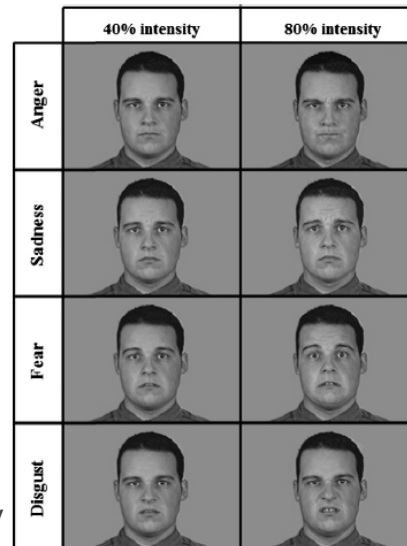
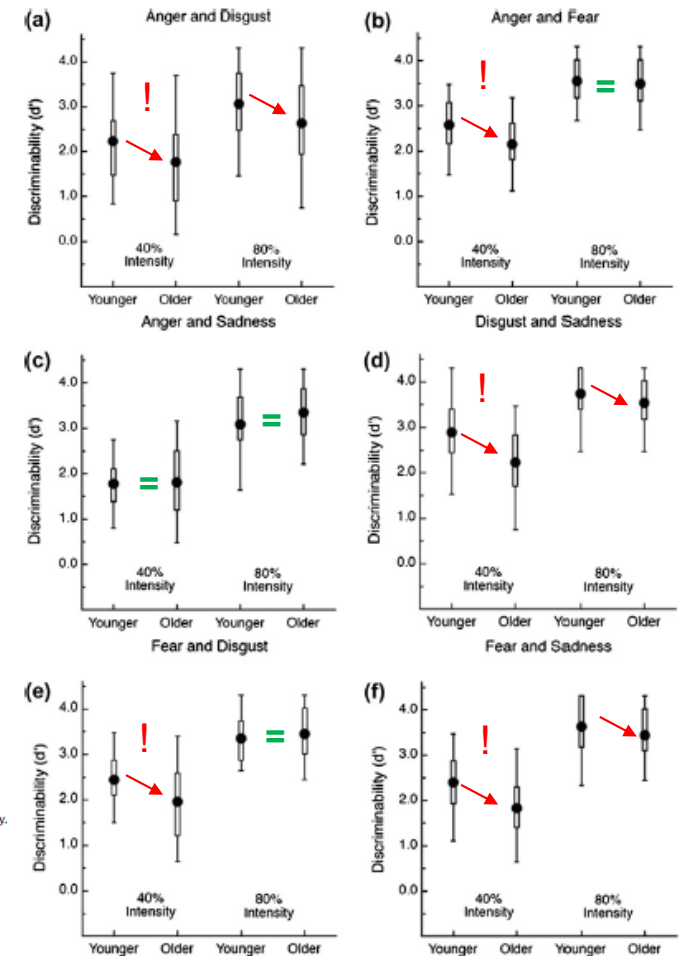
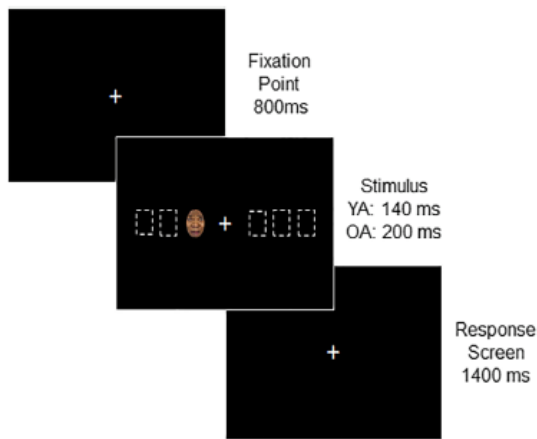


Fig. 1. Sample stimuli - anger, sadness, fear, and disgust at 40% and 80% intensity.

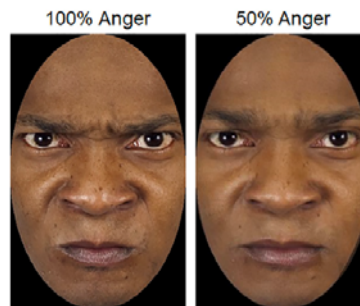


Cue sensitivity varies by emotion and intensity

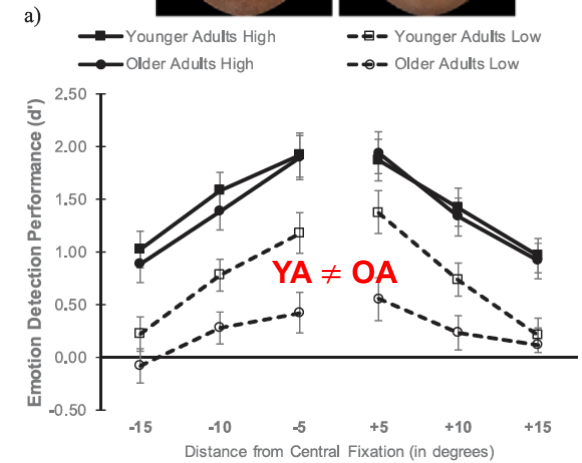
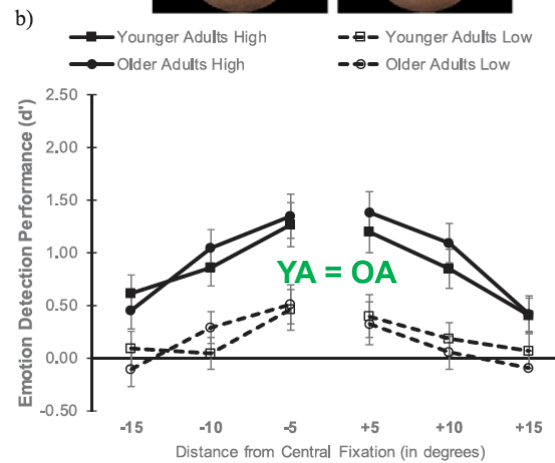


Task: Judge if expression contains emotion or is neutral.

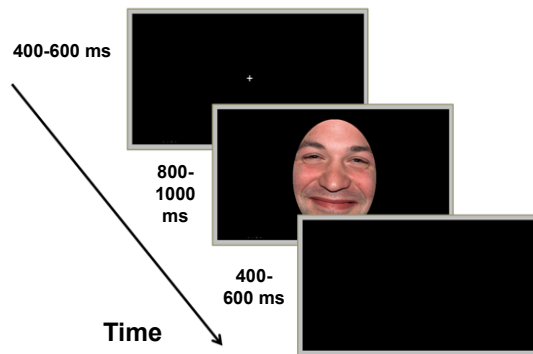
Outcome on y-axis accounts for both "hits" and "false alarms"



Mouth vs. Eyes
Intensity a factor



What's going on in the brain?

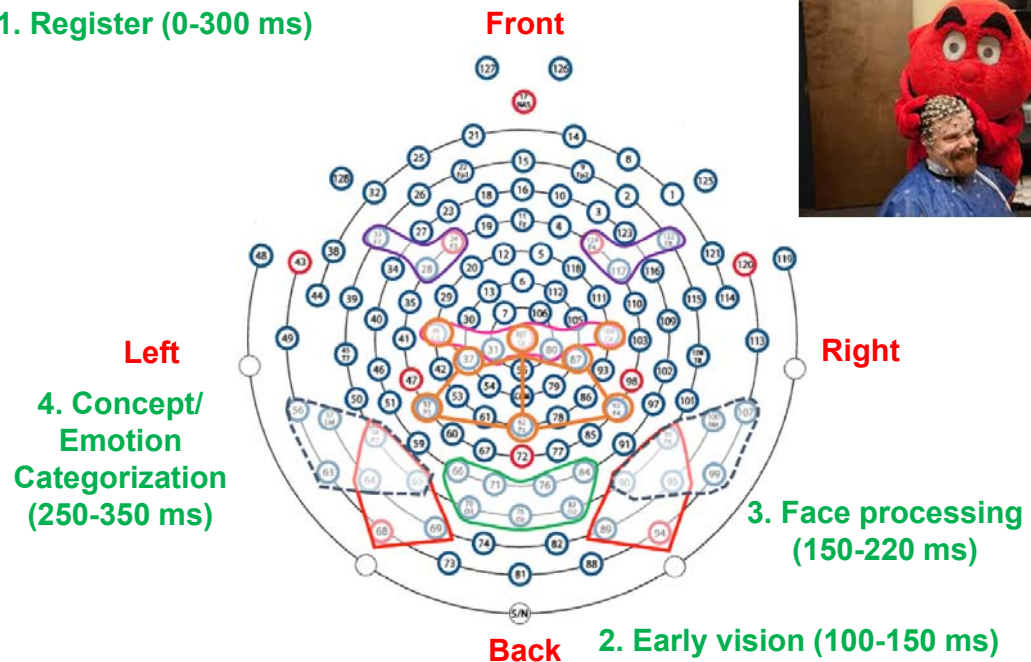


Task: Observe angry, happy, and neutral expressions appearing one at a time under 4 conditions.

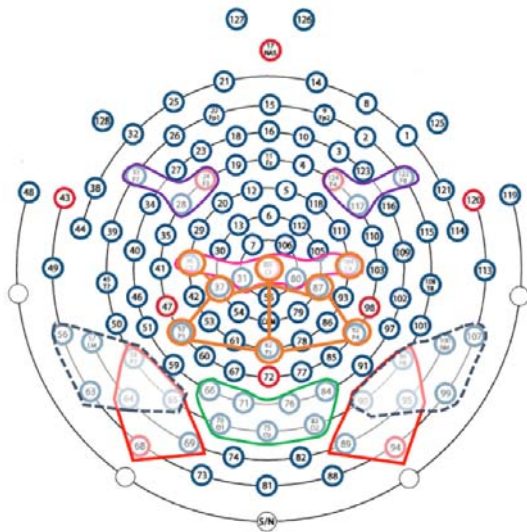
- Totally passively view (TPV)
- Emotion decision (ED)
- Emotion passively view (EPV)
- Gender Decision (GD)

Outcome: Electric potential at electrodes on scalp

1. Register (0-300 ms)



What's going on in the brain?

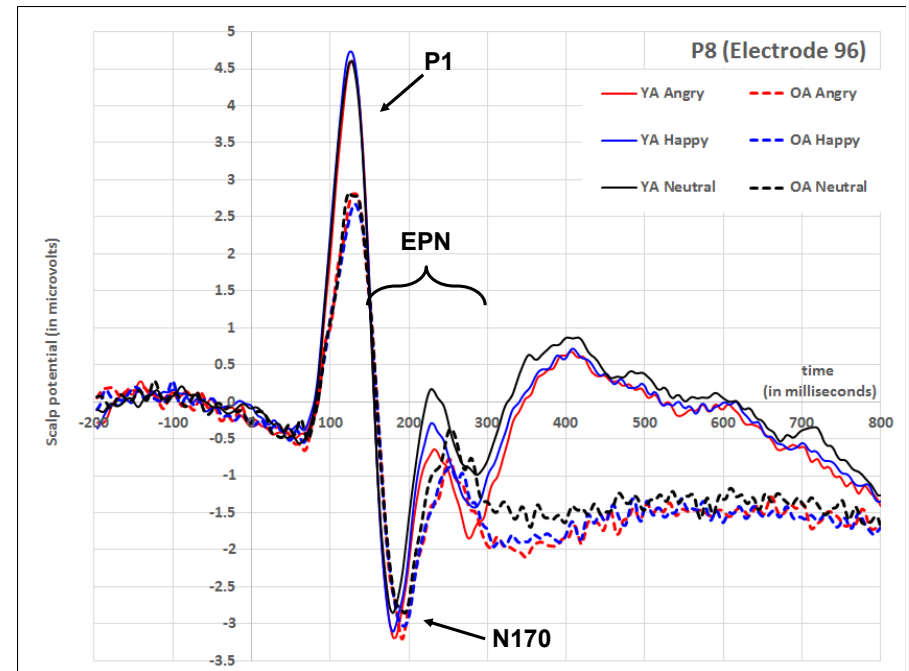


Visual Processing

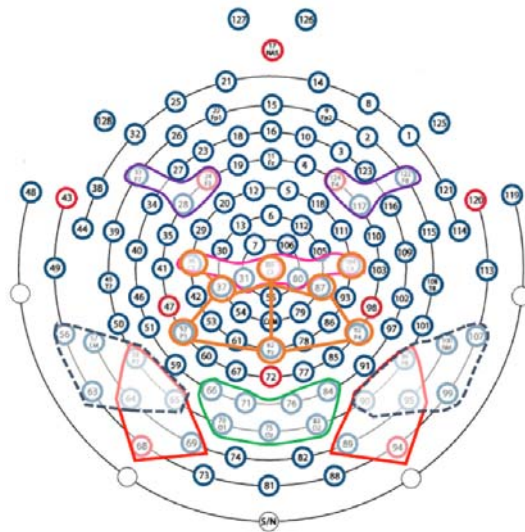
Early on for YA,
Angry > Happy

But later on
for YA and OA,
Angry + Happy > Neutral,
so both perceiving some
aspect of emotion

P1 **occipito-parietal** electrodes
N170 **occipito-temporal** electrodes
EPN occipito-temporal electrodes



What's going on in the brain?



LPP **centro-parietal** electrodes

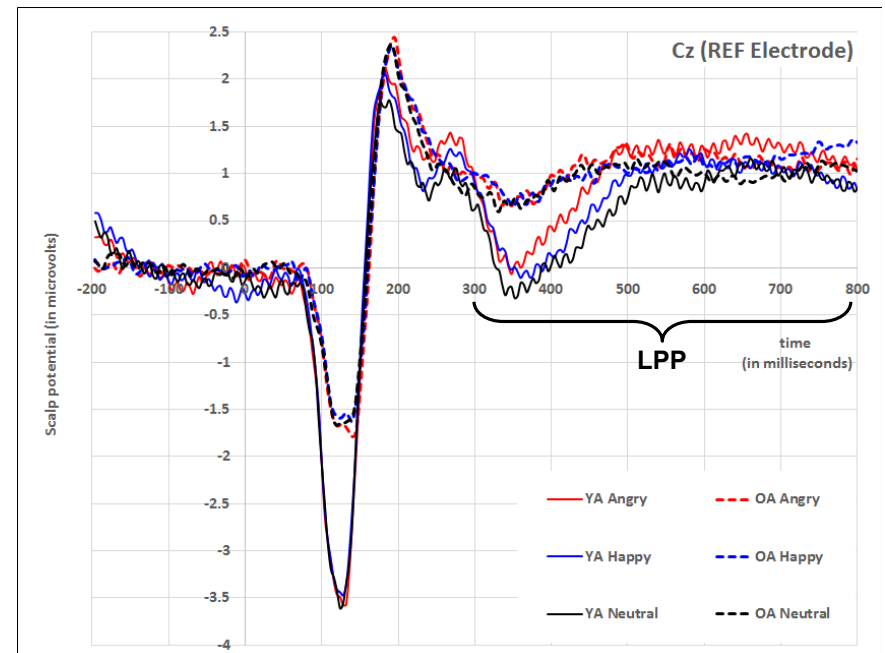
Cognitive Evaluation

From 300-800 ms,
divergence in pattern

YA: Angry > Happy > Neutral
OA: Happy > Angry > Neutral

Take away points:

- Young and old both register faces and their expressions
- Perhaps differ in how visual signal is used to evaluate expressions



Where we look?

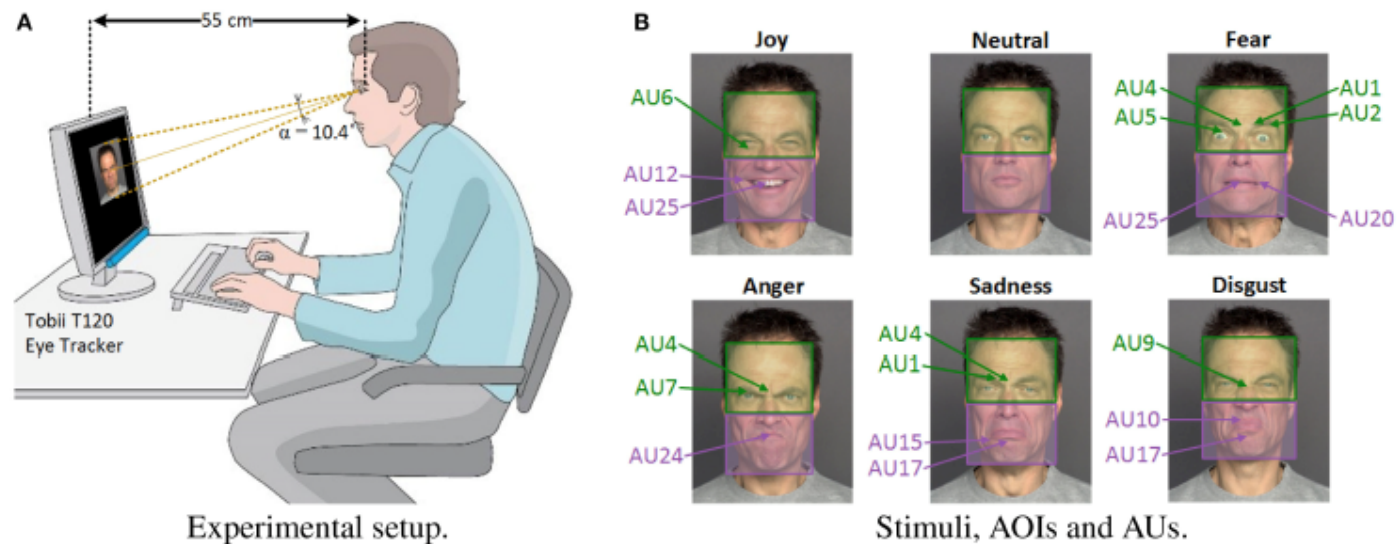


FIGURE 1 | Experimental setup and stimuli. (A) Eye-tracking setup used during the experiment. **(B)** Examples of stimuli images. Green and purple colored boxes represent upper-face and lower-face AOIs, respectively. The different Action Units (AU) activated for each facial emotion are shown in green or purple characters, depending on whether they are related to upper-face or lower-face muscles. All facial images are used with permission of the copyright owners (Ebner et al., 2010).

Where we look?

- Younger adults balance their focus between lower and upper regions, but older adults focus more on **lower region** of face (Chaby et al., 2017)

Task: Look at face “in a natural manner” for 2 s, then select a label

Outcomes on y-axis accounts for time out of 2 s fixated on designated facial regions

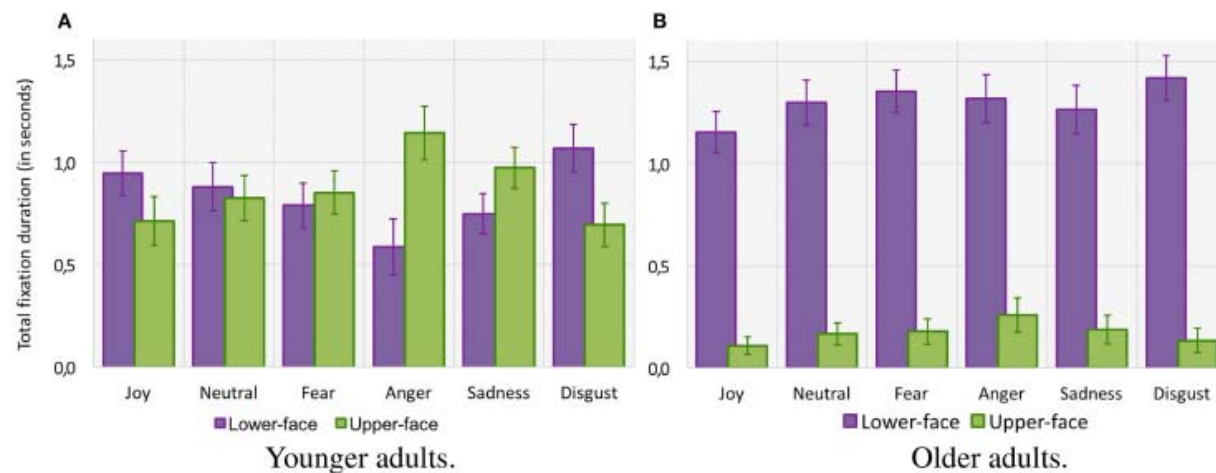


FIGURE 5 | Total fixation duration (in seconds) within lower-face and upper-face AOIs for each facial emotion category for younger adults (A) and older adults (B). Error bars indicate standard errors of the means.

What about masks? Masks cover mouth region



Masks cover mouth region



Masks cover mouth region



Masks cover mouth region



What emotion is being expressed on the face?



- Congruent context (e.g., body language and props) boosts older adult performance when deciding between confusable emotions (Minton & Mienaltowski, 2020; Noh & Isaacowitz, 2013)

Final Thoughts

- When motivated to communicate with others, we are attuned to verbal and non-verbal cues of their emotional states
- Emotions relying on similar cues, especially mouth dominant cues, may be more difficult to distinguish from one another (e.g., sadness, anger, and disgust)
- Challenge lies in interpreting emotion in masked strangers whom we may run into (and perhaps do so less frequently and when in a rush)
- Be tactfully expressive with gestures, other body language, and tone of voice

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