Age-related differences in the statistical regularity of emotional faces

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Introduction

- **Statistical regularity**: People extract regular/consistent information from the environment to make a better prediction for upcoming events.
- Prior experience should enhance statistical regularity usage [1].
- We hypothesized that older adults, with more life experience and exposure to different types of emotions, may involve more top-down thinking in social interactions, so that they will predict farther emotion expressions than younger adults.
- **We examined differences in fMRI neural responses when young and older adults predict sequences of emotional facial expressions.**

Method

Participants   24 older adults (mean age = 65.96 years old) & younger adults (mean age = 22.46 years old)

Procedure
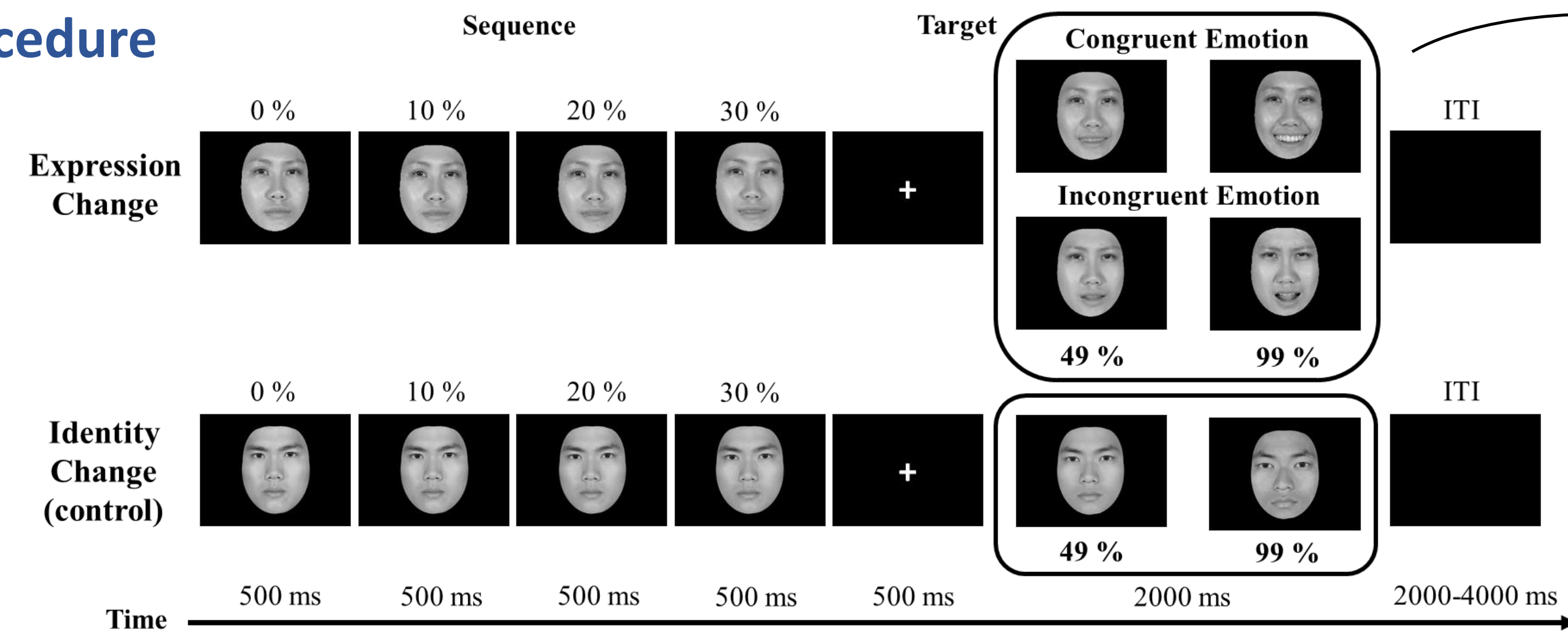
Question: Does the face meet your expectation?
Response: YES or NO

| Accurate response	49%	99%
Congruent	YES	NO
Incongruent	NO	NO

Experimental Design

4 factors:
- **Age group** old, young
- **Congruent emotion** congruent, incongruent
- **Emotion of sequence** happy, disgusted
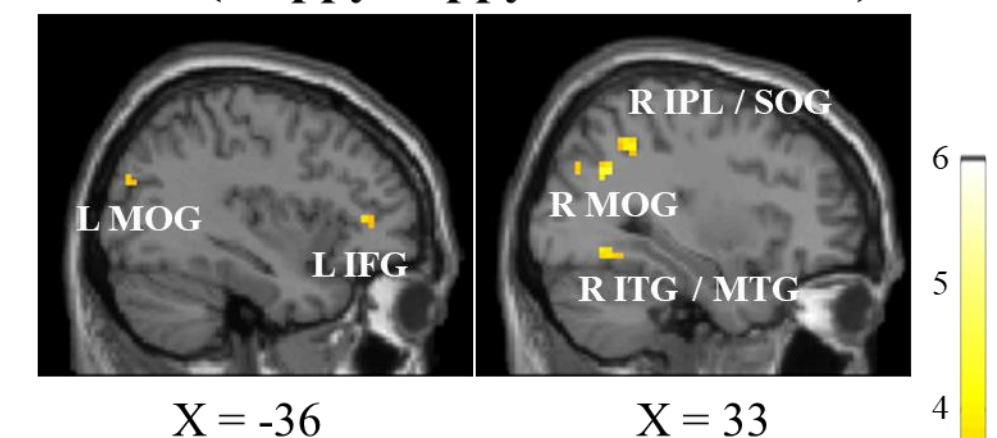- **Target percentage** 49%, 99%

Behavioral Results

- Older adults had lower hit rates for congruent disgusted sequence; they judged 49% disgusted faces as less expected than young adults did.
- Older adults had higher "yes" responses for incongruent conditions; they were more engaged whenever happy faces appeared.
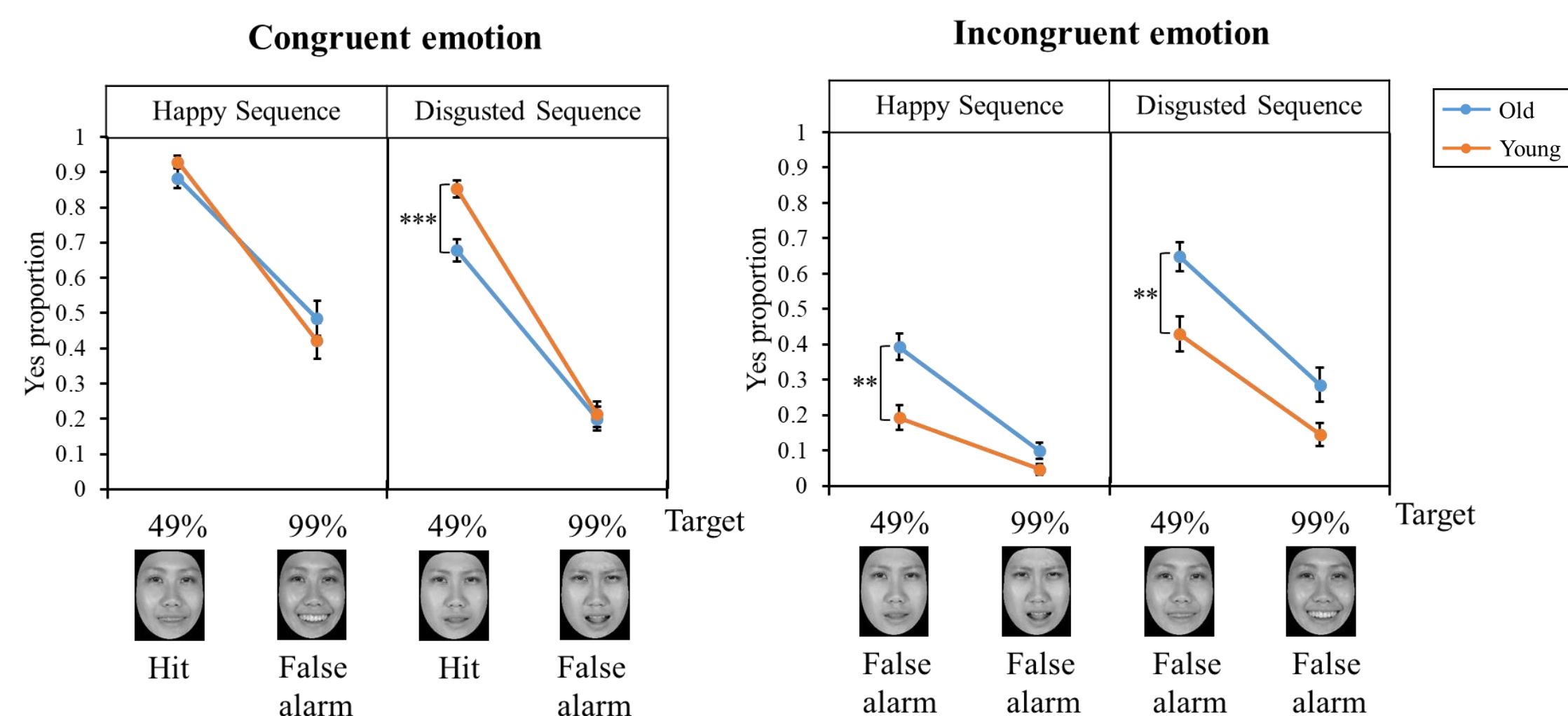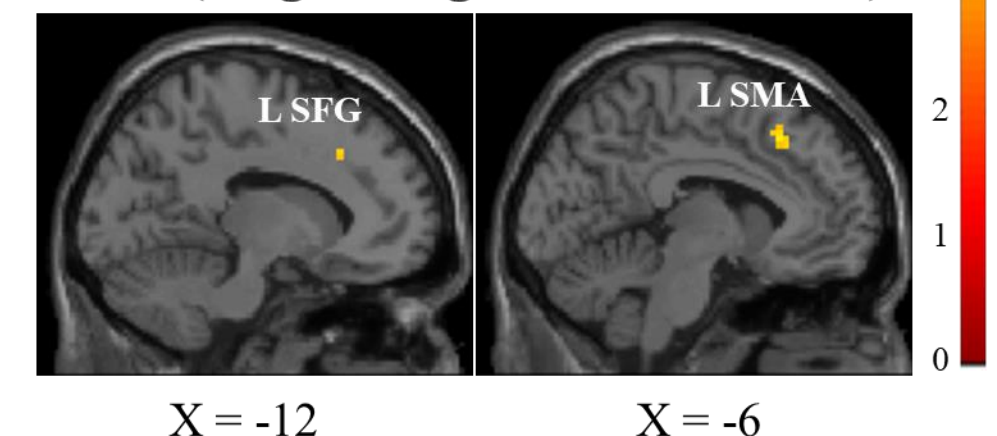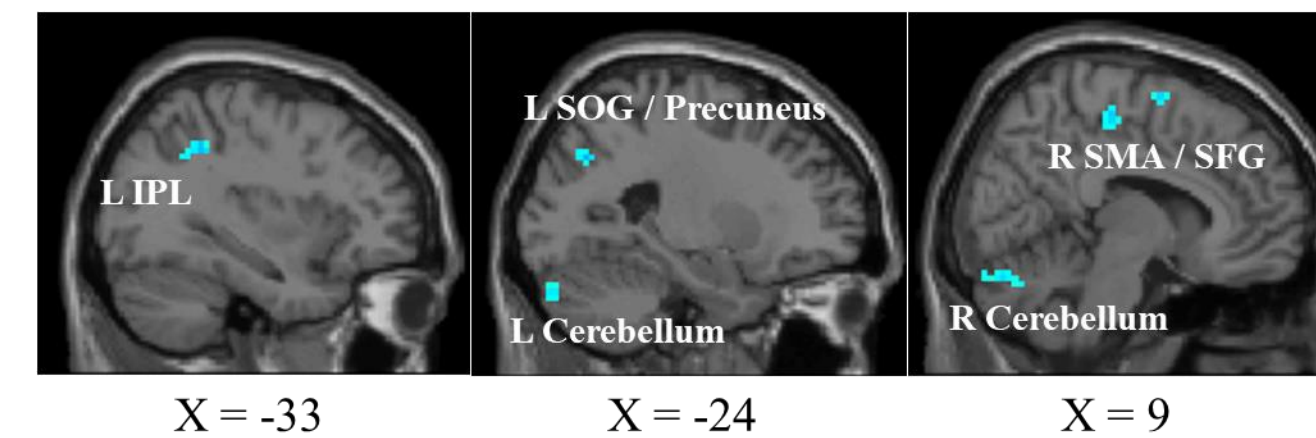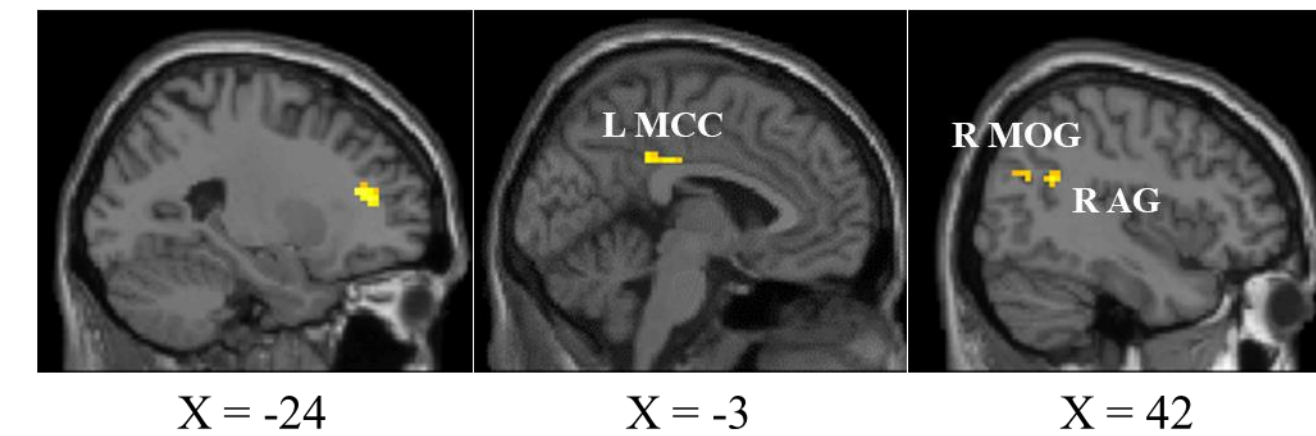

fMRI Results
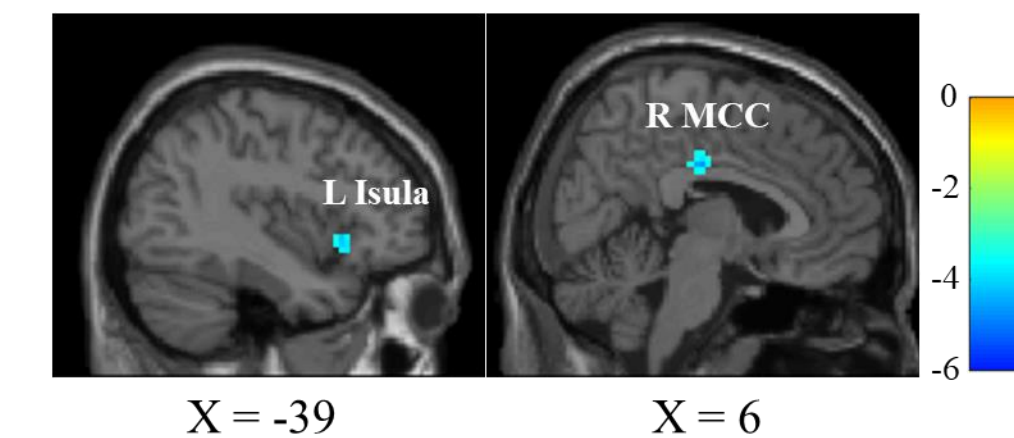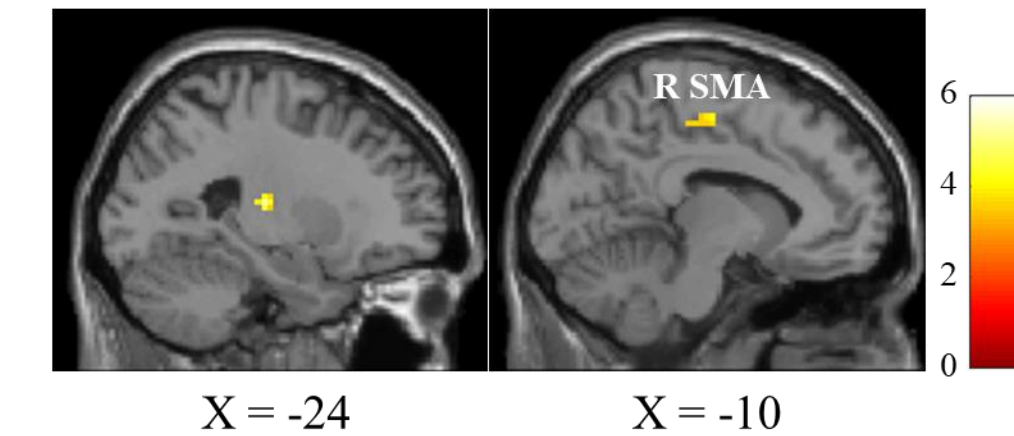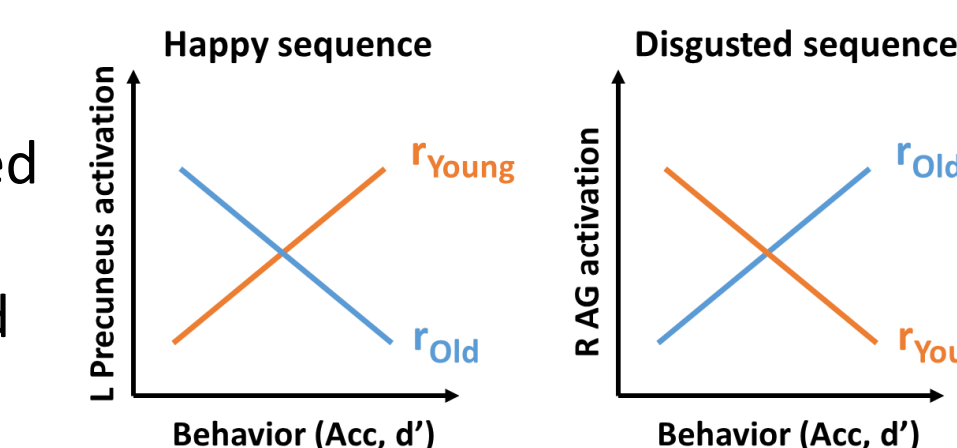

- Older adults activated more than younger adults in IFG, MOG, IPL, SOG, ITG, and MTG during happy sequence and in SFG, SMA during disgusted sequence.

- For better performance, older adults generally reduced neural responses for happy faces [top row] but increased neural responses for disgusted faces [bottom row]. This neural response association with behavior was reversed in young.

Conclusion

- Greater age protracts predictions of emotion from face expression changes, particularly for negative affect.
- Negative affect face changes engage more top-down neural processes in older than younger adults and evoke more extreme emotional expectations.
- Positive affect judgment appears less influenced by age, possibly due to enhanced neural attentional processing.
- Statistical regularity of emotional experience alters older's facial expression neural processing and judgment.

[1] Saffran, J. R., Aslin, R. N., & Newport, E. L. (1996). Statistical learning by 8-month-old infants. *Science*, *274*(5294), 1926-1928.