Do You Feel How I Feel?

Developmental Differences in Neural Representations of Affect

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Background

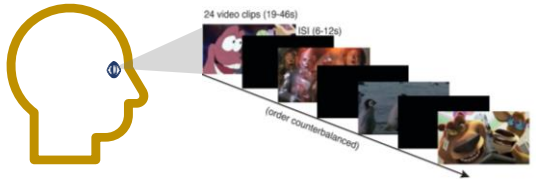
- Maturation in affective behaviors correlate with network developments among key affective regions.
- Whether this is reflected within neural representations has not been determined.
- Naturalistic stimuli offer a more ecologically sound approach to exploring these developmental neural differences.

Sample

	Male	Female	Age Range	Mean Age	Std. Dev.
Children	11	14	04 - 10 yrs	7.4 yrs	1.9 yrs
Adults	11	9	20 - 44 yrs	26.7 yrs	5.2 yrs

Method

Children and adults passively watched 24 film clips (8 Pos, 8 Neg, 8 Neut) during an fMRI scan [3]. The neural patterns evoked within the vmPFC, NAcc, and Amyg were analyzed using an RSA approach.



Representational Similarity [4]

What is it? Watching film generates observable neural patterns. When stimuli with similar features elicit similar patterns, we learn about how those features are represented in the brain. **Why does it matter?** Behaviors and cognitions reference representations. Understanding normative representational development can inform our understanding of non-normative outcomes.

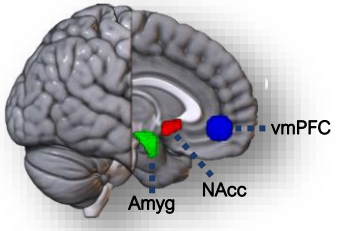
Hypotheses

A. Children will generate more similar patterns than adults, suggesting less **complexity**

B. Children will generate more similar valenced patterns than adults, suggesting less **differentiation**

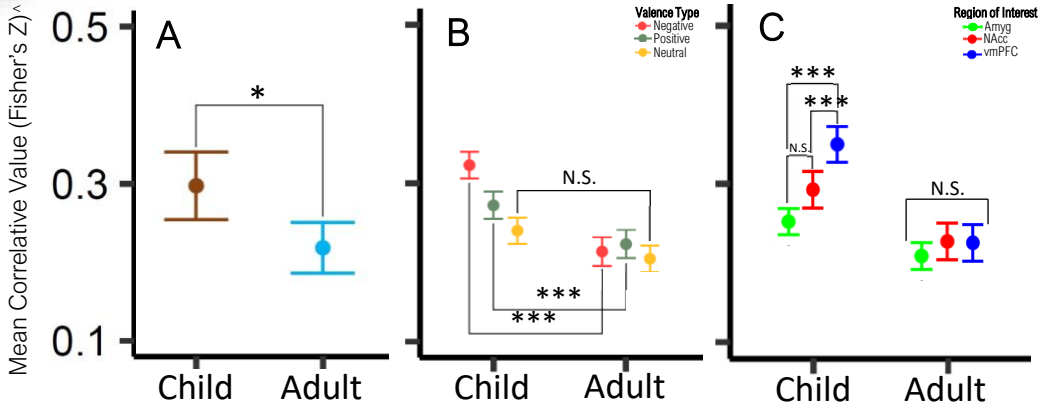
C. Child vmPFC patterns will be more similar relative to subcortical regions than adult patterns, suggesting greater recruitment in **meaning-making** tasks.

Regions of Interest



Analyses

- Intravalence pattern similarity was calculated using the Spearman's rank method. Correlative values were transformed using Fisher's Z.
- Differences in mean pattern similarity were assessed using a 3 (ROI) x 3 (Valence) x 2 (Age Group) Mixed Effects ANOVA with Bonferroni-adjusted post-hoc contrasts.



^ **Note**: Full range (-1.77 to 1.76) of Y-Axis restricted in visuals for comprehension sake. Error bars represent 95% confidence intervals.

Results

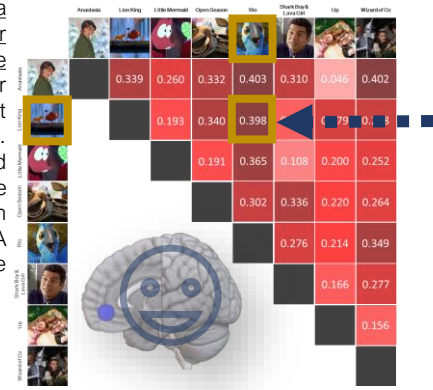
A. Children did demonstrate greater pattern similarity overall

B. Children generated more similar patterns for positive and negative, but not neutral, stimuli

C. Children's vmPFCs demonstrated greater pattern similarity than subcortical regions; adults did not

Calculating RSA

Correlations were performed within individual and ROI, between stimuli of the same valence type (1). Matrices house the mean correlative values across participants of for stimuli pairs in any one ROI (2), which required the construction of 12 separate matrices. The average correlative value of a matrix the same age group symbolizes representational similarity of a valence type for one ROI and age group. Higher values suggest greater similarity. Mean values and variances can be analyzed in traditional ANOVA to measure representational pattern differences.



Discussion

- Results suggest neural affective representations demonstrate predictable patterns in line with known behavioral developmental differences.
- Importantly, this research cannot comment upon the contents of representations, does not include adolescents, and has a relatively small sample size.
- This is the first application of a representational similarity approach on a developmental population using naturalistic stimuli to document affective differences.

References

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4. Popal, H. S., Wang, Y., & Olson, I. R. (2019). A Guide To Representational Similarity Analysis for Social Neuroscience. *Social Cog. Affect. Neurosci.*, *14*(11),1243–1253.

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