Common representational structures across the visual hierarchy in children and adults

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Background & Questions

Many studies have shown that category selective regions (e.g., FFA/PPA/EBA) develop slowly, with development potentially extending into teenage years (1-4).

What about more widespread activation patterns? What is their developmental time-course? Is it slower or faster than category selective regions?

Here, we directly compare the developmental trajectories of category selective regions and distributed activation patterns across the entire visual hierarchy using fMRI.

Stimuli (movie clips)

faces bodies scenes objects scrambles

Motion & Signal-to-Noise

Motion

Signal-to-Noise

Motion (time point rotations (mm))

Signal-to-Noise (50, 70, 80, 60, 50)

We scanned many subjects to find a group of adults and children (N~20) matched on motion and SNR measures (p<0.16 for both mean and variance).

(Note: more data and participants are on the way!)

Large-scale sectors

We performed representational similarity analysis across all visually active voxels within three levels of the visual hierarchy (ISI).

Category selective regions

Will a similar pattern of results be found within category selective regions (FFA/PPA/EBA), which have been shown to develop along a slower trajectory (1-4)?

Category selective regions summary

FFA size

PPA size

EBA size

We found strong correlations between children and adults across the visual hierarchy (i.e., large-scale sectors, category-selective regions, etc.).

Future directions/questions

What about other category selective regions such as OFA, STS, FBA, OPA, and RSC? Does the same dissociation exist between their size and activation patterns?

When exactly do these structures develop? Do they persist throughout adulthood? How do they age?

Summary & Conclusion

We found strong correlations between children and adults across the visual hierarchy (i.e., large-scale sectors, category-selective regions, etc.).

These results suggest that by ages 5-7, many large-scale structures across the visual hierarchy have developed and may serve as a "foundation" upon which category selective regions will later emerge.

Strong correlations were even found between children and adult FFAs, which we found to be smaller in children than in adults.

References