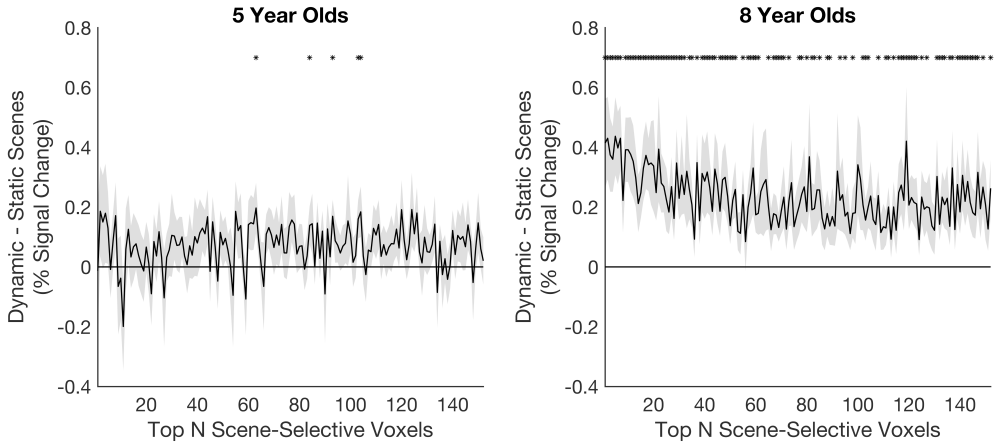

Figure S1. No evidence of first-person perspective motion processing anywhere in the 5-year-old OPA, related to Figure 4. Is it truly the case that the 5-year-old OPA does not represent first-person perspective motion whatsoever? For example, it could be the case that a small population of voxels in the peak of the 5-year-old OPA respond strongly to scene motion, but were not detected in the analysis above because they were averaged together with the surrounding voxels that did not respond strongly to scene motion. To test this possibility, we performed a volume-selectivity function (VSF) analysis [S1-3], which allowed us to explore scene motion responses in individual voxels across the volume of OPA extending from the peak scene-selective response outward. Individual OPA voxels were ranked in each participant from most-to-least scene selective using one half of the runs, and the response to scene motion in the top 152 individual voxels of each participant was then averaged across participants in the remaining, independent half of the runs, yielding the average scene motion responses in the top 152 individual voxels (our analysis focused on the top 152 voxels, since all participants had at least 152 voxels in OPA). For the 5-year-olds, only 5 out of 152 voxels (3.29%) showed a significant response to scene motion (i.e., scene motion responses > 0) (Left Panel; * = $p < 0.05$). Given that we ran 152 statistical tests with alpha = 0.05, this number is similar to the number of false-positive results expected by chance (5%, or 8 voxels). By contrast, for the 8-year-olds, 105/152 voxels (69.08%) showed a significant response to scene motion – well beyond the number expected by chance (Right Panel; * = $p < 0.05$). Thus, we found no evidence of even a small population of scene motion-selective voxels in the 5-year-old OPA. Importantly, we note that these findings in 5-year-olds constitute a null result, and therefore that it could still be the case that navigationally-relevant motion processing is present to some extent by 5 years old, but not detectable using the methods employed here (e.g., fMRI may not be sensitive enough to capture smaller or less reliable responses to navigationally-relevant information processing in earlier stages of development). Shaded regions depict the standard error of the mean.

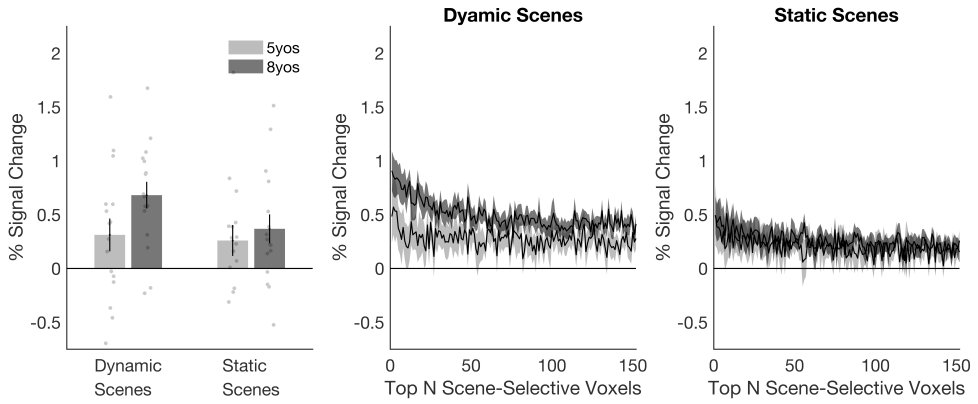

Figure S2. The development of first-person perspective motion processing in OPA occurs via construction of preferred responses, not pruning of non-preferred responses, related to Figure 4. Having established that first-person perspective motion processing develops in OPA in childhood, we next asked *how* such development occurs. Does the development of first-person perspective motion processing occur by construction of preferred responses, pruning of non-preferred responses, or a combination of these two mechanisms? To address this question, we directly compared responses to "preferred" stimuli (i.e., the Dynamic Scenes), as well as responses to "non-preferred" stimuli (i.e., Static Scenes), between 5- and 8-year-olds (Left Panel). A 2 (response: preferred, non-preferred) x 2 (group: 5-year-olds, 8-year-olds) mixed-model ANOVA revealed a significant response x group interaction ($F_{(1,31)} = 5.27$, $p = 0.03$, $\eta_p^2 = 0.15$), with responses to the preferred stimuli (i.e., Dynamic Scenes) showing a marginally significant increase from 5 to 8 (pairwise comparison, $p = 0.06$), and with responses to the non-preferred stimuli (i.e., Static Scenes) showing no significant difference between the 5- and 8-year-olds (pairwise comparison, $p = 0.61$). To further explore how this development occurred across the volume of OPA, and whether any smaller population of voxels might show evidence of pruning, we next conducted a VSF analysis. This analysis confirmed that the increasing response to the preferred stimulus was found consistently in individual voxels extending from the peak scene-selective response well into the surrounding cortex (Middle Panel), while no discernable changes were found anywhere across the volume of OPA for the non-preferred stimulus (Right Panel). Taken together, these results suggest that the development of first-person perspective motion processing occurs primarily via construction of preferred responses, rather than pruning of non-preferred responses. Error bars (Right Panel) and shaded regions (Middle and Left Panels) depict the standard error of the mean.

	F	p	n_p^2
ROI	**52.62**	**0.001**	**0.64**
Condition	2.20	0.12	0.07
Group	0.54	0.47	0.02
ROI x Group	0.01	0.94	<0.001
Condition x Group	**3.31**	**0.04**	**0.10**
ROI x Condition	**10.05**	**0.001**	**0.25**
Group x ROI x Condition	**4.52**	**0.02**	**0.13**

Table S1. Complete results of the mixed-model analysis of variance (ANOVA) comparing the three-way interaction of group (5 yos, 8 yos), region (OPA, MT), and condition (Scene Motion, Object Motion, Face Motion), related to Figure 4. Significant effects ($p < 0.05$) are indicated in bold.

	F	p	n_p^2
ROI	0.74	0.48	0.02
Condition	**6.61**	**0.003**	**0.18**
Group	0.15	0.70	0.005
ROI x Group	0.17	0.84	0.006
Condition x Group	2.18	0.12	0.07
ROI x Condition	0.78	0.54	0.03
Group x ROI x Condition	**2.82**	**0.03**	**0.09**

Table S2. Complete results of the mixed-model analysis of variance (ANOVA) comparing the three-way interaction of group (5 yos, 8 yos), region (OPA, PPA, RSC), and condition (Scene Motion, Object Motion, Face Motion), related to Figure 4. Significant effects ($p < 0.05$) are indicated in bold.

Supplemental References

S1. Kamps, F.S., Morris, E.J., and Dilks, D.D. (2019). A face is more than just the eyes, nose, and mouth: fMRI evidence that face-selective cortex represents external features. NeuroImage *184*, 90-100.

S2. Norman-Haignere, S.V., Albouy, P., Caclin, A., McDermott, J.H., Kanwisher, N.G., and Tillmann, B. (2016). Pitch-Responsive Cortical Regions in Congenital Amusia. J Neurosci *36*, 2986-2994.

S3. Saygin, Z.M., Osher, D.E., Norton, E.S., Youssoufian, D.A., Beach, S.D., Feather, J., Gaab, N., Gabrieli, J.D.E., and Kanwisher, N. (2016). Connectivity precedes function in the development of the visual word form area. Nature neuroscience *19*, 1250-1255.