**A functional MRI study on the neural correlates of motion deficits in amblyopia**

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**Introduction**: Amblyopia is a common developmental visual disorder defined clinically as reduced visual acuity in one eye that cannot be immediately corrected with lenses. Amblyopia also disrupts motion perception in both the amblyopic and fellow eyes; persisting after standard treatment with occlusion therapy. Psychophysical studies report deficits for slow but not faster speeds of motion. This study aimed to determine the neural correlates of motion perception deficits in the clinically-unaffected fellow eye in amblyopia. Because the dorsal visual stream has been proposed to underlie poor motion perception in developmental disorders, we evaluated this hypothesis.

**Methods:** We used functional MRI to measure brain activation by slow (0.1 deg/s) and fast (5 deg/s) speeds of motion-defined form in children and adults treated for amblyopia and age-matched controls without amblyopia. Vertical or horizontal motion-defined rectangles were created by moving dots inside the rectangle in one direction and dots outside the rectangle in the opposite direction at the same speed. Functional localizers were used in separate scans to identify the motion-sensitive area MT+ (moving vs. stationary dots) and the object-selective lateral occipital complex (LOC; objects vs scrambled images) for each participant. These regions have previously been implicated in the processing of motion-defined form. Anatomical regions of interest: V3v and V4v -belonging to the ventral stream; V3d, V6, V7, IPS1 and IPS2 - belonging to the dorsal stream were also selected.

**Results:** Motion perception measured inside the scanner was similar in the two groups for the fast speed but poorer in the amblyopia group for the slow speed (t= -3.2, p=.008). Region of interest analysis for fMRI data revealed a group difference with a lower BOLD signal in the amblyopia group for the slow speed (t= 2.17, p= .043) in the LOC area. Area V4v in the ventral stream showed a significantly lower BOLD signal in the amblyopia group for the fast speed (t= 2.24, p= .037). However, MT+ and the dorsal stream ROIs did not show significant group differences.

**Conclusions:** Brain activation in ventral visual areas including LOC and V4v appears to be different in people with amblyopia and healthy controls during motion-defined form processing. This suggests that the ventral but not dorsal visual stream may underlie the perceptual deficit in amblyopia. This has clinical implications for the target of new therapies to treat amblyopia.