Supplemental methods:

Study eligibility criteria

This study was approved by the Washington University in St. Louis Review board. Stroke participants were prospectively recruited from Barnes Jewish Hospital with the aid of Dr. Lisa Connor of the Washington University Cognitive Rehabilitation Research group and Dr. Jim Moo Lee of the Stroke Trials Team at Washington University. Inclusion criteria for homonymous visual field defect group (HVFD) were as follows: 1) Age 18 or greater; 2) First symptomatic stroke of ischemic or hemorrhagic etiology; 3) No more than two lacunes, clinically silent and less than 15 mm in size on CT; 4) Time of enrollment: <4 weeks from stroke onset; 5) Clinical evidence of visual deficit based on neurological examination.

Exclusion criteria were as follows: 1) The inability to maintain wakefulness during testing; 2) The presence of other neurological, psychiatric or medical conditions that preclude active participation in research or may alter the interpretation of the behavioral/imaging studies (e.g. dementia, schizophrenia); 3) Life expectancy less than 1 year (e.g. cancer or congestive heart failure class IV); 4) Evidence of clinically significant periventricular white matter disease (equal to or greater than grade 5);[1] 5) Claustrophobia limiting the ability to tolerate an MRI study; 6) History notable for retinal disease, eye trauma, ophthalmologic surgery, cataracts corrected or uncorrected, optic nerve disease including glaucoma and any other ophthalmologic condition.

Stroke control participants were required to have clinically normal visual field examination, but the inclusion and exclusion criteria were otherwise maintained.

Healthy control participants were subject to similar exclusion criteria for the study groups with the following additions: 1) A history of atherosclerotic (coronary, cerebral, peripheral) artery disease; 2) An abnormal neurological examination with signs of central nervous system dysfunction.

All participants provided written informed consent according to procedures established by the Washington University in Saint Louis Institutional Review Board and were compensated for their time.

Optic Tract Identification

The optic tract is not easily identified on conventional MRI sequences but has been successfully reconstructed using diffusion tractography[2]. We implemented an automated probabilistic tractography procedure to locate the OT in our participants by tracking between optic tract fibers as they entered the brain and the thalamus in the expected location of the lateral geniculate nucleus. We used the FDT tool[3], a part of

the FSL package 5.0.6.[4] for probabilistic streamline tractography. Extraparencymal OT seed regions were drawn on a group template image derived from T1-weighted images in standard space. The thalamic region from the Harvard Oxford atlas[5] was truncated to exclude all but its posterior-lateral aspect in the expected location of the lateral geniculate nucleus and was marked as a seed. To eliminate false positive fibers, exclusion regions were drawn on the proximal optic radiation, the temporal pole in the expected location of Meyer's loop, in the tectum at the level of the superior colliculus, and in the anterior-medial thalamus. The multiple masks method with 25,000 samples per seed voxel, a curvature threshold of 80 degrees and a step length of .5 mm was employed. Each voxel of the resultant map contained the number of samples connecting seed regions that traverse that voxel. We applied a threshold to this map by a value of 1% of the total number of samples connecting seed regions. To eliminate the effects of variability immediately adjacent to seed regions a small segment at each terminus of the tract were removed using a common mask defined in standard space. The results of this procedure were visually inspected in all participants to ensure that the delineated tract was anatomically plausible based on known anatomy.

References

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