

2009-09-03

Mark Schira, School of Psychology, University of New South Wales, Sydney, New South Wales 2052, Australia

Titel: High Resolution fMRI Revealing the Foveal Confluence in Human Visual Cortex

Abstract

The human visual system devotes a significant proportion of its resources to a very small part of the visual field, the fovea. Foveal vision is crucial for natural behavior and many tasks in daily life such as reading or fine motor control. Despite its significant size, this part of cortex is rarely investigated and the limited data have resulted in competing models of the layout of the foveal confluence in primate species. Specifically, how V2 and V3 converge at the central fovea is the subject of debate in primates and has remained "terra incognita" in humans. Using high-resolution fMRI (1.2 x 1.2 x 1.2

mm(3)) and carefully designed visual stimuli, we sought to accurately map the human foveal confluence and hence disambiguate the competing theories. We find that V1, V2, and V3 are separable right into the center of the foveal confluence, and V1 ends as a rounded wedge with an affine mapping of the foveal singularity. The adjacent V2 and, in contrast to current concepts from macaque monkey, also V3 maps form continuous bands (approximately 5 mm wide) around the tip of V1.

Unexpectedly, for the centermost 0.75 degrees, the cortical representations for both V2 and V3 are larger than that of V1, indicating that more neuronal processing power is dedicated to second-level analysis in this small but important part of the visual field.