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# Mapping human V4: Correcting artefact reveals hemifield organisation

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# Mapping human V4: Correcting artefact reveals hemifield organisation

## **Abstract**

Paper presented at the Australasian Experimental Psychology Conference 2015, 8-11 April 2015, Sydney, Australia.

## **Keywords**

v4, correcting, human, artefact, mapping, reveals, hemifield, organisation

## **Disciplines**

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## **Mapping human V4: Correcting artefact reveals hemifield organisation**

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Ongoing difficulties in mapping the human visual area hV4 have resulted in the existence of two main theories as to its retinotopic organisation. These are i) the full hemifield model, which states the entire hemifield of hV4 is located ventrally, and ii) the split hemifield model, which poses hV4 is mostly a ventral area, but with a small portion located dorsally. An explanation for the apparent variation between subjects was suggested with the discovery of the venous eclipse artefact (Winawer et al. 2010), caused by signal distortion in the region of the Transverse Sinus, potentially obscuring parts of hV4 in some subjects. Puckett et al., 2014, suggested that voxel responses in and near the venous eclipse are reliably inverted rather than randomly distorted. Here we tested whether correcting such voxels could restore a full, ventral hemifield in hV4 in all subjects. The procedure was partially successful, with the complete restoration of a full hemifield in one subject, and improvements in the hV4 maps of others. In summary we found complete hemifield representations for hV4 in 9 of 16 hemispheres. Additionally, consistent clustering of inverted voxel responses was seen in the region of the venous eclipse in all subjects.

## **Ranking Judgments in Visual Working Memory**

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A major debate in modeling Visual Working Memory (VWM) is whether item storage is best described by a discrete (e.g., slots) or continuous (e.g., resources) process. Historically, the slots account has received most support. Usually, the merit upon which the relative fit of each model are gauged depend upon parametric approaches. However, there are issues in simply comparing deviance indices (e.g., AIC, BIC) which may lead to erroneous conclusions regarding the likely data generating model. Instead, we use ranking judgements which require minimal parametric assumptions and permit model based predictions to be compared without the need for model fitting. We present data from a series of experiments that manipulate load on VWM.

## **Both-edges letter position in word recognition errors**

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Much recent research has investigated letter position coding with behavioural tasks such as lexical decision and same/different judgments. In this study we developed a new paradigm to elicit letter identification errors from unimpaired readers in a word recognition task. Of particular interest are letter perseveration errors, which reflect the residual activation of letters from previous trials. When letters perseverate into the same position they occupied in a previous response, the errors reveal the position code used by the identification system: The position code that successfully accounts for the position of the perseverations is assumed to be employed in word recognition. We compared the ability of position schemes based on the word-beginning, word-end, both-edges, midpoint, as well as closed- and open-bigrams to account for the position of over 15,000 perseveration errors in our corpus. Results indicate that their position is best described by a graded-both-edges position scheme. In such a scheme letter position is represented by distance from both the beginning and end of the word, with similar representations for adjacent positions. This study builds upon recent work that posited the both-edges scheme in reading based on the illusory word paradigm with normal readers and analysis of error data from acquired dyslexia.