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# Modelling the human visual cortex, a complete model from visual stimulus to BOLD measurement

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# Modelling the human visual cortex, a complete model from visual stimulus to BOLD measurement

## **Abstract**

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visual, human, modelling, bold, measurement, stimulus, model, complete, cortex

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**O3A-8: Modelling the human visual cortex, a complete model from visual stimulus to BOLD measurement****Mark M Schira**

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Functional magnetic resonance imaging (fMRI) has become a standard tool in vision science, and many properties of visual cortex are fairly well understood and modelled, such as retinotopic organisation and contrast response functions.

However, fMRI is an indirect measure resting upon the blood oxygen level dependent (BOLD) signal. Hence, there are many steps from an experimental manipulation, such as a visual stimulus, to the BOLD response. Our understanding of each of these processes matures, more and increasingly sophisticated models have been proposed. We present a framework integrating an assembly of existing models generating concrete and applicable predictions of the BOLD measurements for any experiment with a simple visual stimulus. We combine previously independent models of the spatiotemporal properties of the BOLD response (Aquino et al., 2012, *PLoS CB*) with an algebraic model of the transformation of visual space to early visual cortex (Schira et al., 2010, *PLoS CB*) and further onto an average cortical surface (Benson et al., *Current Biology*). This allows predicting concrete (Freesurfer average brain) and detailed responses in space and time for an arbitrary visual stimulation (movie), providing a first pass bottom up prediction for testing, validating and optimizing visual experiments and the space–time separability of response.

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