Mind Your Left! It is the left visual field rather than the right hemisphere

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Abstract

A leftward bias is well known in humans and animals, and has been commonly related to the right (R) hemisphere dominance for spatial attention. Previous fMRI studies from our lab suggest that this bias is mediated by faster conduction from the R to left (L) parietal cortices than vice versa, supporting the importance of inter-hemispheric functional connectivity in the leftward bias. Furthermore, bilateral differential activations were demonstrated for fearful vs. neutral faces only if presented in the L hemifield. This was true not only in a core limbic region, the amygdala, but also in major visual-attention and orientation subcortical nodes, the pulvinar and superior colliculus, respectively. These results are consistent with the well- known leftward bias of danger-associated behaviors in animals. Recently, by using simultaneous EEG-fMRI and causal modeling, we found an association between faster neural conduction (ERPs) from R to L hemisphere and higher fMRI-activation in the left pulvinar, probably led by the R hemisphere. This finding suggests the involvement of major sub-cortical attention nodes even in non-emotional leftward bias.Together this multi-scale evidence highlights the relation between hemispheric dominance and asymmetric inter-hemispheric information transfer as the underlying mechanism of leftward bias in spatial attention. This insight may guide future efforts in alleviating attention deficits by focusing on brain-based diagnosis and improving delays in network connectivity. Additionally, the proposed neural model for asymmetry of visuospatial attention might provide important insights into the mechanisms underlying functional brain lateralization in general

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