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Supplementary material

The arrow of time of brain signals in cognition: Potential intriguing role of parts of the default mode network

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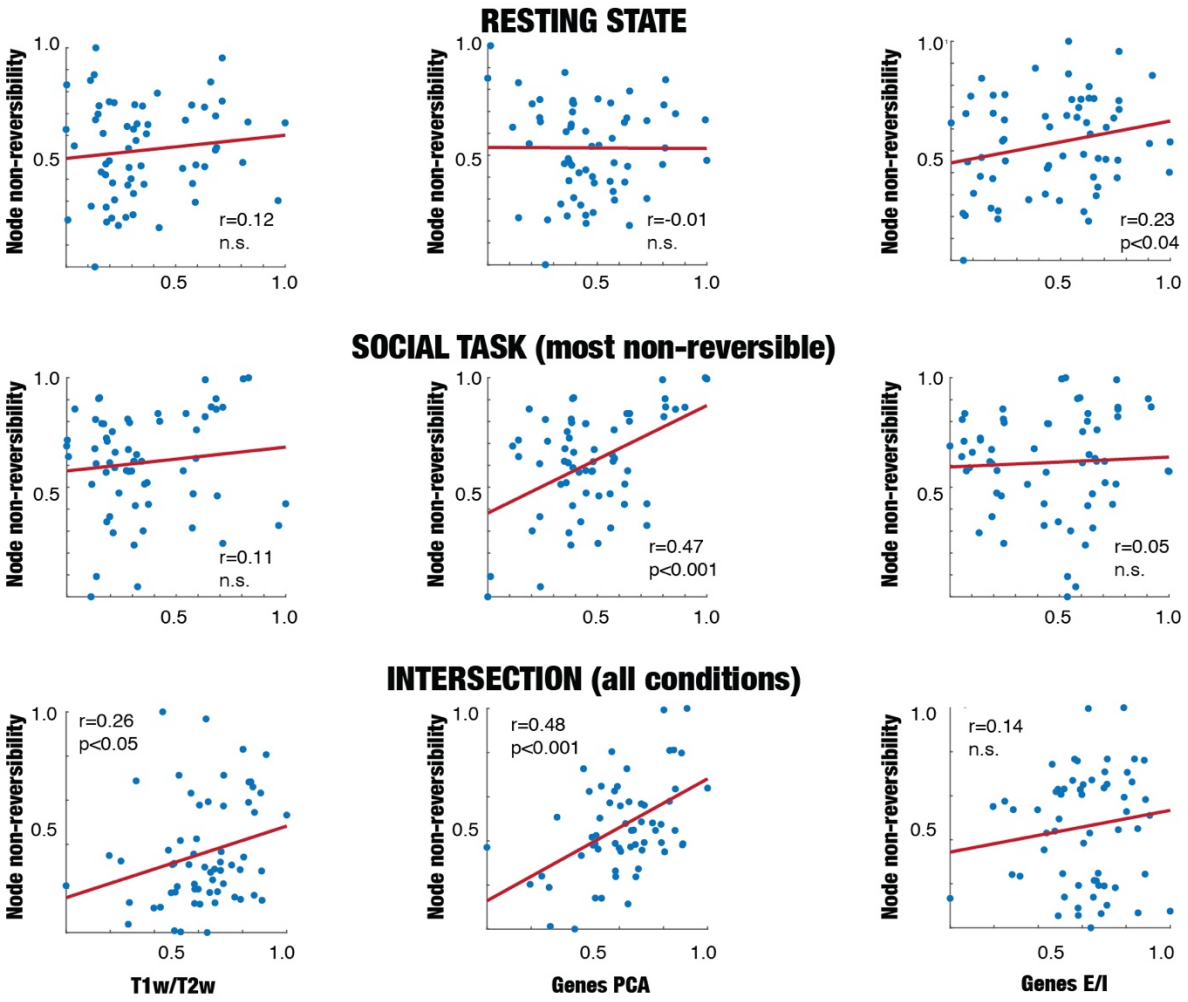

Figure S1. Hierarchy and heterogeneity at the node-level for resting state, most non-reversible task and intersection of all conditions. *We studied the hierarchy of the mean levels (across participants) of non-reversibility for rest, most non-reversible task and intersection by comparing this to other known sources of heterogeneity such as the myelinisation ratio (T1w/T2w ratio, obtained from HCP data) and various forms of gene expressions in the brain, obtained from the Allen Human Brain Atlas (Arnatkeviciute et al., 2019; Deco et al., 2021a; Fornito et al., 2019; Hawrylycz et al., 2012). In particular, we used the first PCA component of all genes and the excitation/inhibition ratio given by the gene-expression for genes coding for the excitatory AMPA and NMDA receptors and inhibitory GABA-A receptor isoforms and subunits. In the resting state condition, we found a significantly correlation ($p<0.04$, non-parametric) with the excitation-inhibition ratio but not with the two other measures. In contrast, the SOCIAL task showed a clear significant correlation with the first PCA ($p<0.001$, non-*

parametric) but not with the others. In contrast, we found significant correlations between the intersection of non-reversibility of all conditions with myelin ($p<0.05$, non-parametric) and Genes PCA ($p<0.001$, non-parametric). This bolsters the role of the DMN for orchestrating cognition.

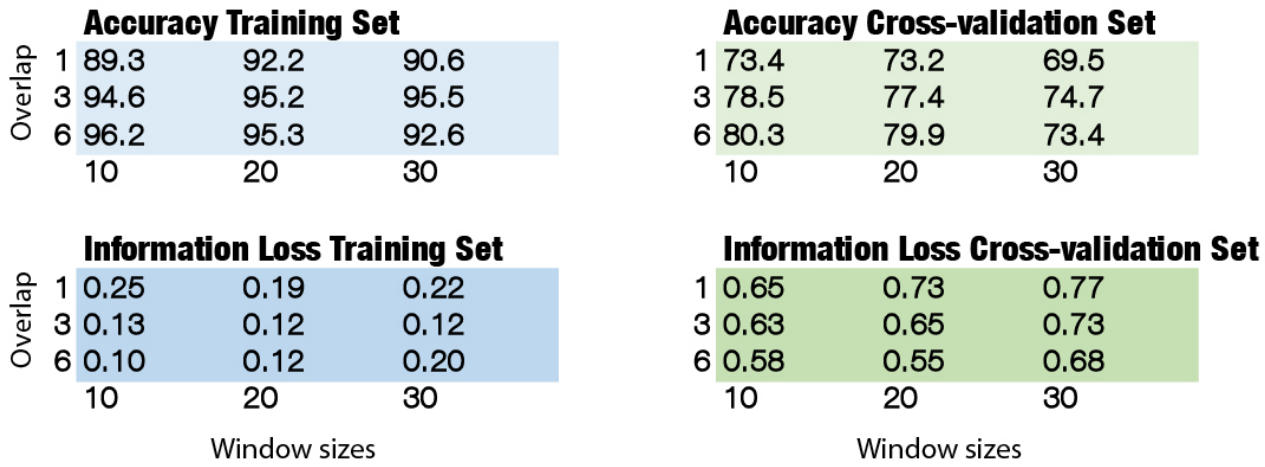

Table S1. **Example of selection of window size and overlap parameters for the global-level analysis in resting state.** The table shows the Accuracy and Information Loss for the Training set, and the Accuracy and Information Loss for the Cross-validation Set using varying window sizes [10,20,30] and overlaps [1,3,6] (both in TRs).