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Supplemental Information

Turbulent-like Dynamics in the Human Brain

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Supplemental Figures

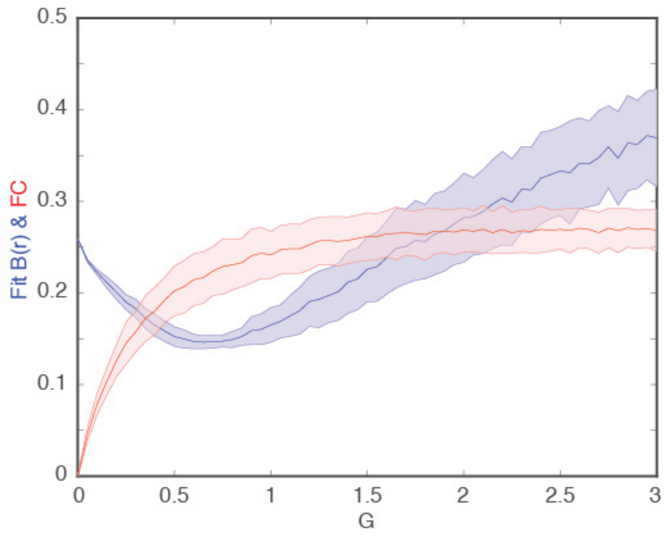

Figure S1. Fitting with functional connectivity. *The traditional strategy of fitting using the correlation between empirical and simulated functional connectivity matrices (red line) is not informative for constraining the model. Related to Figure 3.*

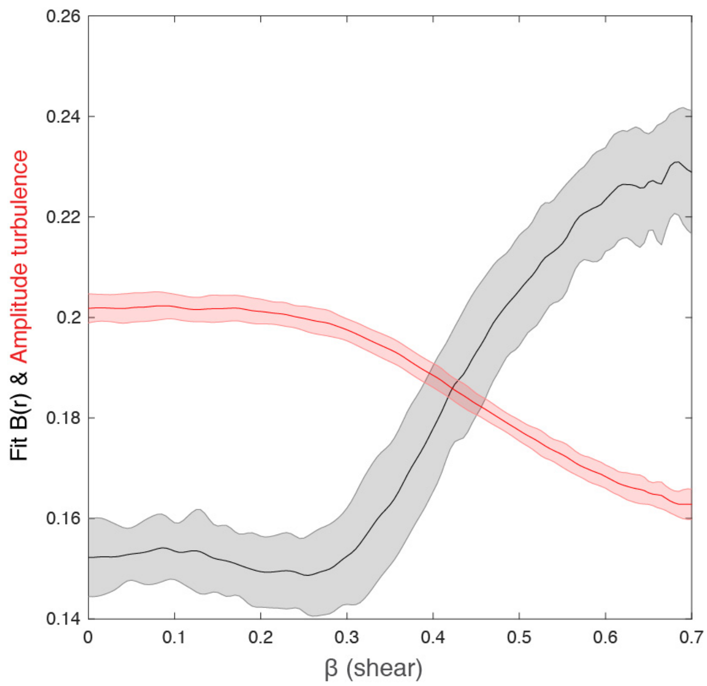

Figure S2. Changes in amplitude turbulence as a function of the shear parameter. *Inspired by the findings by Kawamura, Nakao and Kuramoto (Kawamura et al., 2007), we systematically investigated the influence of the shear parameter (β) on amplitude turbulence (red line) and on the level of fitting (black line). The level of fitting is the error of the estimation of B(r) and is thus clearly not improved by increasing the shear parameter. Nevertheless the shear parameter is strongly affecting the amplitude turbulence, and it is interesting to observe that when this decreases so the level of fitting get worse, establishing the relevance of turbulence for fitting the model. Related to Figure 3.*

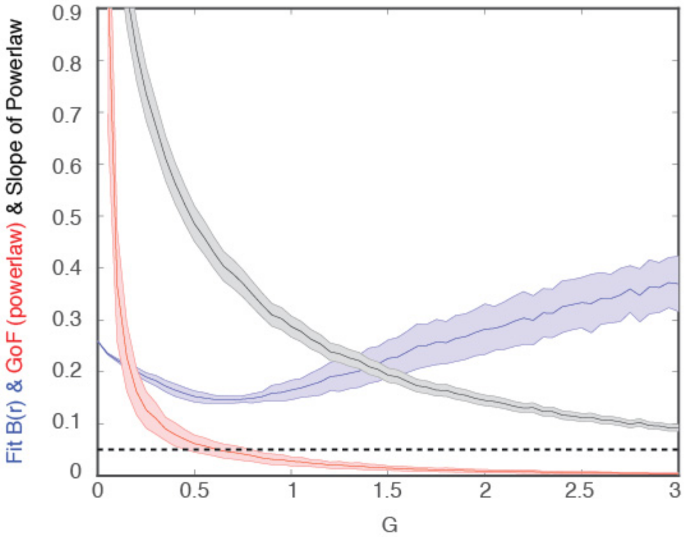

Figure S3. Power law fitting of model. *The power law fitting of the pair correlation function B(r) in the inertial subrange (information cascade) can also be useful for capturing turbulence but is not very sensitive to finding optimal turbulence. The slope of the power law is plotted in. The goodness of fit (red line) only goes below $p<0.05$ for $G>0.65$, which is evidence for the existence of power law. This is consistent with the findings of high values of amplitude turbulence in the same range. Related to Figure 7.*

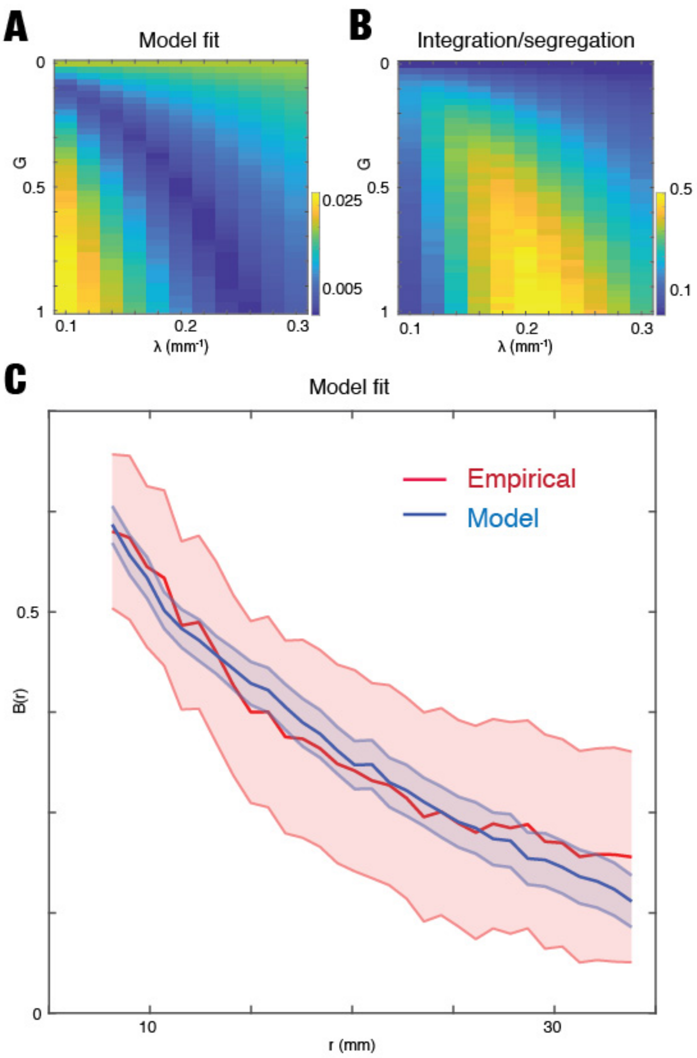

Figure S4. Modelling of lambda in the Exponential Distance Rule. *Independently of the fitting using dMRI connectivity, we wanted to explore the relationship between exponential decay and coupling in a model with these two free parameters.* ***A)*** *We show the root squared error between the empirical and simulated B(r) in the inertial subrange as a function of the two free parameters G and* **λ.** *There is a clear optimal region as the combination of the parameters along the diagonal of the matrix.* ***B)*** *The results show that there is a consistent region of parameters producing an optimal balance between integration and segregation, computed as their product (see Methods).* ***C)*** *For optimal parameters, we plot the very good fit between empirical and simulated B(r) for the inertial subrange. Related to Figure 7.*