Title: Anatomo-functional Organization in Brain Networks
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There are several studies focused on comparing rsFC networks with their structural substrate \cite{hagmann2008, honey2010}. However an accurate description of how anatomo-functional connections are organized, both at physical and topological levels, is still to be defined. Here we present an approach to quantify the anatomo-functional organization and discuss its consistency.

Ten subjects were scanned twice on a 3T General Electric MR scanner. The acquisition protocol consisted of a high resolution T1, six minutes resting state fMRI scan and 26 encoding diffusion directions DWI.
T1 images were parcelled in 88 gray matter ROIs. DTI were built from DWI, and were set as inputs to the tracking algorithm defined in \cite{iturria2007} obtaining one structural connectivity network (SCN) per subject and time point. fMRI were pre-processed, and then co-registered to the b0 image. Voxel time courses belonging to each ROI were band-pass filtered [0.01–0.09 Hz] and linearly detrended, and finally they were averaged. Functional connectivity networks (FCN) were obtained performing Pearson linear correlations between all ROI time courses.
We computed the *topological and physical Rentian* scaling (RS) of the networks \cite{christie2000}. With the physical RS, we study the relationship of the number of nodes and the number of links that are within/crossing an imaginary cube of random centre and size. With the topological RS, we define the same relationship but in communities of nodes where the within community connectivity has been maximized compared to the inter communities connectivity.
This relationship for both physical and topological RS is represented in log-log space and by least square fitting it is possible to obtain the slope of this curve (in linear region), which are called the physical p and topological p_{t} Rent exponents. The expected minimum Rent exponent is defined as $p_{min}=max(0.66,p_{t})$. The closer p is to p_{min} the more optimized the network is \cite{basset2010}.

We found non-significant differences across network modalities and acquisitions for p_{min} $(\alpha=0.99)$. However, they were significantly higher for both modalities in the second acquisition, and SCN showed lower values than FCN in both acquisitions $(\alpha=0.99)$.
The distance between p and p_{min} was computed as an indicator of organization of SCN and FCN. This was significantly lower in SCN than in FCN $(\alpha=0.99)$, revealing that the organization in FC is more random and less structured than in SC. We also obtained the Rent exponents for randomized versions of the original networks. p_{rdm} and $p_{t_{rdm}}$ were higher than their respective p and p_{t} $(\alpha=0.99)$ for both acquisitions and modalities, indicating that the networks were more organized than what would be expected if they were only driven by random forces.

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