SOME ASPECTS OF STATISTICAL NEUROIMAGING

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The ability to record brain signals in-vivo using Neuroimaging has been critical in recent advances in the understanding of the brain. However, the resulting breakthroughs in Neuroscience, Psychology and Medicine would not have been possible without the truly interdisciplinary nature of Neuroimaging. One core aspect is the statistical analysis of the recorded data. In this talk, a short review of some of the most common statistical methodologies used in brain imaging will be given. It will be shown that the issues of spatial and temporal dependencies are often crucial in designing efficient analyses. The specific case of the relatively new protocol of resting-state functional magnetic resonance imaging (r-fMRI) will then be investigated further. This data is used to determine brain connectivity - the second order structure of the brain's activity. It will be shown that considerable case needs to be taken when analysing such data, as non-stationarities in the mean can easily be misinterpreted as second order structure. A test, based on functional data and change point analysis, will be shown to useful in determining which scans might be useful for understanding connectivity.