

Multivariate analysis of neuroimaging data: applications for stroke research”

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The relationship between brain damage and behavioral impairment can be analyzed using two conceptual approaches. The first (univariate) approach, currently dominant in the field, is to go through a series of spatial locations in the brain and see how behavioral impairment is manifest at each spatial location. In this approach, the interactions between spatial locations are ignored. An alternative (multivariate) approach is to analyze all the spatial locations simultaneously and take the interactions between them into account.

There is converging evidence that multivariate methods, applied to neuroimaging data, are more accurate as well as more spatially sensitive. In addition, multivariate methods do not have the problem of multiple comparisons which necessarily arise in univariate methods. Since the brain is organized into a hierarchical set of networks, multivariate methods provide a natural way of studying brain function in both healthy and damaged brains. This lecture reports a series of results obtained in our lab when multivariate methods were used to predict various aspects of speech and language impairment from lesion and connectome data in stroke patients.