Insights into Multivariate Decoding for Estimating the Temporal Dynamics of Representations Encoded in the Brain

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Professor Elaine Åstrand is a world recognized researcher in her field. Her research is very much in line with the conference topics and focuses on the access and extraction of cognitive information with EEG, specifically attention and working memory, from brain activity and the development of rehabilitation techniques for enhancing our cognitive ability.

Short description:
Multivariate pattern classification analysis (i.e. decoding) is a promising tool enabling the extraction of rich spatial information from ElectroEncephaloGram (EEG) activity with high temporal resolution. Multivariate decoding challenges traditional univariate analyses in that it enables the joint analysis of multiple features in relation to the discriminability between two states. For neurofeedback applications, such as for example Motor Imagery (MI) based BCI rehabilitation after stroke, obtaining the highest classification accuracy is not the ultimate goal, but instead, promoting clinically relevant modulations of the brain activity is crucial. Therefore, the interpretation of multivariate decoding in terms of underlying brain features becomes an essential part of a successful neurofeedback protocol. In addition to this, many mental processes can easily be disrupted by both external and internal factors. The relevant brain features are therefore likely to fluctuate across time both within and between trials for the same subject. This talk will address how we can extend multivariate decoding to study the temporal dynamics of EEG activity patterns during a task. By bridging univariate and multivariate analyses, Prof. Åstrand will further discuss how a time-resolved estimate of the strength of information, represented in the brain, can be extracted using multivariate decoding.

More about Elaine Åstrand:
Dr. Åstrand is an Assistant Professor in Neurotechnology at Mälardalen University in Sweden. She has a MS in Biotechnology and received her Ph.D. in Neuroscience from the Institute of Cognitive Sciences in Lyon, France. Her research is in applied neuroscience and focuses on how information can be extracted in real time from brain activity and how the extracted information can be provided as feedback in a closed-loop neurofeedback system. She is the recipient of the 2015 *Société des Neurosciences* Ph.D. award.