

# Machine Learning EEG to Predict Cognitive Functioning in Multiple Sclerosis Patients and Controls

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## 1 Summarized Publication

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## 2 Summary

Event-related potentials (ERPs) show promise to be objective indicators of cognitive functioning. The aim of the study was to examine if ERPs recorded during an oddball task would predict cognitive functioning and information processing speed in Multiple Sclerosis (MS) patients and controls at the individual level. Seventy-eight participants (35 MS patients, 43 healthy age-matched controls) completed visual and auditory 2- and 3-stimulus oddball tasks with 128-channel EEG, and a neuropsychological battery, at baseline (month 0) and at Months 13 and 26. ERPs from 0 to 700 ms and across the whole scalp were transformed into 1728 individual spatio-temporal datapoints per participant. A machine learning method that included penalized linear regression used the entire spatio-temporal ERP to predict composite scores of both cognitive functioning and processing speed at baseline (month 0), and months 13 and 26. The results showed ERPs during the visual oddball tasks could predict cognitive functioning and information processing speed at baseline and a year later in a sample of MS patients and healthy controls. These objective neurophysiological indicators of cognitive functioning and processing speed, and machine learning methods that can interrogate high-dimensional data, show promise in outcome prediction.that can interrogate high-dimensional data, show promise in outcome prediction[1].

## References

1. Jollans, L., Whelan, R.: The clinical added value of imaging: A perspective from outcome prediction. *Biol Psychiatry Cogn Neurosci Neuroimaging* 1(5), 423-432 (2016).