Recurrence Plots
Exemplary application to ERP data
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APPLICATION TO THE DATA OF THE ODDBALL EXPERIMENT

Procedure
Probands were seated in a dimly lit room in front of a monitor and were instructed to count tones of high pitch. Each subject was tested in nine blocks. The blocks varied in the probability of occurrence of the higher tones from 10 to 90%. Each block contained at least 30 target tones. Response was given in a three alternative choice (using cursor keys of the keyboard). During the test, the EEG was recorded.

The stimuli were computer-generated beeps of 100ms length. Tones were either high (1400Hz) or low (1000Hz). They were presented with an ISI of 1000ms.

Data analysis and interpretation
After computing event-related voltage averages for the experimental manipulations (10% up to 90% target probabilities) one observes a P300 ERP component whose amplitude is correlated to the probability of the stimuli (surprise ERP). This ERP reflects the switching between two modal of cognitive behaviour. During the episodes where the frequent stimulus is presented to the subjects, they went into a mode of automatic processing of the events. When switching to the rare stimulus arises, the brain function is switched to controlled processing. The amplitude of the P300 reflects the switching costs.

Spatially RQA measures for the 31 electrodes. The vertical based measures LAM and TT significantly reveal transitions around the electrodes Fz (4) and Cz (18) after the stimulus at 200 ms.

References
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