EEG analysis of local sleep and its relation to lane departures

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Local sleep

- Sleep has been thought of as a global phenomenon, but today it appears as if regions of the brain typically fall asleep at different times.
- The locality depends on prior usage and novelty. For example, a visuomotor task (such as driving) trigger sleep in the posterior parietal regions and a tracking task (such as driving) trigger sleep in motor cortex.
- During periods of local sleep, the eyes are open, the person is responsive to stimuli and the global EEG indicates an awake state.
- If a local brain region that is required for a particular task goes offline, performance errors are expected.

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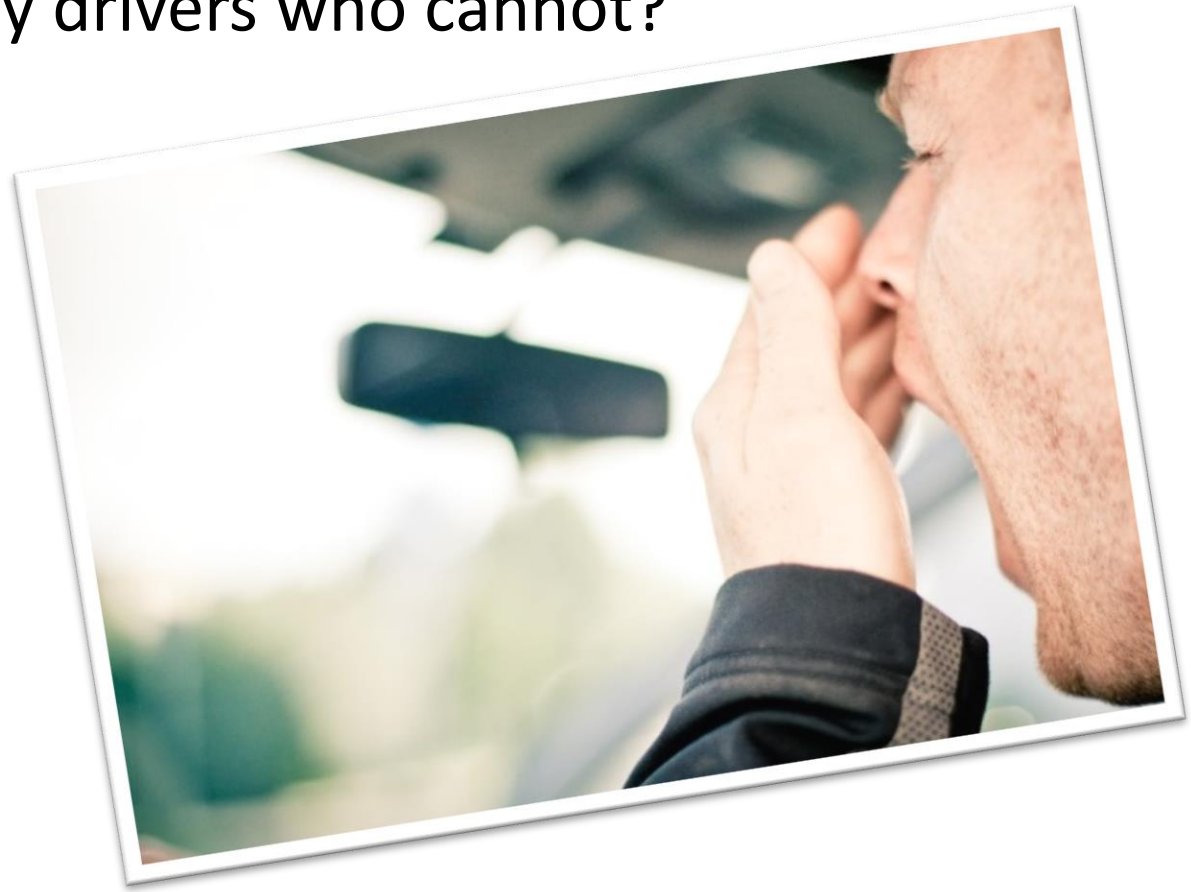
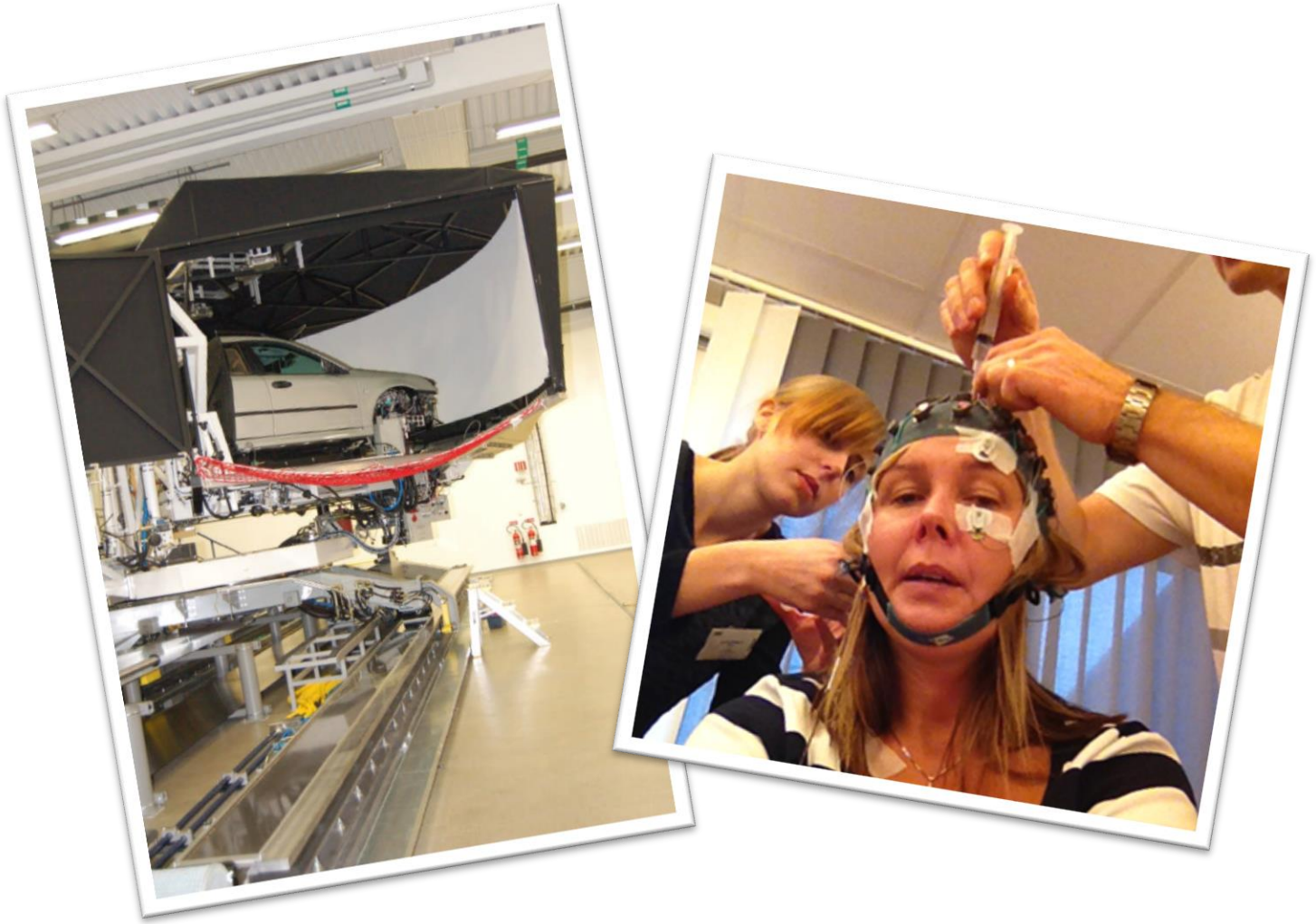
Aims of this experiment

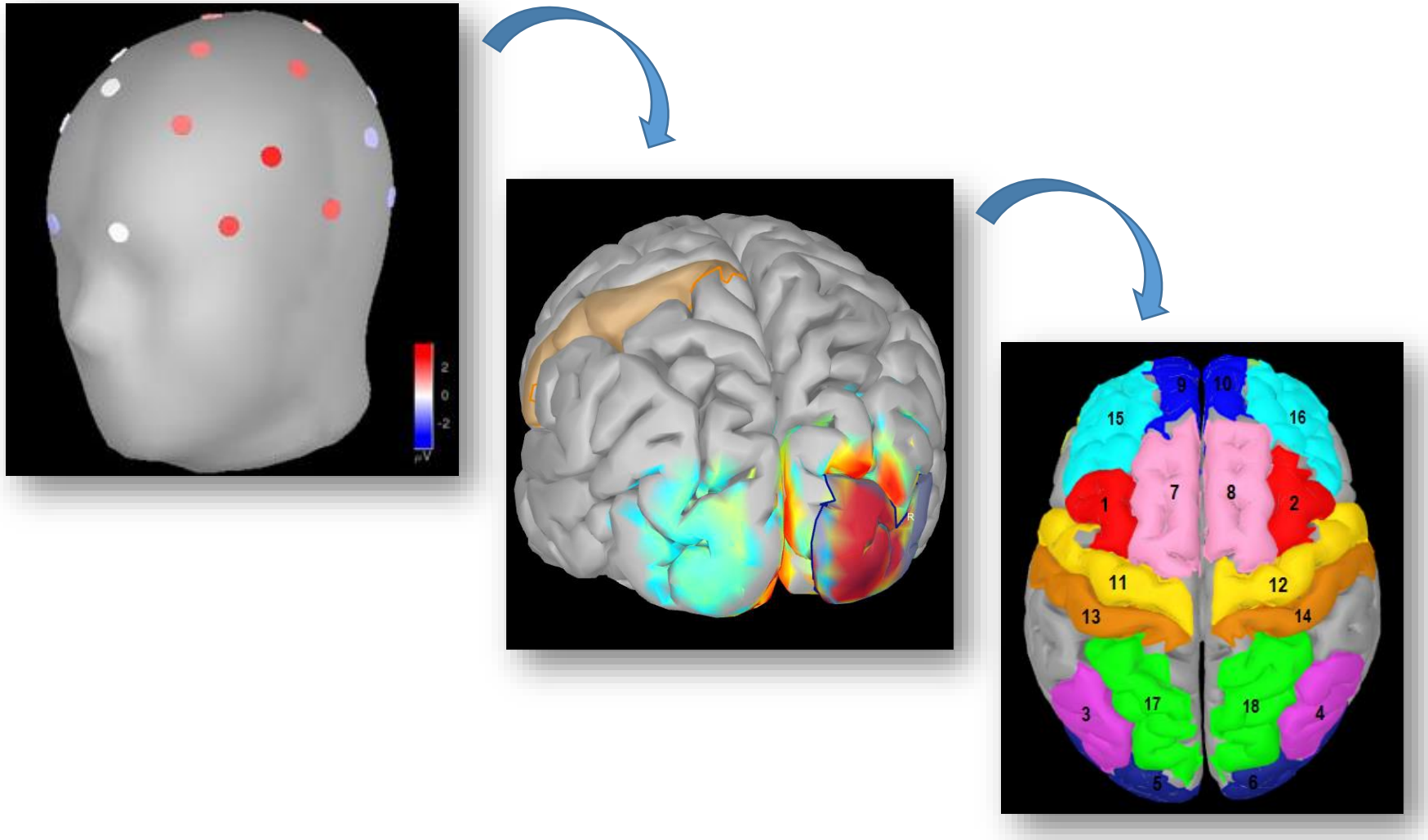
- Can local sleep explain our video?
- Is there a difference between sleepy drivers who can stay on the road versus sleepy drivers who cannot?



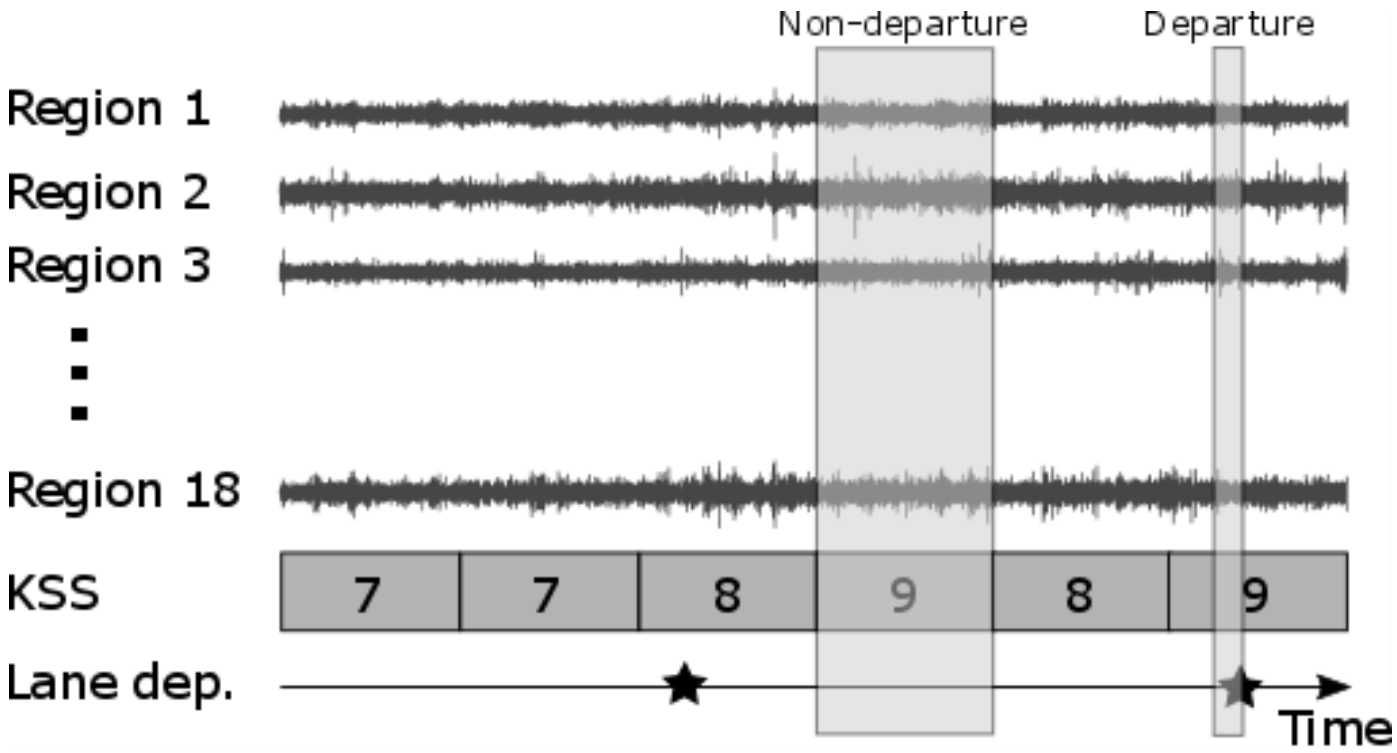
Experiment



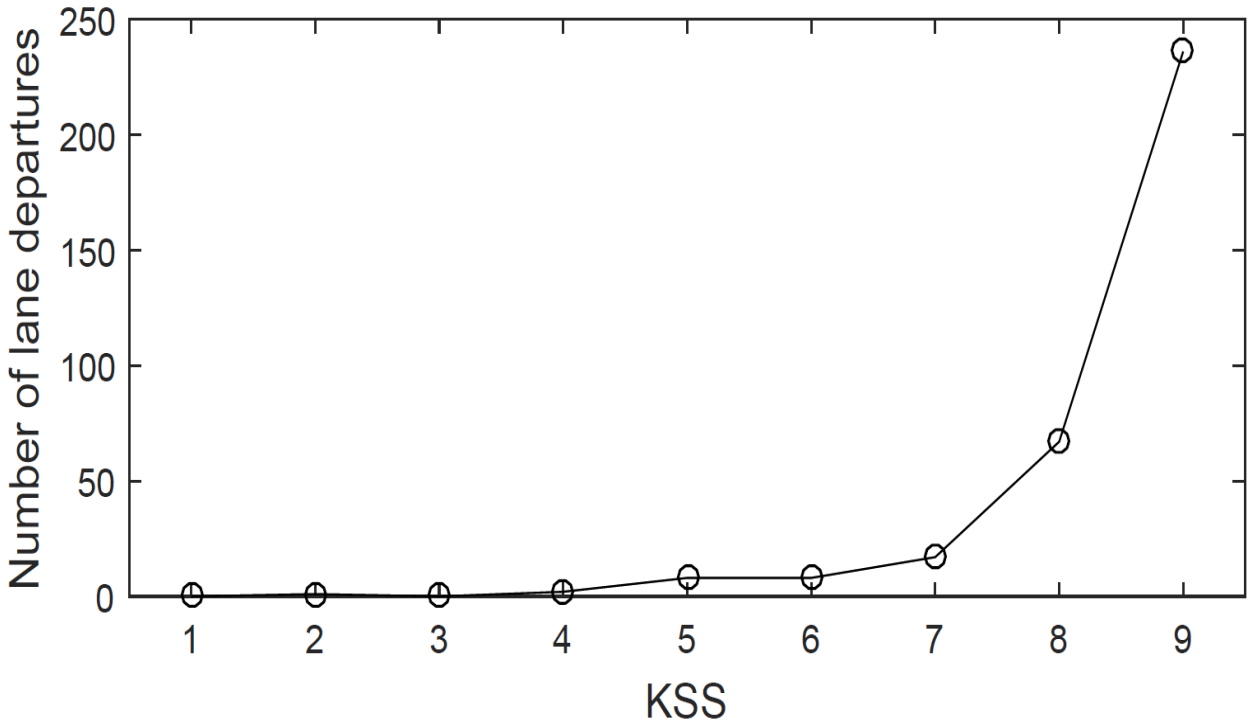
Methodology



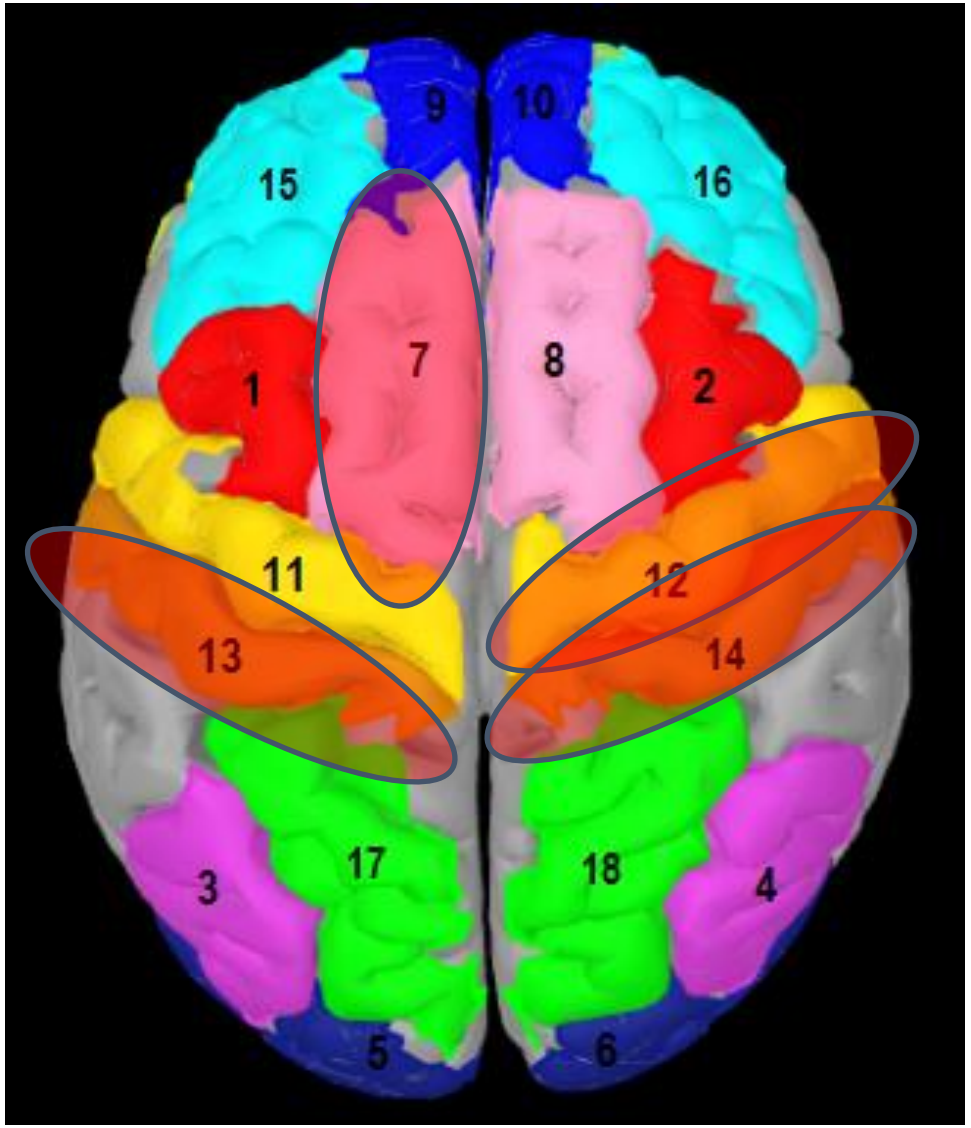
Methodology, continued



Global theta and lane departures increase with sleep deprivation



Results



Limitations and future work

- This is an exploratory study!
- Asymmetry between the left and right hemisphere
- Multiple comparisons of numerous brain regions and segment sizes
- Generalisability of the results – sex, age, real road, …

- Just accepted for publication in Journal of Sleep Research, DOI:10.1111/jsr.12527

Thank you!

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