

# Rocking and Rolling the Brain to Sleep

## Vestibular Stimulation and its Impact on Sleep

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### INTRO

The impact of rocking vestibular stimulation on sleep has garnered interest in the last decade. Two studies indicated that translation during sleep in mice<sup>1</sup> and humans<sup>2</sup> leads to:

- Faster sleep onset
- Increase in N2 in afternoon nap
- Increase in N3 sleep in nighttime sleep
- Decrease in REM sleep for mice with high intensity of rocking
- Increase in sleep spindles (density)
- Higher memory performance

Another study with low intensities using translation and rotation did not find such clear effects<sup>3</sup>.

### AIM & HYPOTHESIS

The present project investigates the impact of passive vestibular motion on sleep and cognitive performance.

To this end, we will conduct two EEG studies:

- Daytime nap
- Nighttime sleep

We expect that rotation during the nap/night will lead to deeper sleep at the cost of wakefulness and light N1 sleep. We also expect that there will be more sleep spindles in the rocking condition, and that memory performance will be better after a night of sleep with rotation.

### STUDY DESIGN

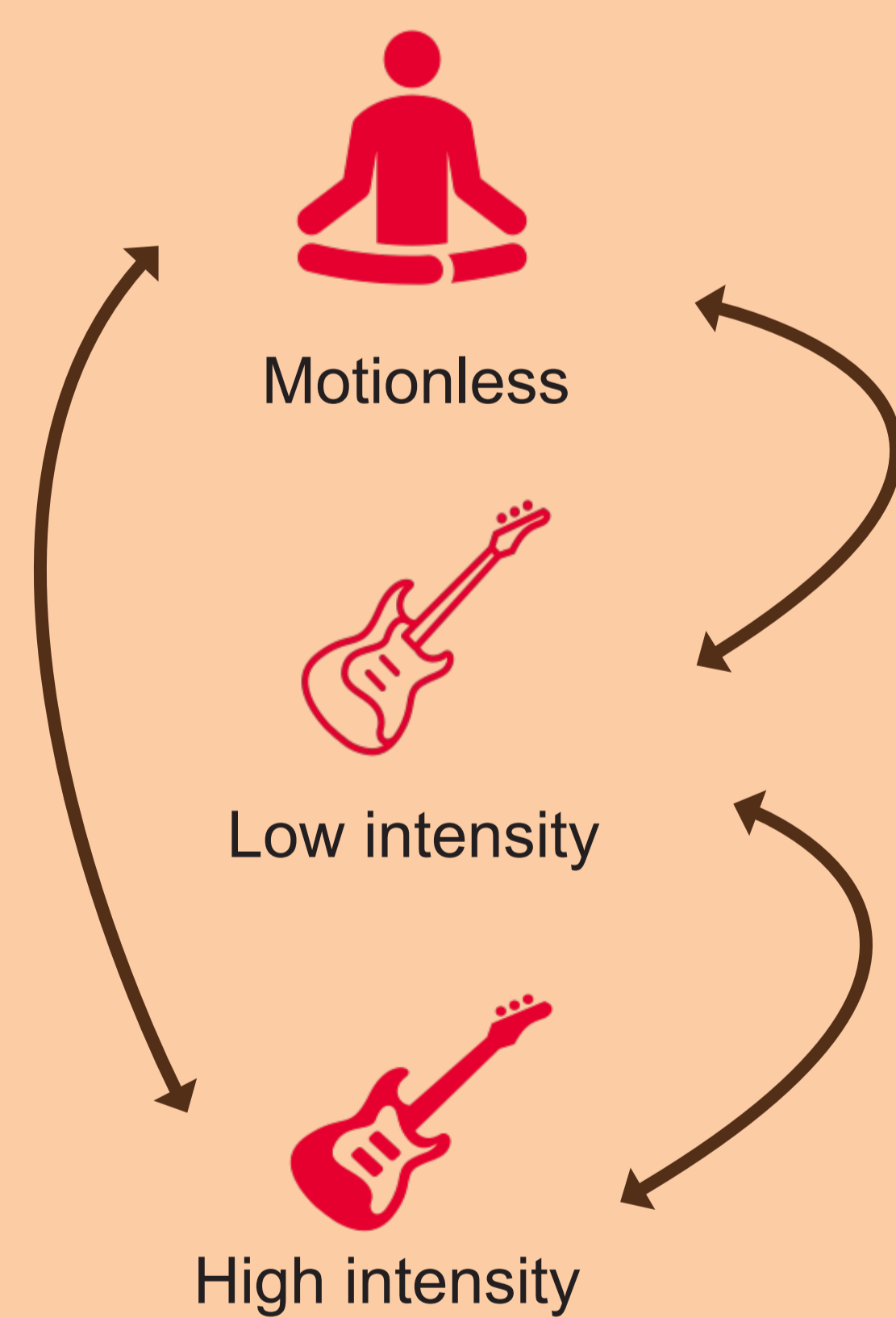
Meeting one week before first nap/night to instruct participants about study design.

#### DAYTIME STUDY

20 healthy participants will be tested during 3 naps on the motion platform.

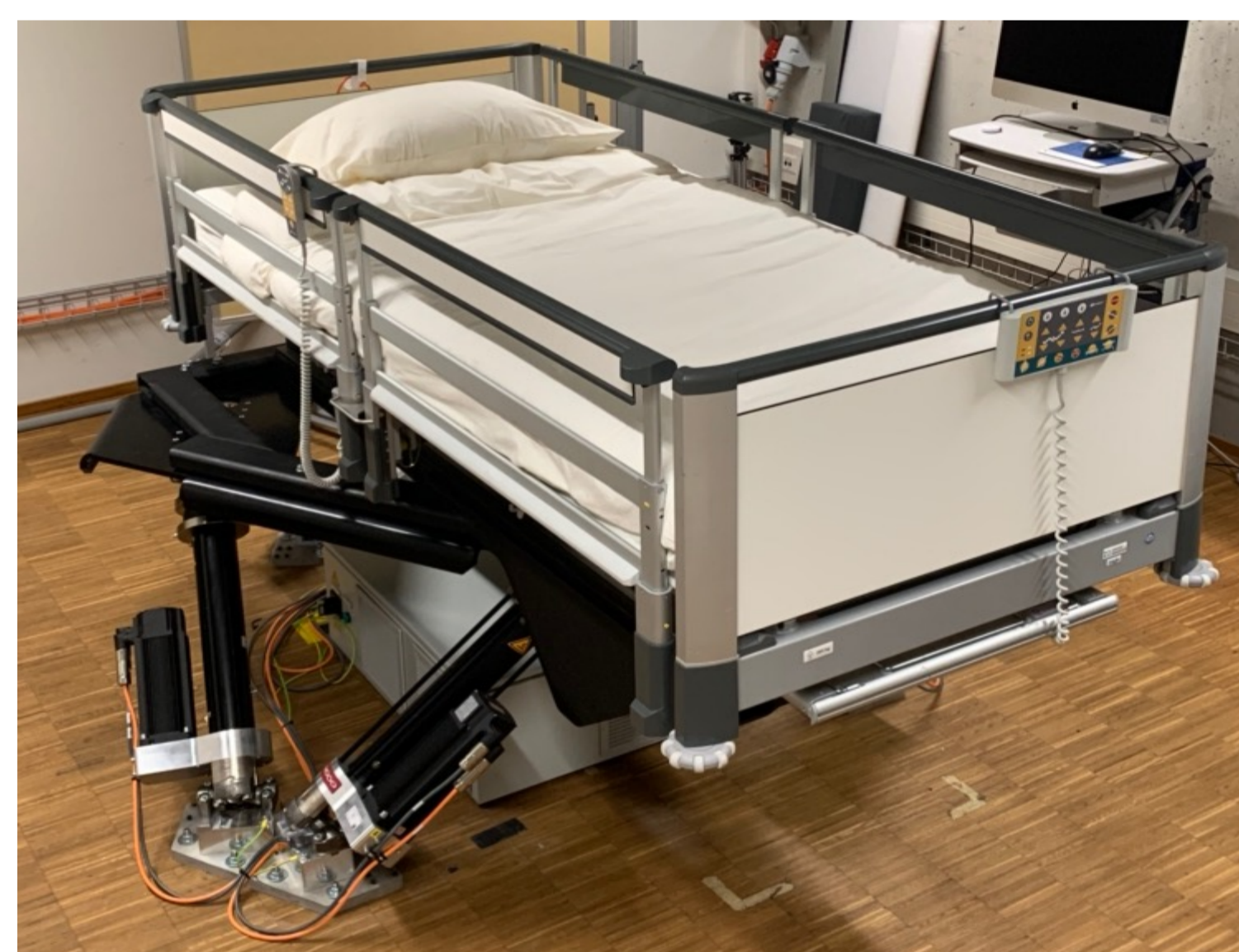
#### EXPERIMENTAL NAPS

- Random order of conditions with a one week washout period
- 1.5 hours bedtime

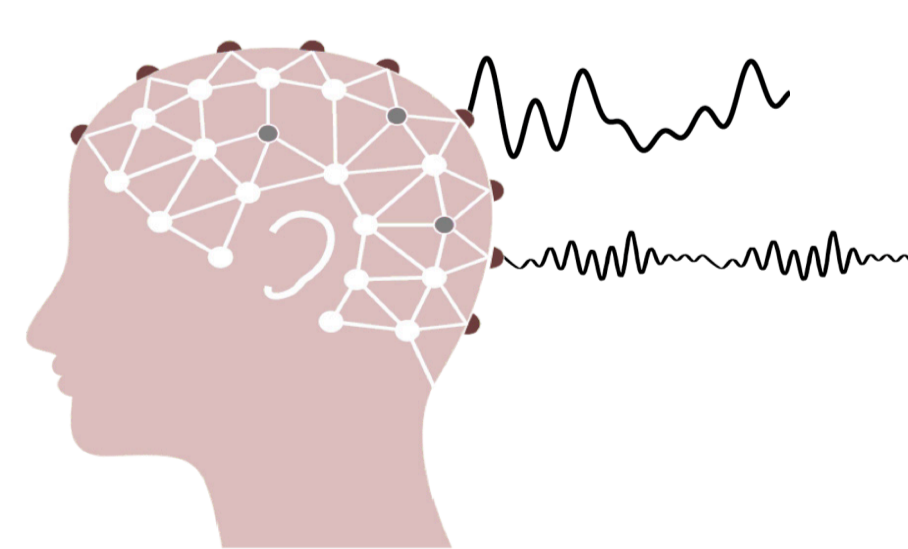


- Dream recall after every nap

#### STIMULATIONS & MEASUREMENT



Cocktail of rotation (yaw, pitch, roll) at .25 Hz during sleep using a bed mounted on a 6 DoF motion platform.



- Wake and overnight 256-EEG recording
- Connectivity analysis and analysis of sleep macro- and micro-architecture

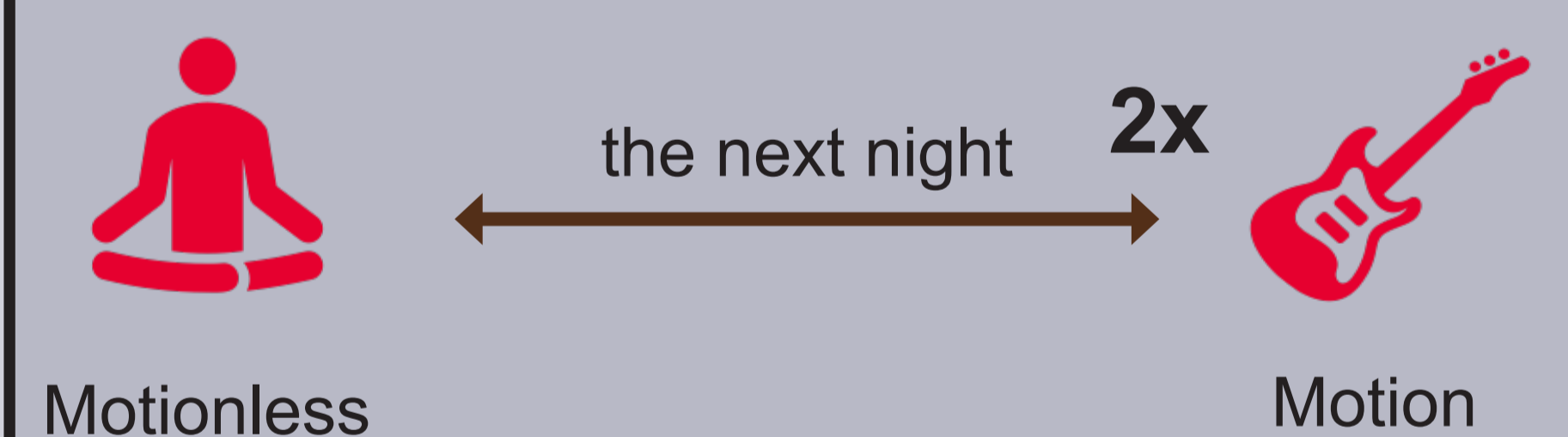
#### NIGHTTIME STUDY

45 healthy participants and 10 vestibular patients will sleep on the motion platform for 4 consecutive nights.

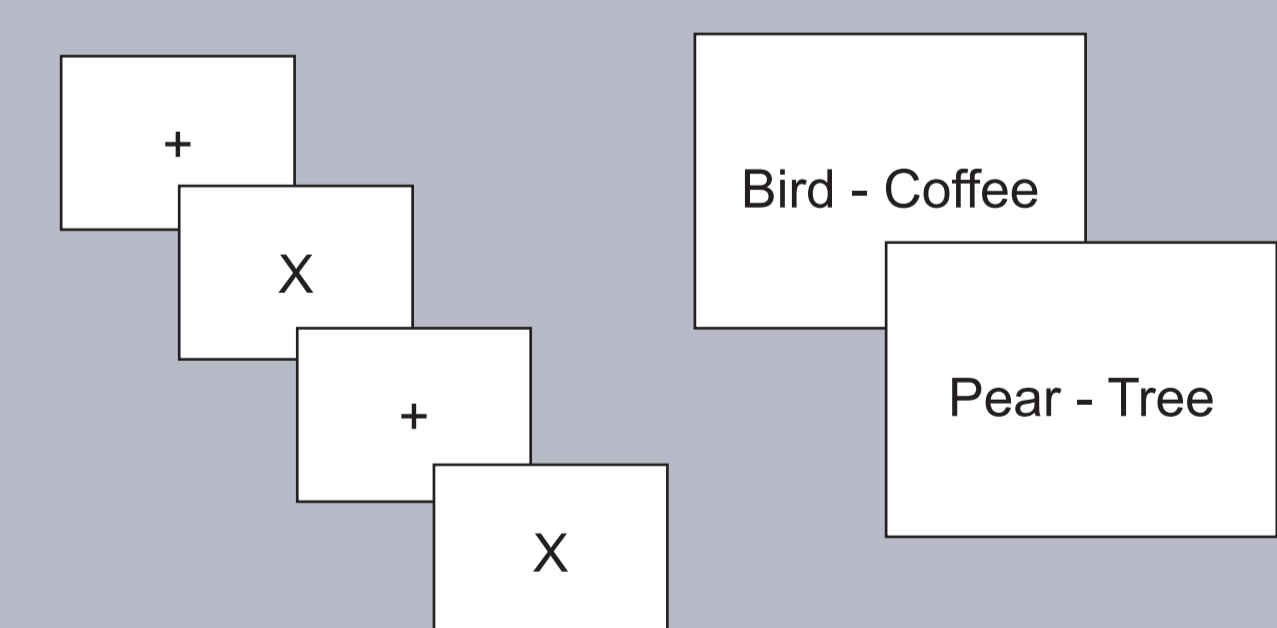


#### EXPERIMENTAL NIGHTS

- Random order of 2 conditions over 3 nights
- 8 hours bedtime



- Dream recall



- Alertness, divided attention & memory tasks before and after sleep

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### REFERENCES

- <sup>1</sup>Kompotis et al. (2019). Current Biology.
- <sup>2</sup>Perrault et al. (2019). Current Biology.
- <sup>3</sup>Omlin et al. (2018). Scientific Reports.

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