



The "Stockholm Sleepy Brain Project" – an update

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Background and aim

Sleepiness is a brain state with pervasive effects on cognitive and affective functioning. However, little is known about the functional mechanisms and correlates of sleepiness in the awake brain. It has been proposed that sleepiness affects functional connectivity between cortical areas, affecting both long-range and short-range connectivity. Furthermore, sleepiness is known to affect emotional processing in the brain, but mechanisms for this effect are largely unknown. This project aims to investigate overall effects of sleepiness on brain function with particular regard to emotional processing.

Method and Design

We investigate the effects of sleep deprivation using a randomized cross-over design. Resting state functional connectivity is being investigated using functional magnetic resonance imaging (fMRI). Emotional contagion is studied using concurrent fMRI and electromyography (EMG) of facial muscles in response to emotional expressions (fig 1a) and empathy for pain is investigated using pictures of others in pain (fig 1b). To study emotional reappraisal, participants have been instructed to actively up-regulate or down-regulate their emotional responses to picture stimuli (fig 1c). These paradigms are well-established but have not previously been studied in the context of sleepiness. The cohort of participants is well characterized using rating scales, biometric information, and blood sampling.

Preliminary findings

86 participants from 2 age groups have participated in the experiment and enrollment is complete. Polysomnographic data show that 77 participants completed intervention successfully (fig 2). Ratings using the Karolinska Sleepiness Scale (KSS) show that sleep deprivation caused increased sleepiness (fig 3).

Conclusion

Data collection has been satisfactorily concluded and we have demonstrated efficacy of the sleep deprivation intervention. Analyses of fMRI data are ongoing. In future perspectives, we aim to extend this project using additional sleep interventions such as sleep stage suppression.

Figure 1a

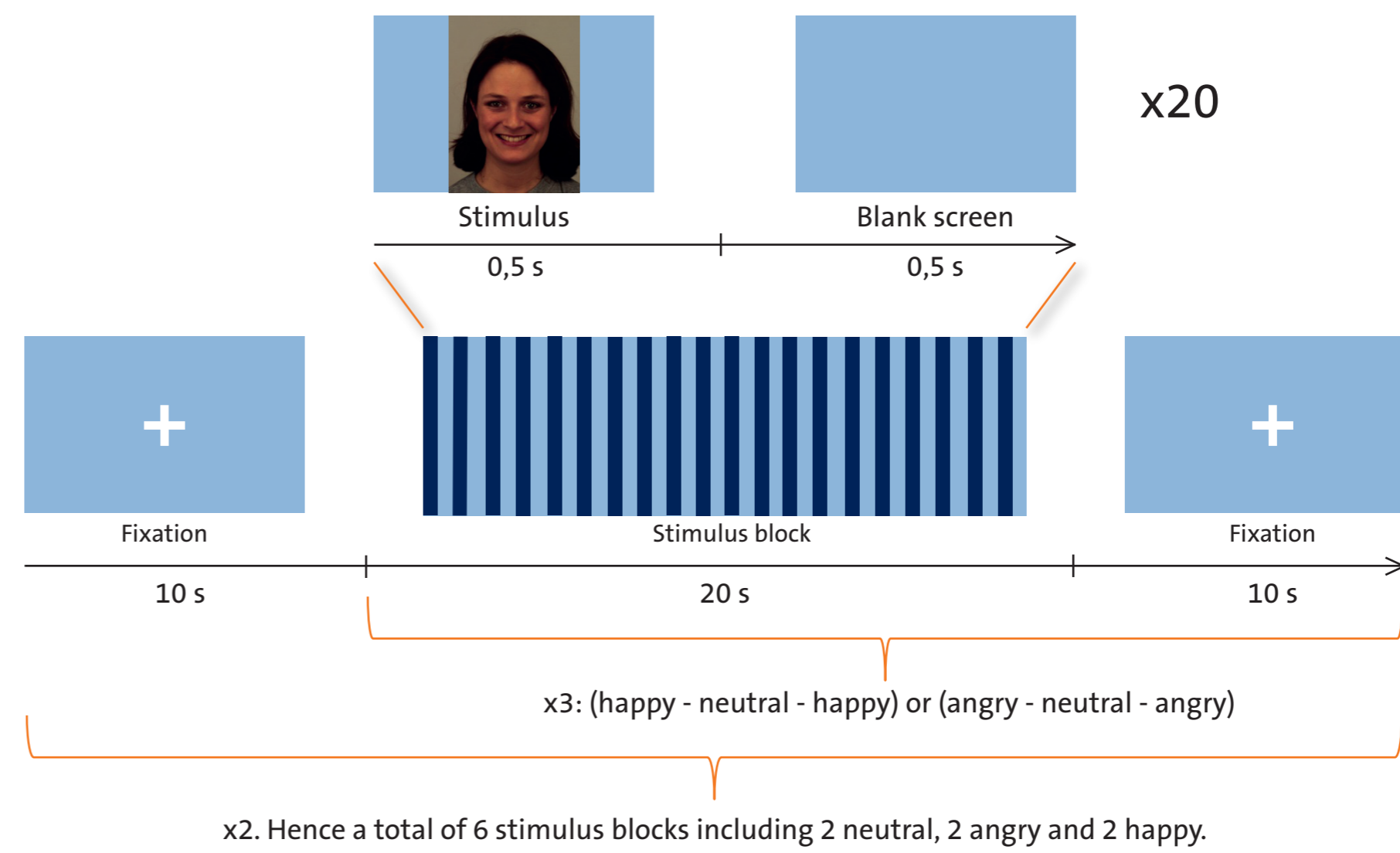


Figure 1b

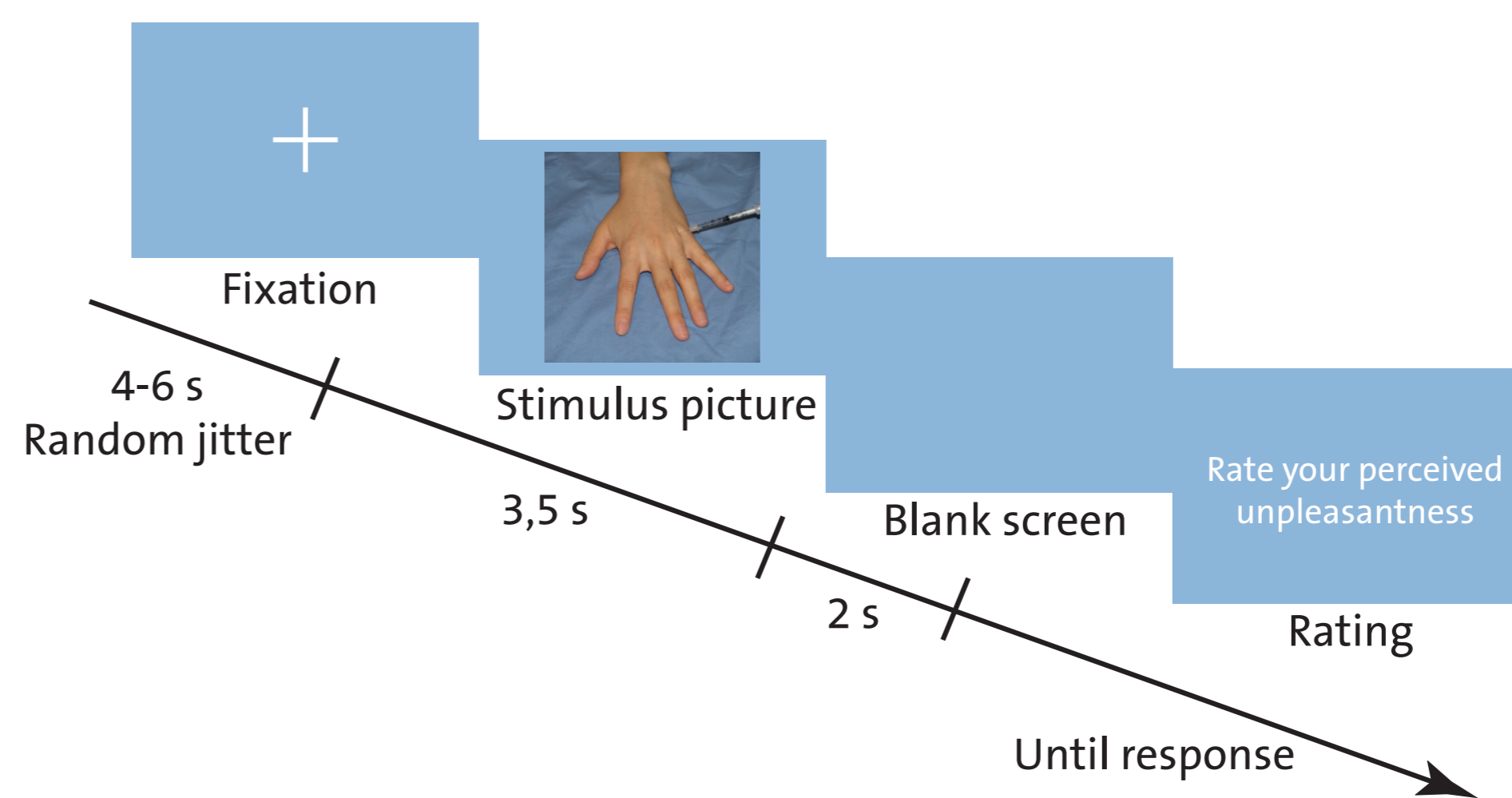


Figure 1c

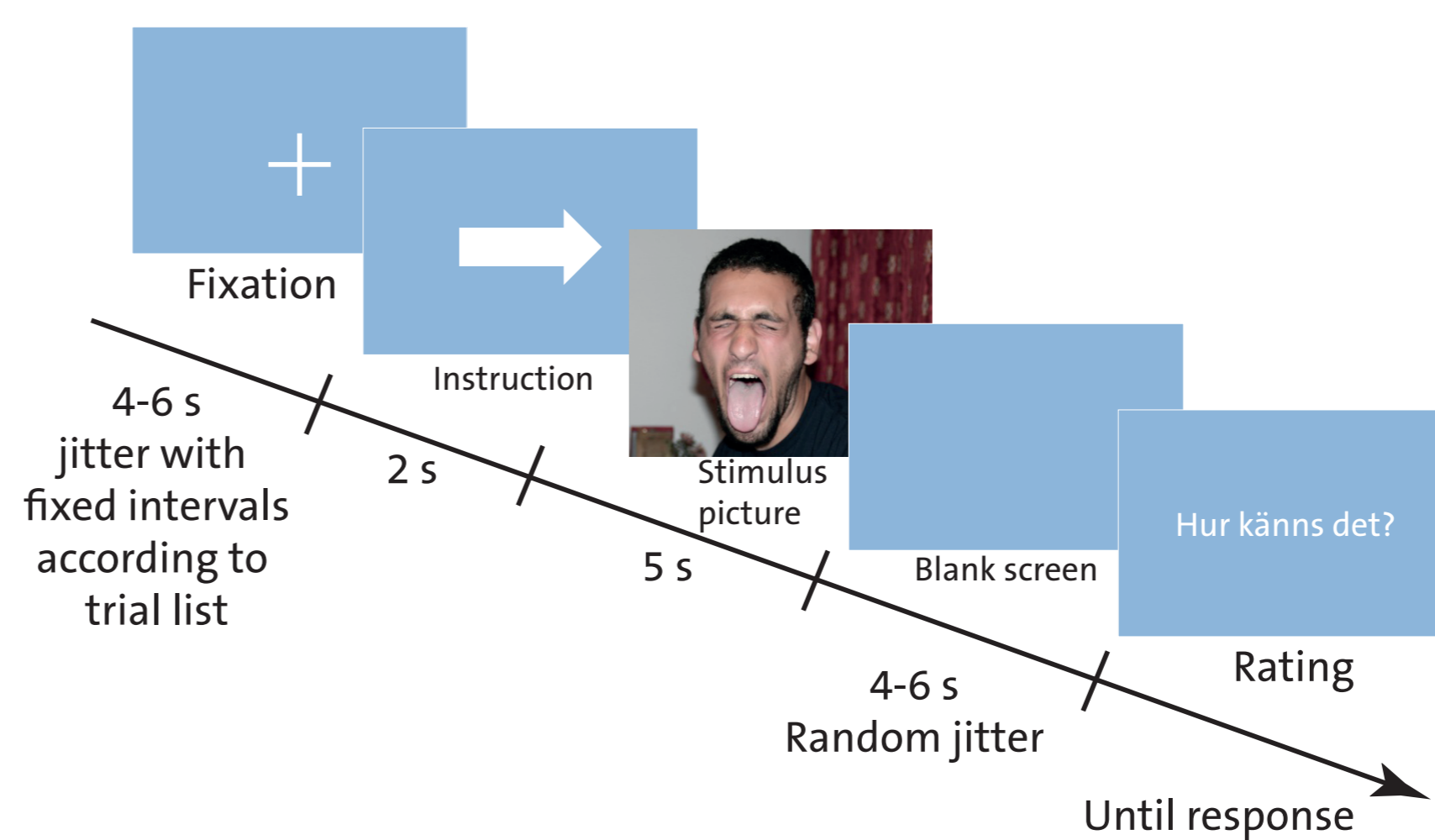


Figure 2

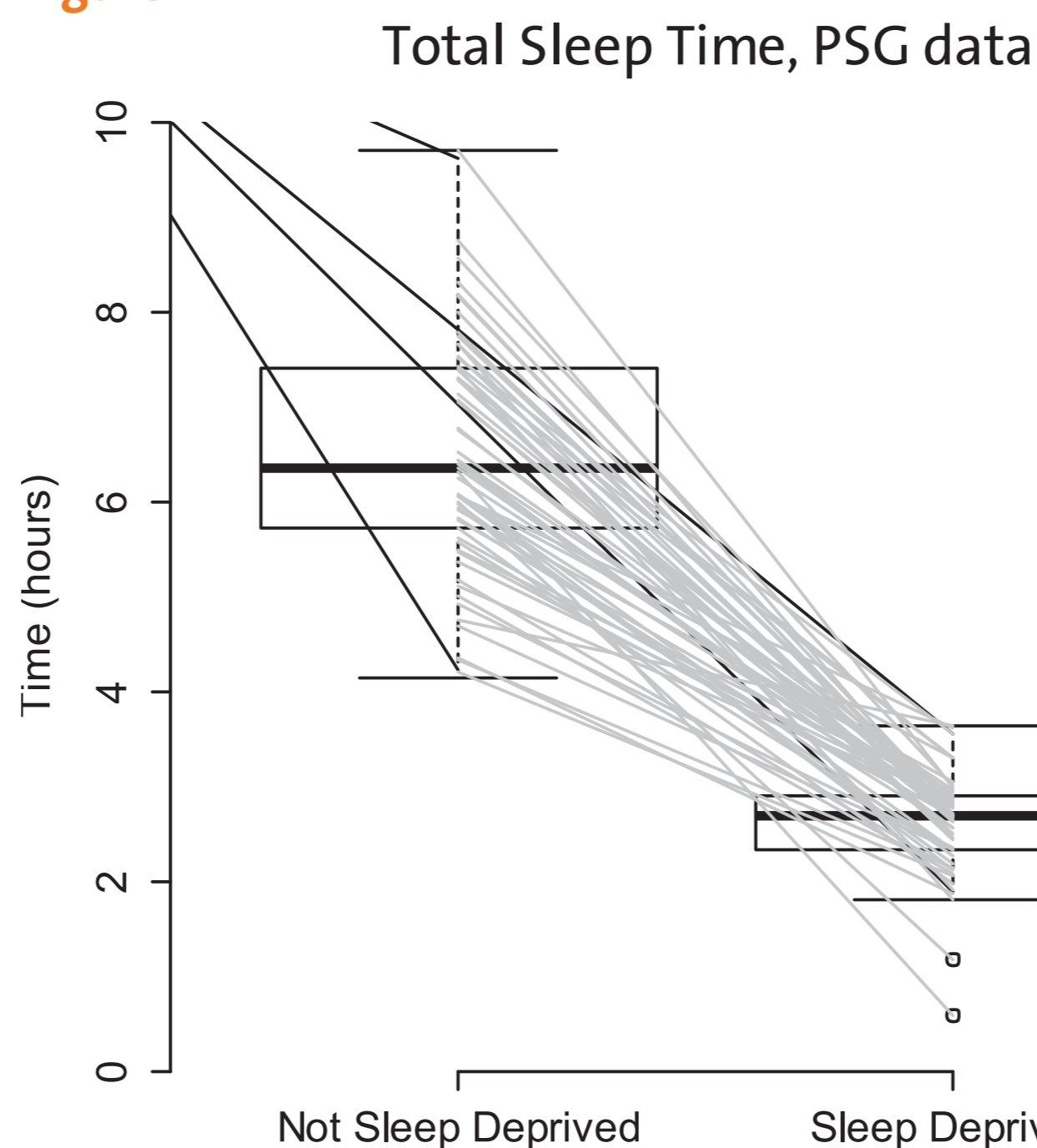


Figure 3

