

Supplementary Materials for ‘Modulating sleep: slow oscillation and spindle stimulation effects on physiology and memory’

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Table S1: Group descriptions. For each condition, average and standard deviation for age, sex ratio and time spent sleeping in NREM2 and NREM3 are reported

Conditions	Age	Sex	NREM2&NREM3 sleep duration
SLEEP	26.8 +/- 7.8	N=20 (F=13, M=7)	73.9 +/- 18.5
SO	23.8 +/- 5.8	N=20 (F=16, M=4)	69.7 +/- 20.2
SPINDLE_DELAYED	24.9 +/- 6.3	N=20 (F=15, M=4)	62.4 +/- 21.4
WAKE	23.3 +/- 3.8	N=20 (F=14, M=6)	0.3 +/- 0.8
SPINDLE	24.5 +/- 4.9	N=22 (F=14, M=8)	78.8 +/- 24.5
ALL	24.6 +/- 5.9	N=102 (F=72, M=29)	
ALL (except Wake)			71.4 +/- 21.8

Author	Subjects	Mean age	Target	Stimuli	Measures	Design	Sleep	Evoked	Behaviour
Ngo, Martinetz, et al. (2013)	N = 11	24.2 (0.9)	SO up-state	2 clicks	Declarative	Within	Night	↑ SO	↑ Declarative
Ngo, Miedema, et al. (2015)	N = 18	23.8 (0.6)	SO up-state	2 clicks	Declarative	Within	Night	↑ SO	↑ Declarative
Ong, Lo, et al. (2016)	N = 16	22 (1.4)	SO up-state	5 clicks	Declarative	Within	Night	↑ SO	↑ Declarative
Leminen et al. (2017)	N = 15	30.5 (N/A)	SO up-state	1 click	Declarative	Within	Night	↑ SO ↑ Spindle	↑ Declarative only
Papalambros et al. (2017)	N = 13	75.2 (N/A)	SO up-state	5 clicks	Declarative	Within	Night	↑ SO ↑ Spindle	↑ Declarative
Ngo, Seibold, et al. (2019)	N = 34	25.1 (3.4)	SO up-state	7 clicks	Declarative	Within	Night	↑ SO ↑ Spindle	No change
Ong, Patanaik, et al. (2018)	N = 37	22.5 (2.3)	SO up-state	2 clicks	Declarative	Within	Nap	↑ SO ↑ Spindle	No change
Henin et al. (2019)	N = 31	23.5 (0.6)	SO up-state	1 click	Declarative Navigation	Within	Night	↑ SO ↑ Spindle	No change
Diep et al. (2020)	N = 24	39.9 (4.2)	SO up-state	continuous clicks*	Declarative Procedural	Within	Night	↑ SO	↑ Working memory in high responders
Schneider et al. (2020)	N = 17	55.7 (1.0)	SO up-state	2 clicks	Declarative Procedural	Within	Night	↑ SO ↑ Spindle	No change
Harrington, Ngo, and Cairney (2021)	N = 12	20.0 (2.0)	SO up-state	2 clicks	Declarative	Within	Night	↑ SO	No change
Koo-Poeggel et al. (2022)	N = 16	25.6 (0.6)	SO down-to up-state	2 clicks	Declarative	Within	Nap	↑ SO ↑ Spindle	No change
Baxter et al. (2023)	N = 20	29.0 (5.0)	SO up-state	1 click	Procedural	Within	Nap	↑ SO ↑ Spindle	No change

Figure S1: Comprehensive review of SO-CLAS experiments. All these studies used 50ms pink noise. The table has been adapted from Table 1 in ?, retaining only studies involving healthy adult participants while incorporating more recent research findings.

Table S2: Correlations between detected and evoked responses in both frequency bands for each stimulation condition.

	SWA evoked	Spindle evoked
SWA detect	SO: $r = 0.73$, $p < .001^{***}$	SO: $r = -0.07$, $p = 0.78$
Spindle detect	SP: $r = -0.02$, $p = 0.93$ SPd: $r = 0.03$, $p = 0.93$	SP: $r = 0.37$, $p = 0.09$ SPd: $r = 0.66$, $p = 0.004^{**}$
SWA evoked	————	SO: $r = 0.08$, $p = 0.75$ SP: $r = 0.27$, $p = 0.22$ SPd: $r = 0.33$, $p = 0.19$

Table S3: Correlations between change in performance on each task and magnitude of evoked response.

	GLT	MSL Accuracy	Piano Pitch	Piano Rhythm
Evoked slow wave activity	SO: $r=-0.05$, $p\text{-value}=0.85$ SP: $r=0.30$, $p\text{-value}=0.17$ SPd: $r=0.10$, $p\text{-value}=0.69$	SO: $r=-0.03$, $p\text{-value}=0.91$ SP: $r=0.29$, $p\text{-value}=0.21$ SPd: $r=0.36$, $p\text{-value}=0.18$	SO: $r=-0.16$, $p\text{-value}=0.51$ SP: $r=-0.21$, $p\text{-value}=0.35$ SPd: $r=0.01$, $p\text{-value}=0.98$	SO: $r=-0.08$, $p\text{-value}=0.75$ SP: $r=0.23$, $p\text{-value}=0.31$ SPd: $r=-0.27$, $p\text{-value}=0.29$
Evoked spindle activity	SO: $r=-0.09$, $p\text{-value}=0.70$ SP: $r=0.12$, $p\text{-value}=0.60$ SPd: $r=-0.11$, $p\text{-value}=0.68$	SO: $r=-0.22$, $p\text{-value}=0.39$ SP: $r=0.27$, $p\text{-value}=0.23$ SPd: $r=0.45$, $p\text{-value}=0.09$	SO: $r=-0.35$, $p\text{-value}=0.13$ SP: $r=-0.50$, $p\text{-value}=0.02^*$ SPd: $r=-0.06$, $p\text{-value}=0.82$	SO: $r=-0.16$, $p\text{-value}=0.49$ SP: $r=0.26$, $p\text{-value}=0.25$ SPd: $r=-0.57$, $p\text{-value}=0.02^*$