

	Rat ID	CONTROL		OPTO _{SO+}		OPTO _δ
		OPTO _{OFF}	OPTO _{RAND}	OPTO _{SO}	OPTO _{SO+δ}	
Contribution (number of sessions)	1	3	-	3	-	3
	2	3	-	3	-	3
	3	3	-	3	-	4
	4	2	-	2	-	2
	5	2	2	2	-	2
	6	1	3	-	1	-
	7	1	4	-	1	-
	8	1	-	-	4	-
	9	2	-	-	2	-
	10	2	-	-	2	-
	11	1	-	-	1	-
	12	2	-	-	2	-
	Total	23	9	13	13	14

Table S1. The number of sessions contributed by each rat to the respective experiment types. Related to Figures 1-7. The behavior results for rat ID #8-12 were partially published in the previous study (Gulati et al., 2017), and we reanalyzed the data from these animals in regards to interactions between SO/δ waves and spindles, and reactivations in this study.

		Online detection			
		SO	δ	None	Total
Offline detection	SO	76.9 ± 3.6 %	10.9 ± 3.1 %	12.2 ± 2.0 %	100 %
	δ	24.2 ± 2.9 %	70.0 ± 3.0%	5.8 ± 2.5 %	100 %

Table S2. Comparison of online detections to offline detections for SO and δ waves. Related to Figures 2 and 3.

	Sleep	CONTROL	OPTO _{SO+}		OPTO _δ
			OPTO _{SO}	OPTO _{SO+δ}	
SO rate (#/min)	Pre-	23.89 ± 1.42	26.96 ± 1.86	20.91 ± 1.85	22.91 ± 0.92
	Post-	24.82 ± 1.52	25.63 ± 0.95	21.23 ± 1.89	24.14 ± 1.00
SO peak-trough amplitude (z-score)	Pre-	4.97 ± 0.09	5.06 ± 0.08	4.81 ± 0.07	5.01 ± 0.09
	Post-	4.98 ± 0.08	5.09 ± 0.09	4.77 ± 0.08	4.99 ± 0.09
SO (0.1~1 Hz) average power (dB)	Pre-	-9.04 ± 0.51	-10.34 ± 0.67	-7.94 ± 0.22	-10.16 ± 0.44
	Post-	-9.61 ± 0.47	-10.65 ± 0.52	-8.32 ± 0.23	-10.88 ± 0.53
δ rate (#/min)	Pre-	58.61 ± 1.05	60.42 ± 1.35	55.83 ± 0.82	59.61 ± 0.87
	Post-	60.55 ± 0.86	61.48 ± 1.04	58.40 ± 1.06	61.11 ± 0.77
δ peak-trough amplitude (z-score)	Pre-	2.66 ± 0.05	2.76 ± 0.06	2.57 ± 0.07	2.85 ± 0.03
	Post-	2.74 ± 0.06	2.84 ± 0.02	2.75 ± 0.02	2.89 ± 0.01
δ (1~4 Hz) average power (dB)	Pre-	-4.95 ± 0.38	-4.18 ± 0.41	-6.35 ± 0.74	-4.22 ± 0.26
	Post-	-4.67 ± 0.41	-4.20 ± 0.46	-5.35 ± 0.49	-4.32 ± 0.45
Spindle rate (#/min)	Pre-	10.93 ± 0.38	11.33 ± 0.57	11.13 ± 0.47	10.26 ± 0.24
	Post-	10.93 ± 0.36	11.18 ± 0.33	11.68 ± 0.29	10.88 ± 0.51
Spindle peak amplitude (z-score)	Pre-	4.05 ± 0.12	3.85 ± 0.07	4.02 ± 0.13	3.77 ± 0.08
	Post-	4.00 ± 0.15	3.80 ± 0.07	3.89 ± 0.11	3.72 ± 0.06
Spindle (10~14 Hz) average power (dB)	Pre-	-12.80 ± 0.50	-12.95 ± 0.73	-11.64 ± 0.55	-12.62 ± 0.68
	Post-	-12.58 ± 0.56	-12.87 ± 0.73	-11.27 ± 0.63	-13.52 ± 0.71
Baseline spindle rate (#/min)	Pre-	2.43 ± 0.23	2.51 ± 0.30	2.02 ± 0.21	2.53 ± 0.21
	Post-	2.68 ± 0.23	2.81 ± 0.30	2.05 ± 0.11	2.25 ± 0.26

Table S3. Sleep waves activity in the respective experiment types. Related to Figures 1-7.

The mean ± s.e.m. of activities of SO, δ waves, and spindles are presented in the table. Values upper and lower from the dashed line are for pre-training sleep and post-training sleep, respectively, in each parameter and each condition. Amplitude activity is normalized by subtracting mean and dividing by standard deviation in each individual sleep block. Baseline spindles are spindles which were nested neither to SO and δ waves.