

Supplementary Material

Legends for videos S1-S4

A cognitive-related neural oscillation pattern, generated in the prelimbic cortex, can control operant learning in rats

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Video S1. Operant conditioning with pattern-evoked cue. Animals were trained to activate the presentation of a square virtual button on an iPad® screen by the generation of a θ/β - γ transition pattern selected from LFPs recorded in the PrL cortex. Ten different examples are presented. LFP recordings corresponding to the illustrated behaviors are shown at the bottom. The presentation of the selected pattern is indicated by a red circle. The moment when the animal touched the screen is indicated with a red dot located near the feeder, at the same time that the food pellet is delivered.

Video S2. Operant conditioning with pattern-evoked cue using a wireless recording system. The same as for Video 1, but using a wireless recording system.

Video S3. A slow-motion presentation of an operant conditioning sequence with pattern-evoked cue. A representative sequence of operant conditioning using the selected θ/β - γ transition pattern to trigger the presentation of a visual display on an iPad® screen device. The animal was rewarded with a food pellet after touching the screen. The observed behaviors are indicated on the left, while the corresponding changes in power in the θ band (0-12 Hz) are indicated on the right, including the real (1 s) time scale. The total duration of the video is represented at the bottom.

Video S4. Effects of the electrical stimulation of the PrL cortex during operant conditioning. Animals were conditioned to press the square virtual button presented automatically on an iPad® screen to obtain a small pellet of food. The experimental animal was stimulated at the moment of touching the screen as indicated by the presentation of a red dot at the top left of the video. Electrical stimulation consisted of 200 Hz, 200 ms, double negative-positive 50 μ s pulses. A total of eight examples are presented. Note that the animal did not look for the pellet after stimulus presentation. Some examples of normal sequences from touching the screen and moving to the feeder, collected from a non-stimulated animal, are presented (a total of 36 s) at the beginning of the video.