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A brain activity to control switching among perceptual states for Ambiguous Apparent Motion

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In this presentation, we report a brain activity correlating with a controllability of switching among perceptual state for ambiguous apparent motion (AAM). Because the perception fluctuates nevertheless the physical stimulus is same, many researches using this stimulus are accumulated by many brain scientists to declare pure brain activity reflecting visual awareness. However in the following researches, this perceptual switching phenomenon is regarded as a phenomenon, which is difficult to control by will. Here we observed controllability of switching with changing the Stimulus Onset Asynchrony (SOA) as 100,200,300,400,500ms, then it is observed that the percentage of controllable trials show extreme increase from ~0 % to ~100% near 300ms as the threshold. Here, the possibility that there are occurring eye movements is checked. Next, we measured MEG for brain activity when presenting stimuli having SOA as 500ms, and calculated Root Mean Square (RMS). Then, we aimed at the difference of magnetic fields evoked by 4 flips included in main stage among perceived motion patterns, and examined whether the evoked magnetic field strengthen for the motion patterns at the timings of perceptual switching between vertical and horizontal motion than others. As the result, it is observed that peaks in window 300-400,400-500 ms showed relevant modulation for perceptual switching and 0-100,100-200,200-300 ms not. From these results, the RMS peak in 300-400ms is suggested to relate with the control of switching of perception for AAM.

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Bilateral Cerebellar Ablation Does not Impair Trace Eyeblink Conditioning in Mice

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Cerebellar dependency of the eyeblink conditioning has extensively been investigated in delay paradigm in rabbits, which does not necessarily require the hippocampus. However, there are only a few works studying about cerebellar involvement in trace paradigm, which greatly depends on the hippocampus. We have found that the cerebellar mutant mice, which lack the glutamate receptor δ2 subunit, show a severe impairment in delay paradigm but can learn trace paradigm despite their severe abnormalities in the cerebellar cortex. In this study, we investigated the effect of bilateral cerebellar ablation on trace eyeblink conditioning in wild-type mice. We have already found that cerebellar lesion made *before.* conditioning does not impair delay conditioning but does if made *after.* the conditioning in wild-type mice.We used C57BL/6J male mice that received bilateral cerebellar aspiration. After two weeks of recovery, they were conditioned for 10 days in trace paradigm using 1-kHz tone (350 ms) and periorbital shock (100 ms) with a trace interval of 500 ms. They learned as well as the non-lesioned control mice. There were no significant differences in the frequency of occurrence of the adaptive conditioned responses or their temporal pattern between the lesioned and the control mice. This result is consistent with the trace conditioning in the cerebellar mutant mice and also with the delay conditioning in cerebellum-ablated wild-type mice. The effect of post-conditioning cerebellar ablation on trace conditioning is now under investigation.

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Depth perception in Plaid pattern motion and in Crossed barber-pole Illusion

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Nakamura (2005) declared that component (transparent) motion can be perceived in plaid pattern motion with no depth clue and with no asymmetrical difference between the two gratings. They are oriented perpendicularly and the luminances of the bars are monotonically the same. The spatial frequency and the width (duty cycle) of the gratings are the same and they drift with the same sliding speed. Those properties satisfied the condition for the integration of local motion information, however the perception is bistable. In the component motion the two gratings are perceived to move in the opposite direction, not perpendicularly to their orientations. They seem just like as a couple of barber-pole motions were crossed each other. Nakamura (2005) experimentally confirmed that the perceiving rate of component motion is dependent on the elongation rate of rectangular window, the spatial frequency of gratings and the width of bars. He suggested that the perceiving rate should be related to the contour perception and/or the depth one along the edge of window frame. It will be presented that the depth perception along the window edges is experimentally confirmed. The "kinetic depth capture" will be applied, which was originally derived from the "stereo capture". Nakamura, T., (2005), Aperture problem in plaid patterns and depth perception, VISION, 17(3), 169-183 (in Japanese).

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Exploratory behavior in pill bugs whose antennae wear the artificial attachments.

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Recently it has been revealed that the antennae of pill bugs (*Armadillidium vulgare*, Isopoda, Crustacean) play an important role to explore the environment [1] and suggested that they have the cognitive ability to evaluate the environment [2]. The computer simulation on the model of the cognitive mechanism reproduced the real bug's behavior well [3]. In this study, the flexibility of the antennal cognitive function was investigated. Their antennae were extended by mascara or covered with silicon tubes of which the surfaces had various texture (bristly, fluffy etc.) and the individuals were placed in a circular runway for two hours respectively. It was observed apparently that the patterns of antennae's movement and individual's walking continued to change. The quantitative results (e.g., analysis of cross-correlation between the patterns of antennae's movement and individual's walking) are presented at the meeting.[1] Moriyama, T. & Migita, M. (2004) *AIP Conference Proc.*, 718, 459-464.[2] Moriyama, T., Riabov, V. B. & Migita, M. (2005) *Cognitive Studies*, 12, 188-206.[3] Migita, M. & Moriyama, T. (2004) *AIP Conference Proc.*, 718, 451-458.