

Motion-assist devices for sensorimotor learning using a rat experimental model

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Developed rat-learning experimental apparatus. Credit: Advanced Industrial Science and Technology

Researchers have demonstrated that learning effectiveness can be improved by assisting stimulus-response motion in a timely manner. Rats learned more rapidly when an external force was applied to cause an incorrect response motion, than when such a force was applied to cause a correct response motion.

Air-pressure stimuli were applied to one forepaw of a rat. The number of days for the rat to learn the correct forepaw (an error rate of less than 15 %) was investigated by varying the timing of <u>intervention</u> and the



target forepaw for intervention (on the correct response side or the incorrect response side). The results showed that such intervention influenced learning effectiveness. The learning time frame was less when intervention produced an incorrect motion than when intervention produced a correct motion. The intervention was effective when applied just before the rat responded spontaneously.

In recent years, rehabilitation techniques using robotic technology-based motion-assist devices have been expected. It is difficult to verify their effectiveness on humans, due to differences in disability level and the level of motivation for training. However, the effectiveness of training on small animals can be verified by creating damage with high reproducibility. There have hitherto been no experimental models able to evaluate the effectiveness of motion-assist devices.

The researchers will investigate neural mechanisms in the rehabilitation processes by training <u>rats</u> with hemiplegia from a stroke using the developed <u>motion</u>-assist device. Thus they will contribute to the improvement of <u>rehabilitation techniques</u> based on neuroscientific knowledge.





Effect of the timing of intervention (performance on the 4-th and 5-th training days). Credit: Advanced Industrial Science and Technology

Provided by Advanced Industrial Science and Technology

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