

Learning through mere exposure

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In cooperation with colleagues from the Leibniz Institute for Employment Research of the TU Dortmund, neuroscientists in Bochum have demonstrated that human visual perception and attention can be improved without training. In *Current Biology* they report that the sense of vision can be lastingly changed by merely exposing subjects to visual stimuli for a short period of time. Thereby the frequency of the stimulus presentation determines whether perception and attention are enhanced or impaired.

What was previously known from animal studies has thus for the first time been demonstrated for human individuals too. "The findings open new perspectives in the intervention and treatment of visual perceptual disorders, because the changes can be induced quite simply" said Dr. Christian Beste of the RUB Institute of Cognitive Neuroscience.

New perspectives in learning

"The gold standard to achieve a lasting change in behaviour and perception is by means of training and practice, which intensively stimulates the brain" explains PD Dr. Hubert Dinse from the RUB's Institute of Neuroinformatics. "In case of learning through passive stimulation, training is replaced by stimulus exposure, but in order to be effective, it has to conform to specially adapted timing." As the scientists have shown, visual perception is impaired after slow visual stimulation, whereas rapid stimulation leads to improved perception. "In this way, we can determine the direction of learning processes by simple selection of the stimulation frequency" Dinse sums up. The changes

were remarkably stable, as the effects remained unchanged for ten days.

From animal models to humans

From animal experiments it is known that stimulating [nerve cells](#) electrically with either high or low frequency strengthens or weakens connections between cells, which is the foundation of learning and plasticity. In humans, changes in behaviour and perception are usually evoked by prolonged practice. The findings of the Bochum and Dortmund neuroscientists suggest that instead of training or electrically stimulating cells, selective behavioural changes can be evoked in humans by using equivalently timed visual stimulation of only forty minutes duration.

Making stimuli stronger or weaker

"Whether a sensory event is able to attract attention depends on its strength" states Beste. According to some models, different sensory events compete with each other and only the strongest influence our behaviour. Using passive visual stimulation, depending on the frequency, stimuli can be weakened or strengthened, thus changing the attentional process.

More information: Beste C, Wascher E, Güntürkün O, Dinse, H (2011) Improvement and Impairment of Visually Guided Behavior through LTP- and LTD-like Exposure-Based Visual Learning. Current Biology. [doi:10.1016/j.cub.2011.03.065](https://doi.org/10.1016/j.cub.2011.03.065)

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