

Why an alerted person counts for two

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It was already known that people respond faster when prepared. However Dutch researcher Jan-Mathijs Schoffelen has now unravelled the mechanism in the brain behind this phenomenon. Transmitting and receiving neurons synchronise with each other so that the stimulus is transmitted more efficiently.

Neurons in the nervous system appear to function like cogs. If cogwheels can interlock well they rotate more smoothly. The parallel phenomenon in neurons is the rhythm of the transmitting and receiving neurons being synchronous (coherence). When the signal arrives, the receiving neuron is extra sensitive for the stimulus.

Schoffelen, a neuroscientist, demonstrated a greater level of coherence between the brain and spinal cord in prepared people. Consequently they had a faster response time than when they were not prepared for an action. The coherence occurred slightly earlier than the actual transmission of the stimulus, which indicates the presence of an active process.

Study subjects had to look at moving rings on a screen. They were asked to respond to changes in the speed of movement by moving their arms. By doing this Schoffelen manipulated the probability distribution for this change in speed. This increased or decreased over the course of time. In the 'practice session' the study subjects were trained on one of these probability distributions. The higher the probability of a change, the shorter the response time of the volunteers.

Coherence between the spinal cord and the brain was also found to reveal which areas of the brain are active during certain movements. This is a highly promising application, as the techniques used are not harmful to the body. Schoffelen made external measurements of the brain using magneto-encephalography (MEG) and external measurements of the electrical activity of the spinal muscles using electromyography (EMG). Schoffelen's research was funded by NWO Division for Earth and Life Sciences.

Source: NWO

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