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Neural activity in the brain is harder to disrupt when we are aware of it

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We consciously perceive just a small part of the information processed in the brain – but which information in the brain remains unconscious and which reaches our consciousness remains a mystery. However, neuroscientists Natalia Zaretskaya and Andreas Bartels from the Centre for Integrative Neuroscience (CIN) at the University of Tübingen have now come one step closer to answering this question.

Their research, published in *Current Biology*, used a well-known visual illusion known as 'binocular rivalry' as a technique to make visual images invisible. Eyes usually both see the same image – binocular rivalry happens when each eye is shown an entirely different image. Our brains cannot then decide between the alternatives, and our perception switches back and forth between the images in a matter of seconds. The two images are 'rivals' for our attention, and every few seconds they take turns to enter our consciousness.

Using this approach the two scientists used a moving and a static picture to cause perceptual alternations in their test subjects' minds. Simultaneously they applied magnetic pulses to disturb brain processing in a 'motion area' that specifically processes visual motion. The effect was unexpected: 'zapping' activity in the motion area did not have any effect on how long the moving image was perceived – instead, the amount of time the static image was perceived grew longer.

So 'zapping' the motion area while the mind was unconsciously processing motion meant that it took longer for it to become conscious

of the moving image. When the moving image was being perceived, however, zapping had no effect.

This result suggests that there is a substantial difference between conscious and unconscious motion representation in the brain. Whenever motion is unconscious, its neural representation can easily be disturbed, making it difficult for it to gain the upper hand in the rivalry. However, once it becomes conscious it apparently becomes more resistant to disturbance, so that introducing noise has no effect. Therefore, one correlate of conscious neural codes may be a more stable and noise-resistant representation of the outside world, which raises the question of how this neural stability is achieved.

More information: Natalia Zaretskaya and Andreas Bartels: Perceptual effects of stimulating V5/hMT+ during binocular rivalry are state-specific. *Current Biology*, 21 October 2013.

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