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Sleepwalkers are better at automatic walking

Sleepwalkers who are awake may have a multi-tasking advantage over non-sleepwalkers, according to recent research that uses virtual reality.

Try counting backwards from 200 in steps of 7 while walking en-route to your favourite café. Chances are, you will slow down or even freeze mid-stride, unless you are a sleepwalker.

Breakthrough research using virtual reality has revealed significant differences in how the brains of sleepwalkers and non-sleepwalkers control and perceive body movement – a first in cognitive science. Sleepwalkers exhibit increased automation in their movements with respect to non-sleepwalkers. The results are published in *Current Biology* on October 23, 2017.

Wearing a full-body motion capture suit in a room full of IR-tracking cameras at EPFL (Ecole polytechnique fédérale de Lausanne), sleepwalkers and non-sleepwalkers were asked to walk towards a target object, in this case a virtual cylinder. The subject was shown a life-size avatar that could truthfully replicate or deviate from the subject's actual trajectory in real-time. Participants could therefore be tricked into walking along a modified trajectory to compensate for the avatar deviation. Their walking speed and accuracy of movement along with their movement awareness were then recorded and analysed.

There was no difference between sleepwalkers and non-sleepwalkers while performing this first task – just as previous research would have suggested. When the researchers added a layer of complexity, however, a clear distinction emerged between the two groups.

Subjects were asked to count backwards in steps of 7 starting from 200. Non-sleepwalkers significantly slowed down when having to count backwards while walking, yet sleepwalkers maintained a similar walking velocity in both conditions, showing a strong link between sleepwalking and automatic control of locomotion not during nocturnal episodes of sleepwalkers, but during full wakefulness. Furthermore, sleepwalkers were more accurate at detecting changes in the virtual reality feedback when faced with the mental arithmetic task.

“We found that sleepwalkers continued to walk at the same speed, with the same precision as before and were more aware of their movements than non-sleepwalkers,” says EPFL neuroscientist Olaf Blanke. “The research is also a first in the field of action-monitoring, providing important biomarkers for sleepwalkers – while they are awake.”

Sleepwalkers are known to perform complex movements such as walking in the absence of full consciousness. This ability may translate into a multi-tasking advantage for sleepwalkers while awake. Somnambulism, or sleepwalking, currently affects between 2-4% of adults and over 10% in children. The condition can cause movements ranging from small gestures, to complex actions such as walking and even behaviours like getting dressed, driving a car, or playing a musical instrument, – all while asleep.

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Sleepwalking is caused by a partial arousal from slow-wave or deep sleep, however it is not known which functional brain mechanisms are affected by this pathophysiology. The new relationship between sleepwalking and conscious movement control offers new insights into the brain mechanisms of sleepwalking and could potentially be used to aid diagnosis of sleepwalking while the subject is awake, rather than requiring an overnight stay in a sleep laboratory.

“Traditionally, little has been known about daytime markers of sleepwalking, mostly because of the difficulty in investigating this condition experimentally,” explains Oliver Kannape from the University of Central Lancashire (UCLan) and lead author of the study. “Our research offers novel insight into this common sleep disorder and provides a clear scientific link between action monitoring, consciousness, and sleepwalking.”

Useful Links

Press kit: <http://bit.ly/2017Sleepwalkers>

Youtube video: <https://youtu.be/XDBNges-DjM>

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