Patterns in the brain shed new light on how we function

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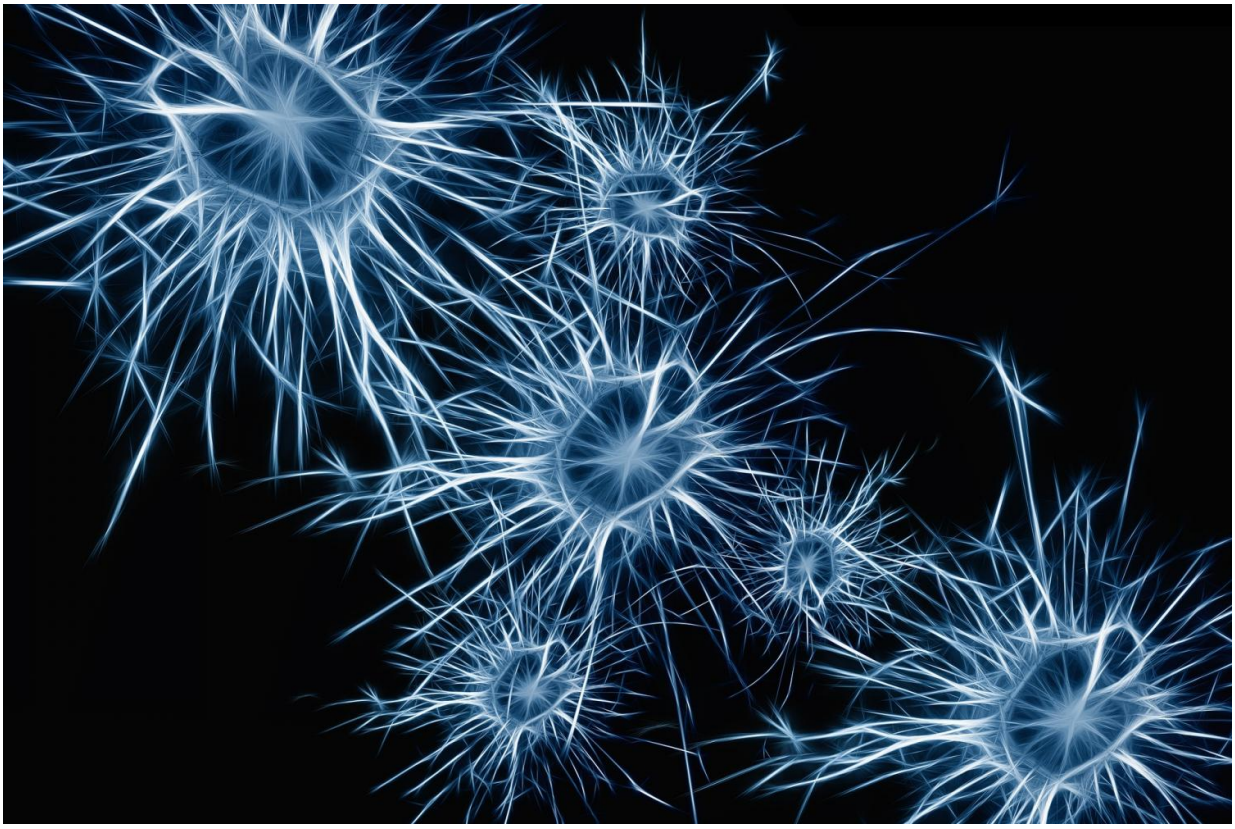

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The patterns created by neurons in the brain can be used to shine a light on how the brain functions, and take us a step closer to creating intelligent robots, scientists claim.

Publishing their research today in *PLoS Computational Biology*, the international team from the universities of Newcastle and Zurich, ETH Zurich and the California Institute of Technology, show that the way the neurons are structured and the patterns they make can be used to explain how they behave and function.

Modelling the neurons in the visual cortex—those responsible for sight—the researchers showed the seemingly random patterns could be explained by simple developmental rules.

In turn, these recurring patterns can be used to better understand how neurons organise their connections to communicate with one another.

Co-author of the study Dr. Roman Bauer, a Research Fellow in the School of Computing, explains:

"At first glance, the network of neurons in the human brain appears so tangled and complex you would think it impossible to start to understand how they all connect together.

"But what we have shown is that certain neurons make particular patterns which follow some quite simple rules.

"If we can spot these patterns in the brain then we can use them to predict how those particular neurons are behaving."

Focussing their work on the connections between the thalamus and cortical regions of the brain, Dr. Bauer says that if we can understand how animals sense visual stimuli and recognise objects it could revolutionise current technology.

"When we change the orientation of an object, the brain still recognises it as the same object and easily adjusts to the changing situation. But

current AI has a real problem with that.

"If we can simplify the brain to a few key patterns that can be translated by technology then it might be possible to create artificial intelligence that truly mimics the human brain.

"More importantly, by understanding what healthy network looks like, it will allow us to spot changes or abnormalities and inform new treatments."

More information: A generative growth model for thalamocortical axonal branching in the Primary Visual Cortex. Pegah Kassraian Fard, Michael Pfeiffer and Roman Bauer. *PLoS Computational Biology*, 2020. journals.plos.org/ploscompbiol … journal.pcbi.1007315

Provided by Newcastle University

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