Distinguishing genuine patterns from simple human misperceptions

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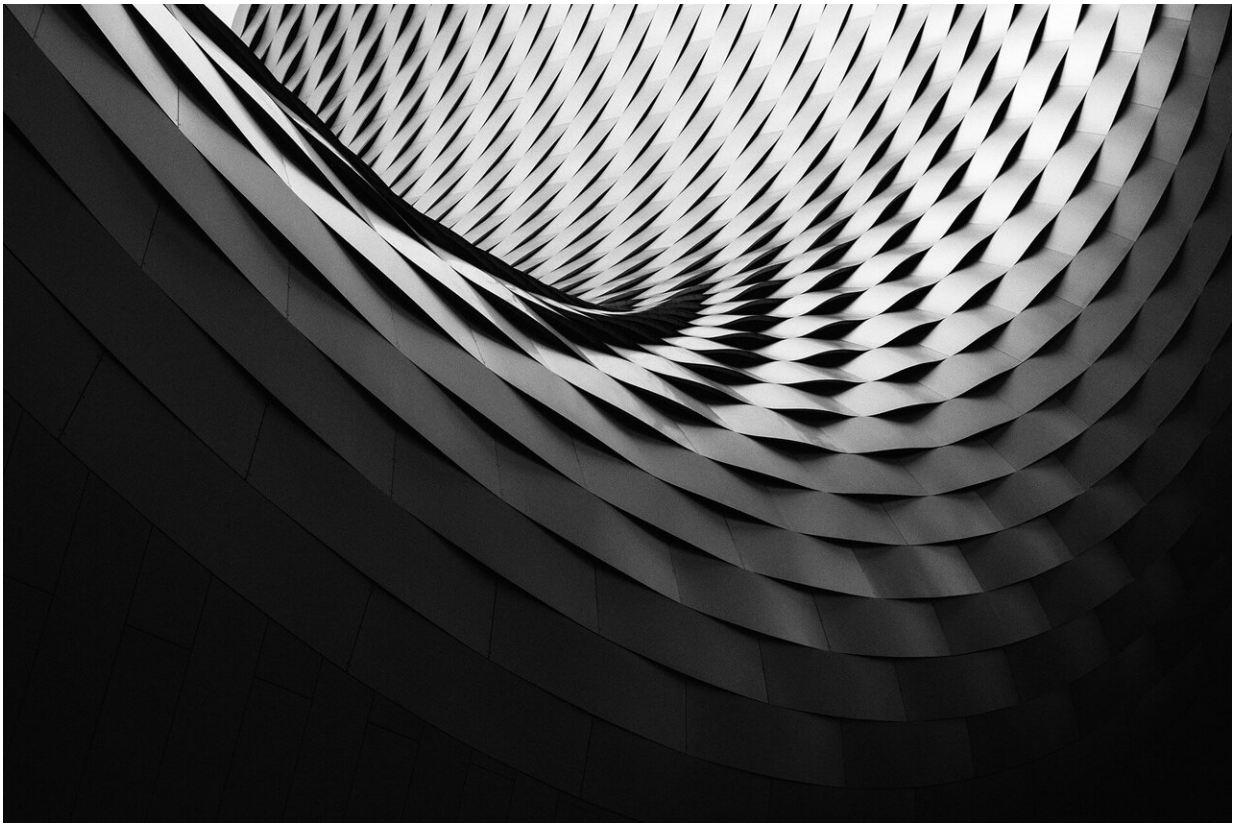

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Does the universe follow patterns, or do we humans just see them wherever we look? In a new paper for the *Australasian Journal of Philosophy*, SFI Program Postdoctoral Fellow Tyler Millhouse proposes

a criterion evaluating just how real a pattern is likely to be.

Millhouse's take on the age-old question could prove to be a valuable heuristic for scientists studying complex adaptive systems, such as brains, where neuroimaging data are interpreted as exhibiting patterns that may or may not correspond to higher-level cognitive processes.

"Humans as pattern-finders are on a hair-trigger," Millhouse says, "and we can be inclined read patterns into a system where they may not be real." He gives, as a clearly spurious example, the Ig-Nobel prize-winning researchers who scanned a dead salmon's brain in an MRI machine and turned up a signal that correlated with social perspective-taking. The salmon experiment was designed to caution neuroscientists against over-interpreting data—seeing patterns where they don't really exist. There are also plenty of neuroimaging studies that show compelling evidence that patterns of neural activity in certain regions of the brain do correspond with higher-level behaviors, like navigating a landscape.

The new paper advances a 1991 account by SFI External Professor Daniel Dennett, which used 'compressibility' to judge how real a pattern is likely to be. Much like highly detailed photographs can be compressed into JPEG files that capture the essential features of the original image, Dennett defined real patterns by whether complex scientific data can be faithfully represented by simpler scientific models.

For Millhouse, compressibility alone is not sufficient for evaluating patterns in a complex dataset because it doesn't account for the interpretation these datasets often require. When scientists look at neuroimaging data, for example, they use the data to create a map of brain activity. That mapping process involves an interpretation of the measurements that can sometimes read patterns into the data where none were present, like in the case of the dead salmon. Millhouse argues that

the more complex the interpretation required, the less real the pattern is likely to be.

"This is about getting us to reflect on how much interpretive work we do," Millhouse says, "And it also cautions us to think about how scientific theorizing works in general. It's easy to come up with reasons your theory is ok despite evidence to the contrary. This work suggests that the amount of 'reading into' we have to do is closely connected to what it means for the world to really exhibit a pattern."

"Really Real Patterns" is published in the *Australasian Journal of Philosophy*.

More information: Tyler Millhouse, Really Real Patterns, *Australasian Journal of Philosophy* (2021). DOI: 10.1080/00048402.2021.1941153

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