

# Natural selection can favor 'irrational' behavior

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It seems paradoxical that a preference for which of two houses to buy could depend on another, inferior, house – but researchers at the University of Bristol have identified that seemingly irrelevant alternatives can, and should, influence choices. Even more remarkable is the finding that optimal choices can violate the principle of transitivity: it can be best to choose A from A or B, and choose B from B or C, but choose C from A or C.

The findings, published in Royal Society Journal *Biology Letters*, are based on two premises: that current options are indicative of the likely options in the near future, and that at least one of the options takes a different amount of time to handle.

The study's lead author, Professor John McNamara of Bristol's School of Mathematics said: "I foresaw that inferior options could affect choices, but the finding of intransitive choice is most exciting." Previous work on the topic has relied on the state of the individual changing whereas this result is more general.

The researchers are part of the Modelling Animal Decisions team at the University of Bristol, which aims to understand mental mechanisms from an evolutionary perspective. Consequently, the paper is pitched in terms of an individual choosing between prey options where each type of prey takes a different amount of time to handle. Assuming that the individual wants to maximise their long-term rate of energy gain, it is possible to calculate which option they should take, based on the

currently available options and how likely each option is to appear or disappear over time.

The finding is important because it shows that two of the keystone principles of rationality, regularity and transitivity, cannot be applied easily. Knowing that an individual prefers an orange to a banana, and that they prefer a banana to an apple tells us nothing about which they 'should' prefer from an orange and an apple, because each fruit has a different handling time.

Similarly, a small property developer that buys, renovates and sells one house at a time cannot rule out house A just because it would be preferable to choose house B (if those were the only two options). Different houses take different amount of time to renovate so another option, C, might mean that overall, the best option is to buy house A.

**More information:** 'Natural selection can favour 'irrational' behaviour' by John McNamara, Peter Trimmer and Alasdair Houston in *Biology Letters*: [rsbl.royalsocietypublishing.org ... .1098/rsbl.2013.0935](https://rsbl.royalsocietypublishing.org/doi/10.1098/rsbl.2013.0935)

Provided by University of Bristol

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