

# The science behind spite

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Credit: George Hodan/public domain

Psychology, biology, and mathematics have come together to show that the occurrence of altruism and spite - helping or harming others at a cost to oneself - depends on similarity not just between two interacting individuals but also to the rest of their neighbours.

According to this [new model](#) developed by researchers DB Krupp (Psychology) and Peter Taylor (Mathematics and Statistics, Biology) at Queen's and the One Earth Future Foundation, individuals who appear

very different from most others in a group will evolve to be altruistic towards similar partners, and only slightly spiteful to those who are dissimilar to them.

However, individuals who appear very similar to the rest of a group will evolve to be only slightly altruistic to similar partners but very spiteful to dissimilar individuals, often going to extreme lengths to hurt them. Taken together, individuals with 'common' and 'rare' appearances may treat each other very differently.

This finding is a new twist on established [evolutionary theory](#) and could help explain racism and corresponding forms of prejudice in humans and other species.

"Similar individuals are more likely to share copies of each other's genes and dissimilar individuals are less likely to. As a consequence, evolutionary theory predicts that organisms will often discriminate, because helping similar partners and harming dissimilar ones increase the fraction of the discriminating party's genes in future generations," says Dr. Krupp.

The new theoretical model was developed using [inclusive fitness theory](#) - a foundational biological framework that considers how an organism's behaviour affects its own reproductive success as well as that of its neighbours.

"We tend to think of individuals as caring only about what another individual looks, smells or sounds like, but our model shows that the appearance of surrounding neighbours matters tremendously, too," says Dr. Krupp. "This work predicts extreme differences in behaviour between what we call 'common' and 'rare' types of [individuals](#) - those that are similar or dissimilar to their [neighbours](#)."

This study has been published in *Proceedings of the Royal Society B: Biological Sciences*.

**More information:** Social evolution in the shadow of asymmetrical relatedness, [DOI: 10.1098/rspb.2015.0142](https://doi.org/10.1098/rspb.2015.0142)

Provided by Queen's University

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