



to one that begins with a single cognitive mechanism.

According to Fabrizio Mafessoni, who is a post-doctoral researcher at the Max Planck Institute for Evolutionary Anthropology, standard theoretical models of the origins of empathy tend to focus on scenarios in which coordination or [cooperation](#) are favored.

Mafessoni, and his co-author Michael Lachmann, a theoretical biologist and Professor at the Santa Fe Institute, explored the possibility that the [cognitive processes](#) underlying a broad range of empathetic responses—including emotional contagion, contagious yawning, and pathologies like echopraxia (compulsive repetition of others' movements) and echolalia (compulsive repetition of others' speech)—could evolve in the absence of kin selection or any other mechanism directly favoring cooperation or coordination.

Mafessoni and Lachmann posited that animals, including humans, can engage in the act of simulating the minds of others. We cannot read other minds—they are like black boxes to us. But, as Lachmann explains, all agents share almost identical "black boxes" with members of their species, and "they are constantly running simulations of what other minds might be doing." This ongoing as-actor [simulation](#) is not necessarily geared toward cooperation: it's just something humans and animals do spontaneously.

An example of this process is represented by [mirror neurons](#): it has been known for some time that the same neurons engaged in planning a hand movement are also used when observing the hand movement of others. Mafessoni and Lachmann wondered what the consequences would be if they were to extend that process of understanding to any [social interaction](#).

When they modeled outcomes rooted in cognitive simulation, they found

that actors engaged in as-actor simulation produce a variety of systems typically explained in terms of cooperation or kin-selection. They also found that an observer can occasionally coordinate with an actor even when this outcome is not advantageous. Their model suggests that empathetic systems do not evolve solely because agents are disposed to cooperation and kin-selection. They also evolve because animals simulate others to envision their actions. According to Mafessoni, "the very origin of empathy may lie in the need to understand other individuals."

For Lachmann, their findings "completely change how we think about humans and animals." Their [model](#) is grounded in a single, cognitive mechanism that unifies a broad set of phenomena under one explanation. It therefore has theoretical import for a wide range of fields, including cognitive psychology, anthropology, neuroscience, complex systems, and evolutionary biology. Its power stems from both its unifying clarity and its theoretical interest in the limits of cooperation as an explanatory frame.

The study is published in *Scientific Reports*.

**More information:** *Scientific Reports*, [DOI: 10.1038/s41598-019-41835-5](#)

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