

'Invisible hand' guides evolution of cooperative turn-taking, research shows

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It's not just good manners to wait your turn -- it's actually down to evolution, according to new research by University of Leicester psychologists.

A study in the University's School of Psychology sought to explain how turn-taking has evolved across a range of species. The conclusion is that there is an "invisible hand" that guides our actions in this respect.

Professor Andrew Colman and Dr Lindsay Browning carried out the study due to appear in the September issue of the journal *Evolutionary Ecology Research*. The study has helped to explain the evolution of cooperative turn-taking.

Professor Colman said: "In human groups, turn-taking is usually planned and coordinated with the help of language. For example, people living together often agree to take turns washing up the dishes after meals or taking their children to school. But turn-taking has also evolved in many other species without language or the capacity to reach negotiated agreements. These include apes, [monkeys](#), birds, and antelopes that take turns grooming each other, and mating pairs of Antarctic penguins that take turns foraging at sea while their partners incubate eggs or tend to chicks.

"It is far from obvious how turn-taking evolved without language or insight in animals shaped by natural selection to pursue their individual self-interests."

The researchers say that playing "tit for tat" -- copying in each time period whatever the other individual did in the previous period -- can explain synchronized cooperation, but cannot fully explain turn-taking. "For example, many predatory animals hunt in pairs or larger groups, and this involves synchronized cooperation. 'Tit for tat' has been shown to work very well in initiating and sustaining this type of cooperation."

"But where cooperation involves turn-taking, a 'tit for tat' instinct could sustain the pattern once it was established but could not initiate it in the first place. For example, in a mating pair of penguins who both went foraging or both incubated the eggs at the same time, 'tit for tat' would not be enough to evolve the habit of taking turns."

Using evolutionary game theory and computer simulations, Professor Colman and Dr Browning discovered a simple variation of "tit for tat" that explains how turn-taking can evolve in organisms that pursue their individual self-interests robotically.

The researchers state: "Turn-taking is initiated only after a species has evolved at least two genetically different types that behave differently in initial, uncoordinated interactions with others. Then as soon as a pair coordinates by chance, they instinctively begin to play 'tit for tat'. This locks them into mutually beneficial coordinated turn-taking indefinitely. Without genetic diversity, turn-taking cannot evolve in this simple way."

Professor Colman added: "In our simulations, the individuals were computer programs that were not only dumb and robotic but also purely selfish. Nevertheless, they ended up taking turns in perfect coordination. We published indirect evidence for this in 2004; we have now shown it directly and found a simple explanation for it. Our findings confirm that cooperation does not always require benevolence or deliberate planning. This form of cooperation, at least, is guided by an 'invisible hand', as happens so often in Darwin's theory of [natural selection](#)."

Source: University of Leicester ([news](#) : [web](#))

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