# The art of copying: Scientists tell us that even copying mistakes can be good

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(PhysOrg.com) -- New research suggests that accidentally copying the mistakes of others can lead to some of man's greatest innovations. The international project, led by the University of St Andrews, found that mimicking the mistakes of others can ultimately aid the human ability to adapt.

The study, published today, also alludes to the 'secret ingredient' of what researchers call 'the super-effectiveness of human copying'.

The EU-funded project set out to ask key questions about the art of copying, such as who do we copy and why? It was led by Professor Kevin Laland and Dr Luke Rendell of the School of Biology at the University of St Andrews, and involved a team of leading researchers across the world, from UCLA, Stanford, Stockholm and Bologna Universities.

Professor Laland explained, "Human culture is widely thought to underlie the extraordinary demographic and ecological success of our species and one of the foundations of culture is copying.

Many animals, including fish, mammals, birds and even some insects, acquire vital life skills and knowledge through low cost copying.

"Copying pays off because the individuals we copy typically perform the most effective behaviour in their repertoire. In doing so, they inadvertently filter behaviour, making adaptive information available for

others.

"Even if an individual copies at random, they still do better than someone learning through trial and error because the behaviour available to copy is amongst the best around. This study helped us to understand why copying is so widespread in nature."

At the heart of the study was an innovative approach to addressing this question, taking the research out of the lab and into people's homes. The researchers organised an international tournament played out through computer simulation - a worldwide battle of minds, which was ultimately won by two researchers from Canada.

The tournament was a huge success, with 104 teams from 16 different countries taking part. Among the participants were biologists, mathematicians, statisticians, psychologists and computer scientists.

Each team came up with what they thought was the best strategy to win, which were then pitted against each other in a computer simulation. The winners were two Canadians from Queen's University in Canada, neuroscientist Tim Lillicrap and mathematician Dan Cownden, who won with a strategy that had been almost exclusively copied from others

"What was surprising about the tournament findings was that copying pays under such a broad range of circumstances," explained Dr Rendell.

"Copy error (either getting the wrong behaviour or if copying fails completely) does not detract from the value of copying. Indeed, copy error may even be an important source of adaptive behavioural diversity, fuelling human innovation."

Dr Rendell commented, "The most successful strategies timed their copying for when payoffs dropped, evaluated current information based

on its age, and judged how valuable it will be in the future. This capacity to think about the past and future, known as mental time travel, may be the secret ingredient underlying the super-effectiveness of human copying."

The research is published in this week's *Science* journal.

Provided by University of St Andrews