

# Seeing eye to eye is key to copying, say scientists

August 16 2011

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Imitation may be the sincerest form of flattery but how do our brains decide when and who we should copy? Researchers from The University of Nottingham have found that the key may lie in an unspoken invitation communicated through eye contact.

In a study published this week in the [Journal of Neuroscience](#), a team of scientists from the University's School of Psychology show that eye contact seems to act as an invitation for mimicry, triggering mechanisms in the frontal region of the brain that control imitation.

The results could be the first clues to understanding why some people, such as children with autism, struggle to grasp when they are expected to copy the actions of others in [social situations](#).

Dr Antonia Hamilton, who led the research, said: "Many studies have looked at copying and imitation in terms of 'mirror neurons', which are believed to be specialised parts of the human brain that implement imitation. However, we also know that imitation is carefully controlled — people don't imitate everything they see, and only copy what's important.

"Our previous research has shown that when somebody makes eye contact with you, you are more likely to copy them. So eye contact seems to act as a message that says "Copy me now". This recent study aimed to see what happens to that signal in the brain."

The team of psychologists, which also included doctoral student Yin Wang and Dr Richard Ramsey, used functional magnetic resonance imaging (fMRI) to scan the brains of volunteers while they watched videos of an actress who sometimes would make eye contact with them while opening or closing her hand. The participant was told they should open their own hand whenever they saw the actress move her hand so in some trials the participant was copying the actress and in other trials they were not.

Because previous behavioural measurement such as response time revealed that the participant unconsciously copied the actress faster when the actress provided eye contact, the scientists analysed the brain imaging data to find which brain areas controlled the decision to copy. The analysis used a new mathematical method called dynamic causal modelling to compute the information processing in the brain, which has never been applied to imitation before.

The data showed that mirror neuron brain regions do play a role in the copying task. More importantly though, it revealed that these regions are controlled by the medial prefrontal cortex, an area of the brain associated with planning complex cognitive behaviours, expressing personality, decision-making and responding to social situations.

Dr Hamilton added: "Previous studies have shown that this medial prefrontal [brain](#) region is active in many social situations but responds less in people with autism, which explains why children on the autistic spectrum might not copy at the right time.

"Understanding the control of imitation has implications for many other areas of psychology too. For example, are teenagers whose prefrontal cortex is less developed more easily led to copy risky, dangerous or illegal behaviour such as imitating rioters? Could increasing the amount of [eye contact](#) between children and teachers lead to better learning by

imitation? Would better control of [imitation](#) help children with autism to more effectively learn and interact? We plan further research to address these questions."

Provided by University of Nottingham

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