

# Neuroimaging of soccer fans' brains reveals neural basis of in-group altruistic motivation

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Why are sports fans so fanatical about their teams? The answer lies

deeply rooted in their brains, says a new study. Group belongingness is considered a basic human need and has been stated as a critical feature for hominin evolution. In recent decades, studies have shown our tendency to benefit ingroup over outgroup members during decisions, which can be explained by the reciprocal identification among members.

The study, published in Nature's *Scientific Reports* journal on November 23th, reveals for the first time the brain functioning involved in altruistic motivation among soccer fans—a "natural group" that shows strong bonds in real-life settings. The functional MRI study sheds light on the [neural basis](#) of prosocial behaviour of ingroup attachment.

"Attachment to cultural groups is a unique property of humans, fundamental for our survival, which, in turn, makes the investigation of its neural basis critical," states Dr. Jorge Moll, neuroscientist and senior author of the study. He is the head of the D'Or Institute for Research and Education (IDOR), where the research was conducted.

The researchers recruited 27 soccer fans of Brazilian teams for the experiment. Inside the functional magnetic resonance (fMR) scanner, supporters of the four most popular soccer clubs in Rio de Janeiro had to decide whether they wanted to donate a specific amount of money to anonymous fans of their own soccer teams, anonymous non-fans or to keep the amount to themselves. During these donation tasks, the fMR machine captured in detail their brain functioning in order to elucidate the neural underpinnings of ingroup motivation and altruistic decisions. Participants indicated decisions by squeezing a pressure device that they held in their hands during the experimental trials.

Dr. Tiago Bortolini, lead author of the study, from IDOR and the Federal University of Rio de Janeiro, says, "This allowed us to measure their real motivation during the donation tasks, since greater amounts of money required lot of pressure effort on the handgrip device."

The goal of the study was to investigate the [neural mechanisms](#) responsible for altruistic motivation among members of the same social group. In other words, what are the soccer fans' brain areas involved in this kind of behaviour? "Soccer fans constitute an example of natural groups, which are reflected in daily life situations, and thus provide a unique opportunity to investigate group belongingness in a more ecologic fashion."

Results of the donation trials (measured by how strongly they squeezed the handgrip device) showed that, on average, they invested more effort to benefit anonymous fans of their own soccer clubs than non-fans. Greater effort was observed to obtain money for themselves, however.

In order to elucidate what happens in the soccer fans' brains during the donation tasks, the researchers analyzed brain activation for all three types of donation: to soccer fans, to non-fans or to themselves. Analyses showed that the medial orbitofrontal cortex (mOFC) a brain area extremely important for subjective value of choice alternatives, showed increased activity in all conditions.

Since this brain area plays a critical role in decision and values, the researchers decided to investigate how this area (mOFC) interacts with other parts of the brain. This analysis revealed a close relationship of mOFC with the subgenual cingulate cortex—a region that has previously been implicated in altruistic decisions to charitable organizations and in family belongingness—only when donations were targeted to fans of the same [soccer](#) club. A straightforward interpretation is that fans respond to their teammates, even unknown ones, in a similar way that they respond to loved family members or when making noble altruistic choices.

"Understanding the neural mechanisms involved in group belongingness and pro-group behaviour can pave the way for developing novel [brain](#) modulation techniques able to address clinical problems, such as

antisocial behaviors and other psychiatric symptoms, including sports-related aggressive attitudes and behaviors," said Dr. Bortoloni.

**More information:** Tiago Bortolini et al, Neural bases of ingroup altruistic motivation in soccer fans, *Scientific Reports* (2017). [DOI: 10.1038/s41598-017-15385-7](https://doi.org/10.1038/s41598-017-15385-7)

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