

## Genes affecting generosity may be found

Oct. 31, 2007

Special to [World Science](#)

If you like easy games, you'd love this one. The rules: one player receives some money. That player may then choose to give any part of it, or none, to a second player. The end.

It seems absurdly simple—doesn't the second player even do anything?—but that's exactly the point. Scientists studying altruism, or generosity, designed it to provide a straightforward measure of a person's altruism, untainted by considerations such as how the other player might react.

In a new study, researchers staged the game 203 times online between different players unaware of each other's identities. The investigators analyzed the results, as well as the participants' genes. In this way they identified certain variants of a gene called AVPR1a as possibly related to altruism.



Scientists are just beginning to find genes that may underlie this enigmatic quality, which has long puzzled biologists because of questions over how it evolved.

The experiment provided “the first evidence, to my knowledge, for a relationship between DNA variability and real (costly) human altruism,” wrote Ariel Knafo of Hebrew University in Jerusalem, a member of the research team, in an email. The study appears in the early online edition of the research journal *Genes, Brain and Behavior*.

A study two years ago also linked variants of another gene with altruism, though that research measured altruism based on questionnaires the participants themselves filled out. Only the newer study—whose participants received the equivalent of \$12 to keep or give as they chose—measured generosity through concrete demonstrations of it, Knafo said.

“Games recreate social interactions in the laboratory using real money payoffs and thus engage people in ‘put your money where your mouth is’ decisions,” wrote Knafo and co-authors in the study. They found variations in generosity of upwards of 44 percent in association with variants in the AVPR1a gene.

The gene codes for the production of a molecule, called a receptor, that allows a chemical known as vasopressin to affect brain cells. Vasopressin in turn has been implicated in social bonding. The researchers found greater altruism in players in which a key section of the AVPR1a gene, called its promoter, was longer. A promoter is the region of a gene that allows cellular machinery to actually read the gene and carry out its instructions. A longer promoter can result in greater activity of the gene.

The study two years ago, conducted by a group that included some of the same researchers in the new study, identified variants in a gene encoding the so-called dopamine D4 receptor as affecting altruism. The gene plays a similar role for the brain chemical, or neurotransmitter, dopamine as AVPR1a plays for vasopressin. Because dopamine is linked to the sense of reward or excitement, researchers hypothesized that the gene might contribute to rewarding feelings associated with helping others. That study appeared in the April 2005 issue of the journal *Molecular Psychiatry*.

The findings could help biologists sort out altruism's evolutionary history, according to the researchers. One remarkable fact, they noted, is that AVPR1a has also been found in rodents called voles, and also promotes social bonding in them—suggesting altruism is rooted in very ancient genes. But these might have taken on powerful new roles during human evolution: evidence suggests many genes' promoter regions became longer in the lineage leading to humans compared to chimps and other primates.

Whether such findings will help illuminate the murkier question of why greater altruism seems to have evolved in humans, is harder to say.

Evolutionary theory explains the population wide spread of certain genes as resulting from the advantage those genes provide. Such a schema seems to have little place for genes that prompt us to hand over advantages to others. Nonetheless, simulations and experiments suggest that for various reasons, some forms of altruism can evolve. As “an inherent human trait distinguishing us from all other vertebrate species,” as Knafo and colleagues wrote, it's sure to remain an active area of research.

*Image; Kind Heart by the Belgian painter Gustave Leonhard De Jonghe (1829-1893), depicting a girl giving money to the homeless.*