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Andrea Estrada

UCSB Study on Sibling Detection Mechanism Highlighted in 'Nature'

Fundamental theories in evolutionary biology have long proposed that biological kinship is the foundation of the family unit. It not only creates the sense of altruism that exists among genetically related family members, but also establishes boundaries regarding sexual relations within the nuclear family. Questions have persisted, however, regarding the means by which humans recognize family members -- particularly siblings -- as close genetic relatives.

A team of researchers at the University of California, Santa Barbara, has found evidence of a nonconscious mechanism in the human brain that identifies genetic siblings on the basis of cues that guided our hunter-gatherer ancestors. Their findings will be published in the February 15 issue of the science journal Nature. In a study involving more than 600 test subjects, the researchers found that people felt more altruistic toward individuals this mechanism recognized as siblings, and, at the same time, felt a greater aversion to engaging in incestuous sexual relations with them.

"The old thinking was that Darwinism applied to humans physically, but not socially. Now we see the evolution of a mechanism that finely regulates important aspects of human social behavior," said John Tooby, professor of anthropology and co-director of the Center for Evolutionary Psychology at UCSB. He completed the study with Leda Cosmides, professor of psychology and also co-director of the Center for Evolutionary Psychology, and Debra Lieberman, a former student at the center and

now a professor of psychology at the University of Hawaii. Mechanisms such as the one identified in the current study have been found in many species, he added, but their existence in humans had been a matter of controversy.

According to the researchers, the development of altruism between siblings is a result of natural selection, as are their aversions to sexual relations with one another and their aversion to sexual relations among siblings in general. The study's findings indicate these sensibilities are not primarily a result of socialization by parents or peers, but of motivational systems that evolved to respond to cues of genetic relatedness.

The question the researchers sought to answer was how siblings recognize their close genetic matches. Drawing on the socioecology of ancestral human foragers they found the answer in a set of cues that enable humans to identify their brothers and sisters as siblings. For older siblings, what the researchers refer to as "maternal perinatal association" -- seeing their mothers care for infant siblings -- activates the mechanism in the brain, which, in turn, increases feelings of both altruism and sexual aversion toward younger brothers and sisters.

This cue, however, is unavailable to younger siblings whose birth order precludes the opportunity of watching their mothers care for older brothers and sisters. For these siblings, the mechanism is triggered by the amount of time they live together as

a family during the period from the younger siblings' infancy through adolescence. The researchers found that this "co-residence" regulates sibling altruism and sexual aversion toward adopted and step-siblings as well -- individuals whom the subjects consciously believe to be genetically unrelated. "This shows that the mechanism operates independently of our beliefs about kinship," Cosmides said. "The cues regulate sibling altruism and sexual aversion, no matter what we believe."

The discovery of a mechanism designed to make family relationships non-erotic casts doubt on Sigmund Freud's view that family members are the first and most powerful objects of sexual desire, say the authors.

It also helps to settle a long-running debate in anthropology about whether family relationships are socially created purely by culture, or whether evolved mechanisms in the brain play a role.

The results of the study could also have implications for health care professionals such as psychiatrists and psychologists who treat victims of incest and those who commit it.

"The theory gives a means of identifying who might be at risk," said Tooby. "Siblings who have lived separately for long periods of time have not been exposed to the cues the brain uses to determine who is a sibling. This may offer an explanation as to why someone might have an inclination toward incest."

It also suggests, he says, ways of building families that would be more strongly and reliably linked together by bonds of affection.

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