2006 Cultural Series Lecture

# Seeking the Cause of Autism

Simon Baron-Cohen

» In 1944, Hans Asperger, the Austrian pediatrician for whom Asperger Syndrome is named, suggested that "the autistic personality is an extreme variant of male intelligence...in the autistic individual, the male pattern is exaggerated." Today, Simon Baron-Cohen of Cambridge University suspects that Asperger was correct and is seeking the cause of autism by using modern methods to test Asperger's "extreme male brain" theory.

Baron-Cohen, professor of Developmental Psychopathology and director of the Autism Research Center in Cambridge, was a participant at an autism meeting at CSHL's Banbury Center in March, from which he was buttonholed one evening to give a public, Cultural Series Lecture in Grace Auditorium.

During his talk, Baron-Cohen described how the results of his psychological, neurological, and hormone research have revealed that sex differences in the brain may indeed be the key to understanding autism.

Baron-Cohen maintains that females and males in the general population have different "brain types" or cognitive styles. Empathizing is the ability to predict another's feelings and respond appropriately to another's state of mind. Systemizing is the ability and desire to build systems and determine the rules that govern how they work. The typical female brain, Baron-Cohen said, excels at empathy whereas the typical male brain excels at building systems.

Thus, males are more often systemizers and have less developed empathizing abilities. Females generally have the reverse cognitive style. Such gender differences in cognitive styles can be observed early in development, even among day-old newborns, and continue through adulthood, said Baron-Cohen.

Studies show that individuals with autism frequently have narrow interests and become preoccupied with finding out how a system works. For example, they might become obsessed with spinning the wheel of a toy truck or turning light switches on and off. They find it difficult to pick up on non-verbal cues and have trouble making eye contact and understanding others's emotions. They are worse at empathizing than males in the general population. They have, however, a greater ability than typical males to understand systems, to read maps, and to solve physical and mechanical problems. In essence they display features predicted of an extreme male brain.

What's more, the fathers, mothers and even grandfathers of children with autism are more likely to be systemizers, said Baron-Cohen. Magnetic Resonance Imaging (MRI) shows that although patterns of brain activity differ between males and females in the general population, both the mothers and fathers of children with autism have extreme male patterns of brain behavior. Baron-Cohen has evidence that parents of children with autism are more likely to be strong systemizers themselves.

Along those lines, Baron-Cohen is exploring assortative mating, or the tendency of like individuals to be attracted to each other, to understand the role of genetics in autism.

To further explore the genetic basis of autism, Baron-Cohen is measuring the levels of testosterone—a masculizing hormone—in human fetuses, and testing the prediction that elevated fetal testosterone levels correlate with the development of a systemizing cognitive style. The results indicate that fetuses with elevated testosterone levels do indeed tend to develop into children who are extremely good at analyzing systems but have less well developed language and communication skills.

Baron-Cohen is now testing if elevated levels of fetal testosterone predict a diagnosis of autism, and if the genes that control testosterone play a role in the cause of autism. If his theory proves correct, it will shed light not only on the mystery of autism but also on the neurobiology of sex differences in the general population. **Marisa Macari**

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