



# Gay Brains Structured Like Those of the Opposite Sex

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Brain scans have provided the most compelling evidence yet that being gay or straight is a biologically fixed trait.

The scans reveal that in gay people, key structures of the brain governing emotion, mood, anxiety and aggressiveness resemble those in straight people of the opposite sex.

The differences are likely to have been forged in the womb or in early infancy, says Ivanka Savic, who conducted the study at the Karolinska Institute in Stockholm, Sweden.

"This is the most robust measure so far of cerebral differences between homosexual and heterosexual subjects," she says.

Previous studies have also shown differences in brain architecture and activity between gay and straight people, but most relied on people's responses to sexuality driven cues that could have been learned, such as rating the attractiveness of male or female faces.

## Brain Symmetry

To get round this, Savic and her colleague, Per Lindström, chose to measure brain parameters likely to have been fixed at birth.

"That was the whole point of the study, to show parameters that differ, but which couldn't be altered by learning or cognitive processes," says Savic.

First they used MRI scans to find out the overall volume and shapes of brains in a group of 90 volunteers consisting of 25 heterosexuals and 20 homosexuals of each gender.

The results showed that straight men had asymmetric brains, with the right hemisphere slightly larger □ and the gay women also had this asymmetry. Gay men, meanwhile, had symmetrical brains like those of straight women.

The team next used PET scans to measure blood flow to the amygdala, part of the brain that governs fear and aggression. The images revealed how the amygdala connected to other parts of the brain, giving clues to how this might influence behaviour.

## Depression Link

They found that the patterns of connectivity in gay men matched those of straight women, and vice versa (see image, above right). In straight women and gay men, the connections were mainly into regions of the brain that manifest fear as intense anxiety.

"The regions involved in phobia, anxiety and depression overlap with the pattern we see from the amygdala," says Savic.

This is significant, she says, and fits with data showing that women are three times as likely as men to suffer from mood disorders or depression. Gay men have higher rates of depression too, she says, but it's difficult to know whether this is down to biology, homophobia or simply feelings of being "different".

In straight men and lesbians, the amygdala fed its signals mainly into the sensorimotor cortex and the striatum, regions of the brain that trigger the "fight or flight" response. "It's a more action-related response than in women," says Savic.

### **'Striking Differences'**

"This study demonstrates that homosexuals of both sexes show strong cross-sex shifts in brain symmetry," says Qazi Rahman, a leading researcher on sexual orientation at Queen Mary college, University of London, UK.

"The connectivity differences reported in the amygdala are striking."

"Paradoxically, it's more informative to look at things that have no direct connection with sexual orientation, and that's where this study scores," says Simon LeVay, a prominent US author who in 1991 reported finding differences (pdf) in a part of the brain called the hypothalamus between straight and gay men.

But as Savic herself acknowledges, the study can't say whether the brain differences are inherited, or result from abnormally high or low exposure in the womb to sex hormones such as testosterone.

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