Model predicts 'religiosity gene' will dominate society

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A variety of religious symbols. A new study has investigated how the differing fertility rates between religious and secular individuals might affect the genetic evolution of society overall. Image credit: Wikimedia Commons.

(PhysOrg.com) -- In the past 20 years, the Amish population in the US has doubled, increasing from 123,000 in 1991 to 249,000 in 2010. The huge growth stems almost entirely from the religious culture's high fertility rate, which is about 6 children per woman, on average. At this rate, the Amish population will reach 7 million by 2100 and 44 million by 2150. On the other hand, the growth may not continue if future generations of Amish choose to defect from the religion and if secular

influences reduce the birth rate. In a new study, Robert Rowthorn, emeritus professor of economics at Cambridge University, has looked at the broader picture underlying this particular example: how will the high fertility rates of religious people throughout the world affect the future of human genetic evolution, and therefore the biological makeup of society?

Rowthorn has developed a model that shows that the genetic components that predispose a person toward religion are currently "hitchhiking" on the back of the religious cultural practice of high fertility rates. Even if some of the people who are born to religious parents defect from religion and become secular, the religious genes they carry (which encompass other personality traits, such as obedience and conservativism) will still spread throughout society, according to the model's numerical simulations.

"Provided the fertility of religious people remains on average higher than that of secular people, the genes that predispose people towards religion will spread," Rowthorn told *PhysOrg.com*. "The bigger the fertility differential between religious and secular people, the faster this genetic transformation will occur. This does not mean that everyone will become religious. Genes are not destiny. Many people who are genetically predisposed towards religion may in fact lead secular lives because of the cultural influences they have been exposed to."

The model's assumptions are based on data from previous research. Studies have shown that, even controlling for income and education, people who are more religious have more children, on average, than people who are secular (defined here as having a religious indifference). According to the World Values Survey for 82 countries, adults attending religious services more than once per week averaged 2.5 children, those attending once per month averaged 2.01 children, and those never attending averaged 1.67 children. The more orthodox the religious sect,

the higher the fertility rate, with sects such as the Amish, the Hutterites, and Haredi having up to four times as many children as the secular average. Studies have found that the high fertility rates stem from cultural and social influences by religious organizations rather than biological factors.

But while fertility is determined by culture, an individual's predisposition toward religion is likely to be influenced by genetics, in addition to their upbringing. In the model, Rowthorn uses a "religiosity gene" to represent the various genetic factors that combine to genetically predispose a person toward religion, whether remaining religious from youth or converting to religion from a secular upbringing. On the flip side, the nonreligiosity allele of this "gene" makes a person more likely to remain or become secular. If both parents have the religiosity allele, their children are also more likely to have the religiosity allele than if one or both parents did not have it. However, children born to religious parents may have the nonreligiosity allele, while children born to secular parents may have the religiosity allele. Having the religiosity allele does not make a person religious, but it makes a person more likely to have characteristics that make them religiously inclined; the converse is also true.

All individuals, whether they have religious or secular upbringings, have a chance of defecting. Rowthorn explained that the rates of defection from religious to secular and from secular to religious preferences depend on time and place.

"Amongst Christian Churches in Europe and North America, defection rates are higher than conversion rates," he said. "In some cases, such as the Amish, these losses are greatly outweighed by their very high fertility. However, for mainstream Churches, such as the Catholics or Anglicans, the birth rate is not high enough on its own to offset defections and they rely on immigration to maintain their numbers. In

certain other parts of the world, such as East Asia, mainstream Christian Churches are growing through conversion."

Rowthorn's model shows that, even when the religious defection rate is high, the overall high fertility rate of religious people will cause the religiosity allele to eventually predominate the global society. The model shows that the wide gap in fertility rates could have a significant genetic effect in just a few generations. The model predicts that the religious fraction of the population will eventually stabilize at less than 100%, and there will remain a possibly large percentage of secular individuals. But nearly all of the secular population will still carry the religious allele, since high defection rates will spread the religious allele to secular society when defectors have children with a secular partner. Overall, nearly all of the population will have a genetic predisposition toward religion, although some or many of these individuals will lead secular lives, Rowthorn concluded.

"The rate at which religious people abandon their faith affects the eventual share of the population who are religious," Rowthorn said. "However, it does not alter the conclusion of the article that the religiosity allele will eventually take over. If the defection rate is high, there will be lots of children who are brought up as religious and carry the religiosity allele, but who give up their faith. Such people will carry the religiosity allele into the secular population with them. Many of their descendents will also carry this allele and be secular. In this case, the high fertility group is constantly sending migrants into the low-fertility secular population. Such migrations will simultaneously boost the size of the secular population and transform its genetic composition."

Rowthorn acknowledges that he can only speculate on how a genetic predisposition toward religion may manifest itself in a secular context. Previous research has suggested that a genetic predisposition toward religion is tied to a variety of characteristics such as conservatism,

obedience to authority, and the inclination to follow rituals. In this instance of evolution, it's possible that these characteristics may become widespread not for their own fitness but by hitching a ride with a high-fitness cultural practice.

More information: Robert Rowthorn. "Religion, fertility and genes: a dual inheritance model." *Proceedings of the Royal Society B*. DOI:10.1098/rspb.2010.2504