

How Genes Influence Our Politics

John Stuart Mill called it 'commonplace for political systems to have 'a party of order or stability and a party of progress or reform.'

All people are born alike - except Republicans and Democrats. [Groucho Marx](#)

Why this difference? Environment or Genetics?

We are all familiar with the fact that our environment plays a great part in shaping our political beliefs. (parental influence, family, peers, schools, life experiences.)

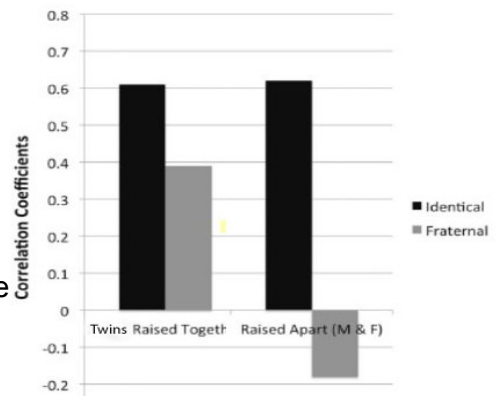
Recent research finds that, to a surprisingly large degree, our genes also shape our political beliefs and orientation. Using data collected from a large sample of fraternal and identical twins, research found that genes likely explain as much as half of why people are liberal or conservative.

Genes influence or predispose many of our political viewpoints, they do not necessarily predict or predetermine them. We will examine some neurological, physiological, and psychological factors, all of which have a genetic background which may affect our political viewpoint. We end with the more recent studies about the specific genes which affect these traits.

DISCLAIMER: Genetics do not predetermine our political views, but our inherited genes do result in predispositions or tendencies. Our DNA may predispose our political views, but even these tendencies can be overridden. I will discuss general differences between conservatives and liberals, but these differences do not necessarily apply to any particular individual.

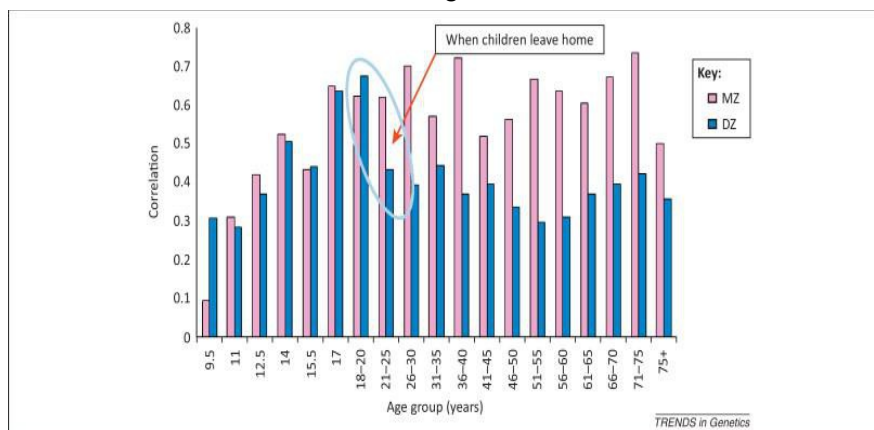
An Early Twin Study

Thomas Bouchard of the University of Minnesota in 1979 began a study involving the political orientations of twins. He compared twins raised together with those separated at birth and raised in different environments. In this study, identical twins separated at birth continued this correlation, while fraternal twins did not. Since identical twins have 100% of the same genes and fraternal twins have 50% of the same genes in general, this shows that genetics has a great influence on political views.

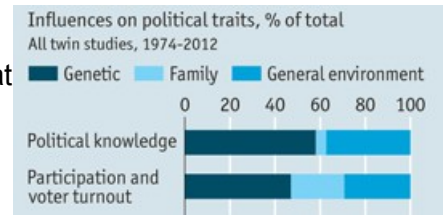


Another Twin Study

Changes in political attitudes of fraternal twins often occur about the age 20, as shown in the table below, where the genetic influence is expressed when the when the parental environment is no longer present. Just as would be expected if genes have political influence, the views of fraternal twins diverged more than did those of identical twins after age 20, when the children have left home.



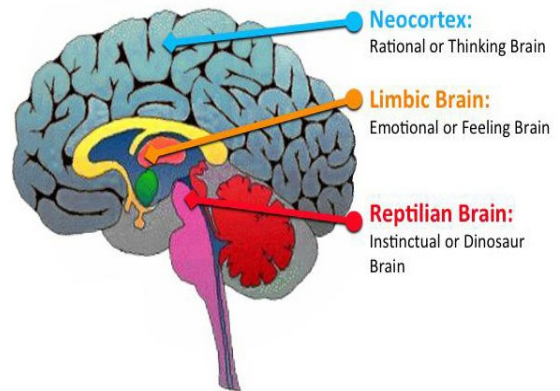
The correlations between identical and fraternal twins in twin studies can be converted to percentages of genetic influences on political traits. Based on all twin studies from 1974-2012, this table shows that nearly 60% of political knowledge is caused by genetics and just more than 40% by environment. Participation in politics and voter turnout are about 50% influenced by genetics and 50% by environment.



Neurological Factors for our Political Viewpoints

We begin with a brief study of the brain. We first think of the brain in terms of its evolutionary history using the simple triune brain theory developed by Paul MacLean. According to this theory, the following three distinct brains emerged successively in the course of evolution and now co-inhabit the human skull.

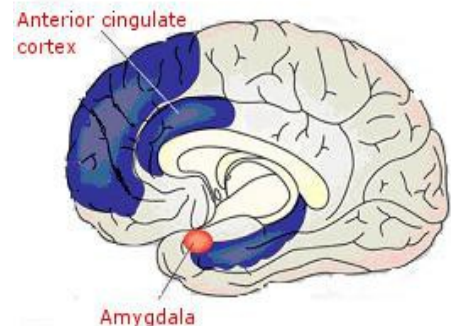
- The "reptilian brain" refers to those brain structures which control the body's sympathetic nervous system, with vital functions such as heart rate, breathing, body temperature and balance.
 - The "limbic brain" is associated with social and behaviors which arose during the age of the mammals. It can record memories of agreeable and disagreeable experiences, so it is responsible for what are called emotions in human beings.
1. The "neocortex" represents that cluster of brain structures involved in advanced cognition. It is responsible for the development of human language, abstract thought, and imagination.



These three parts of the brain do not operate independently of one another. They have established numerous interconnections through which they influence one another. The neural pathways from the limbic system to the cortex, for example, are especially well developed. Let us look at one of those pathways and how it affects our political views.

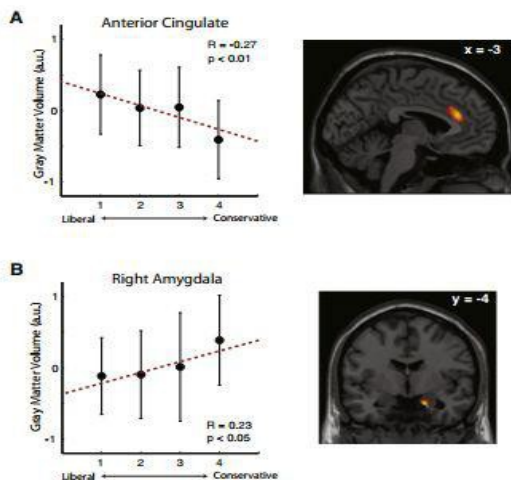
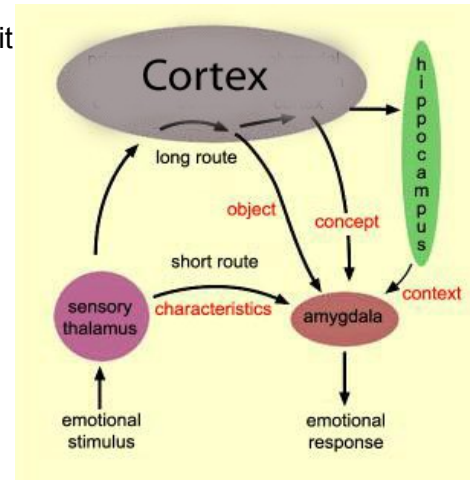
But first we consider one key part of the limbic system, the **amygdala**. This part of the brain continuously monitors sensory inputs, and has a hardwired program that looks for threats. The amygdala reacts instantaneously, like a neural tripwire, telegraphing a message of crisis to all parts of the brain.

The **anterior cingulate cortex**, which sits right on the boundary between the limbic system and the frontal lobe acts like a fulcrum, balancing our feelings and thoughts. If we get too emotional, blood flows into the limbic system, stimulating alertness, defensiveness, and fear in the amygdala. Just like a seesaw, as activity goes up in the limbic area, activity goes down in the frontal lobe. Thus, when we're angry or anxious or fearful, we stop being logical or reasonable, and our cognitive skills are suppressed



Two Pathways to Fear

When the brain receives a sensory stimulus indicating a danger, it is routed first to the thalamus, the “switchboard” for such signals. From there, the information is sent out over two parallel pathways: the “short route” and the “long route”. The short route conveys a fast (30 ms?), rough impression of the situation, because no cognition is involved. This pathway activates the amygdala which generates emotional responses before any perceptual integration has even occurred and before the mind can form a complete representation of the stimulus. The longer route may take 300 ms. Sadly, the knee-jerk responses of the amygdala may cause us to overreact to the world around us.



Relative Sizes of Amygdala and Anterior Cingulate Cortex

A 2010 study used MRI's to compare the sizes of the anterior cingulate cortex and the amygdala. Examination of the anterior cingulate shows a correlation between political attitudes and volume of the anterior cingulate cortex. This 2010 study showed a negative correlation $r = -0.27$.

Conservatives tend to have slightly larger amygdalas. The right amygdala also showed a significant correlation between political attitudes and volume. The correlation here is $r = 0.23$.

How does this affect political thinking?

The amygdala acts like the security officer of the brain, watching for problems and occasionally overreacting. It prefers stability, predictability, and less anxiety. It treats the world as dangerous and allows more instinctive, irrational, impulsive or “thoughtless” action.

The anterior cingulate cortex acts more like an auditor, monitor of conflicts, evaluating of different choices, regulating emotions and exercising cognitive control. Therefore it allows more flexible thinking, working through possible choices, more reliance on proof, data, and analytic reasoning. It permits attitudes which are more accepting of change, more hopeful, more optimistic.

Different architecture means different behavior. Liberals tend to seek out novelty and uncertainty, while conservatives react more quickly to threatening situations. The former are more willing to accept risk, while the latter tends to have more intense physical reaction to threatening stimuli, as described next.

Negativity bias, a physiological difference

The effects on political views cannot be guaranteed by the sizes of amygdala and anterior cingulate cortex but there are tendencies. Next we proceed to some physiological differences which can be measured. One such difference is negativity bias, a physiological response to negative or threatening stimuli.

The amygdala is our danger detector. It's our early warning system. It literally combs through all of the sensory input looking for any kind of a danger and putting in on high alert. It evolved during an era of human evolution when such information was important for survival, as with a tiger in the bush. Consequently, our bodies generally react more intensely to negative stimuli than to equally strong positive ones. This is called a negativity bias and it is stronger in some than in others, as shown by:

1. The Startle Reflex

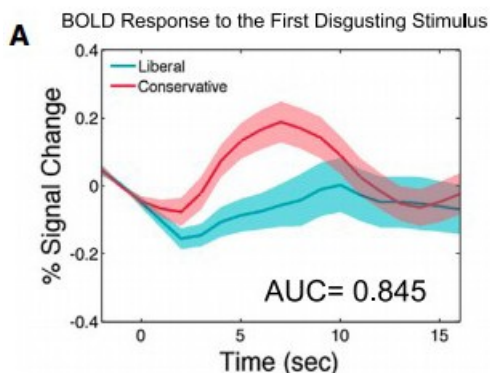
The startle response is basically a protective reflex and can be measured by eye-blink response. It serves to protect the back of the neck, (whole-body startle), or the eye (eye blink), and facilitates escape from sudden stimuli. The startle reflex can start to respond to a stimulus within 20 ms.

All participants in a test exhibited the typical eye-blink reflex in response to the noise burst, but this defensive reaction was significantly stronger for participants who held right-wing views. They demonstrated a more defensive stance on political issues, such as immigration and gun control.

2. Threatening photos

Reactions in tests for this are measured by skin conductance - arousal causes tiny amounts of perspiration, which alter how well electricity flows across the body's surface. Researchers have discovered that the individuals who had a higher physiological response to the threatening images were significantly more likely to have conservative attitudes. For instance, they tended to support capital punishment, patriotism, and the Iraq War. Those who were less startled by the threatening images generally supported pacifism, foreign aid, and liberal immigration policies. Sweating is controlled by sympathetic nervous system, therefore inherited.

3. Disgusting Photos.



This response is measured by fMRIs of brain response in the amygdala. Again, conservatives have a more pronounced response to disgusting photos.



One of the researchers said "A single disgusting image was sufficient to predict each subject's political orientation with 94% accuracy."

Psychological Factors (Personality Attributes)

There are personality differences which show up early and are not the result of environment. A study by Jack and Jeanne H. Block, published in 2006 by the Journal of Research in Personality, showed that some nursery school personality traits accurately predicted conservatism in adulthood.

3-4 year-old personality traits	23-23 year-old
Uncomfortable with uncertainty, fearful and tearful, quiet, neat, compliant, shy	Significant correlation with conservative viewpoints
Expressive, energetic, self assertive, resilient, talkative, curious, open	Significant correlation with liberal viewpoints

Psychological Factors or Personality Attributes

Many methods are used to classify personalities, such as the Big Five, Social Dominance Order, Strict vs. Nurturing Parent, Authoritarianism, etc. We will first follow a widely accepted inventory called the “Big Five” personality dimensions. Specifically, these traits are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism.

Trait	Description
O penness	Being curious, original, intellectual, creative, and open to new ideas.
C onscientiousness	Being organized, systematic, punctual, achievement-oriented, and dependable.
E xtraversion	Being outgoing, talkative, sociable, and enjoying social situations.
A greeableness	Being affable, tolerant, sensitive, trusting, kind, and warm.
N euroticism	Being anxious, irritable, temperamental, and moody.

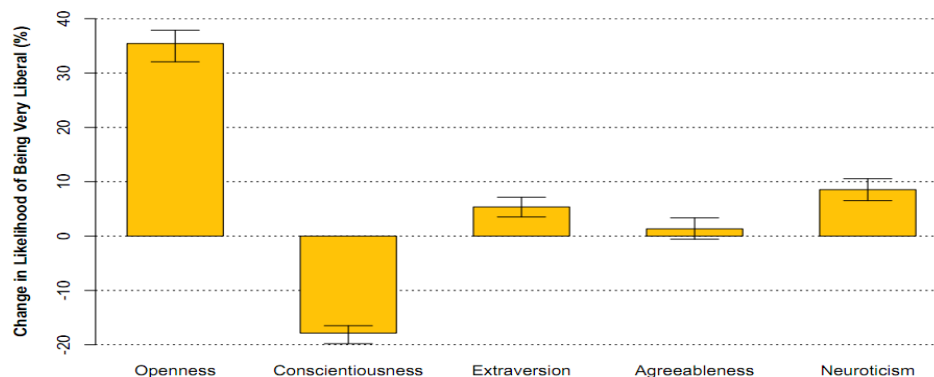
The first three dimensions (O, C, and, to a lesser degree, E) correlate fairly well with left-right voting. Undoubtedly the two most consistently found relationships are the positive effect of conscientiousness on right-wing voting and the positive effect of openness to experience on left-wing voting.

Liberals consistently score higher on a personality measure called “openness to experience,” which is easily assessed through standard questionnaires. That means liberals tend to be the kind of people who want to try new things, including new music, books, restaurants and new ideas.

Conservatives, in contrast, tend to be less open — less exploratory, less in need of change — and more “conscientious,” a trait that indicates they appreciate order and structure in their lives.

Conscientious individuals are theorized to be more conservative because they take greater heed of social norms, valuing order and accomplishments that are socially proscribed. Open-minded individuals are more accepting of unconventional social behavior that is generally associated with the left.

The chart below shows the correlation of the Big 5 traits with political viewpoints, from conservative to liberal.



Over 25 studies involving many combinations of traits have been done. Some results, especially on Conscientiousness (C), Openness(O) and Extraversion(E) are listed below:

Liberal Tendencies	Conservative Tendencies
Open, tolerant, flexible (O+)	Conventional, ordinary (O+, C-)
Creative, imaginative, curious (O+)	Stable, consistent (C+)
Expressive, enthusiastic (O+, E+)	Rigid, intolerant (O-)
Uncontrolled, impulsive (C-)	Stern, cold, mechanical (O-, E-)
Complex, nuanced (O+)	Simple, decisive (O-, C+)
Life-loving, free, unpredictable (O+, C-)	Concerned with rules, norms (C+)

Right Wing Authoritarianism

We now look at another way of classifying personality. Bob Altemeyer (1994) described the components of right wing authoritarianism (RWA) as:

- Authoritarian submission - a high degree of submissiveness to the authorities who are perceived to be established and legitimate in the society in which one lives.
- Authoritarian aggression - a general aggressiveness directed against deviants, outgroups, and other people that are perceived to be targets according to established authorities. (liberals, gays, immigrants)
- Conventionalism (or traditionalism) - a high degree of adherence to the traditions and social norms that are perceived to be endorsed by society and its established authorities, and a belief that others in one's society should also be required to adhere to these norms.

RWA (Right Wing Authoritarianism) correlates negatively with openness ($r = -0.36$) and also correlates positively with conscientiousness ($r = 0.50$), the need for war ($r = 0.50$), corporal punishment ($r = 0.4$), restriction of civil liberties ($r = 0.37$), racial prejudice ($r = 0.50$), dogmatism ($r = 0.40$), anti-intellectualism ($r = 0.37$) and aversion to ambiguity.

Ari Tuschman in *Our Political Nature: The Evolutionary Origins of What Divides Us* defines the categories of authoritarianism as tribalism, tolerance of inequality and perceptions of human nature.

- Tribalism. Tribalism breaks down into ethnocentrism (vs. the opposite force, xenophilia, which means an attraction to other groups) and religiosity (vs. secularism.)
- Tolerance of Inequality. There are two opposing moral worldviews toward inequality; one is based on the principle of egalitarianism, and the other is based on hierarchy.
- Perceptions of Human Nature. Some people see human nature as more cooperative, while others see it as more competitive.

Quantitative Genetics - in Genopolitics

Twin studies unequivocally demonstrate the heritability of politically related behavior. Differences in the brain and negativity bias imply different political viewpoints, as do personality studies. What they do not do, though, is explain the underlying biology. That is an area which is only now starting to be explored.

Genes are distinct regions of human DNA that form the blueprint for molecules that regulate the development and function of the human body. There are an estimated 25,000 genes (most of which exist in multiple copies) in the 23 pairs of chromosomes that make up all human DNA. At conception individuals inherit one-half of their DNA from each parent, with one copy of each gene coming from the mother and one copy from the father.

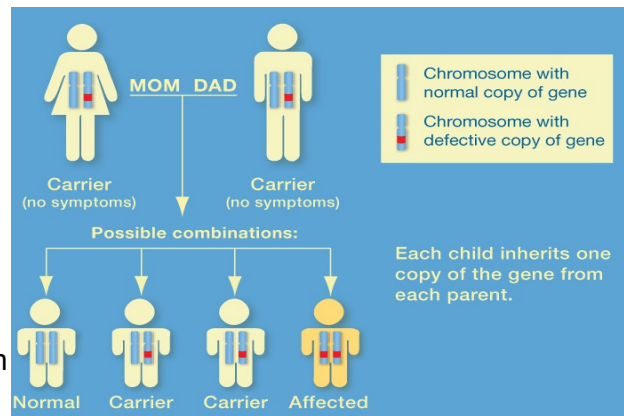
Some genes come in different versions, known as “alleles”—for example, the CFTR gene in Chromosome 7 which may have a defect which causes cystic fibrosis. This is a single-gene disorder which is recessive, which means that both parents who are carriers can give the defective gene to their child.

Unlike the CFTR gene which determines cystic fibrosis when both the defective gene is inherited from both parents, some genes are not determinative but give a predisposition or tendency. Examples are the genes BRCA1 and BRCA2 for breast cancer.

Some traits are influenced by many genes, or are polygenic. For example height is determined by many genes as well as by some environmental factors. So far 3 or 4 genes, with some 700 genetic variants, in chromosomes 7, 8 and 20 are being studied, using genomes of over 250,000 people.

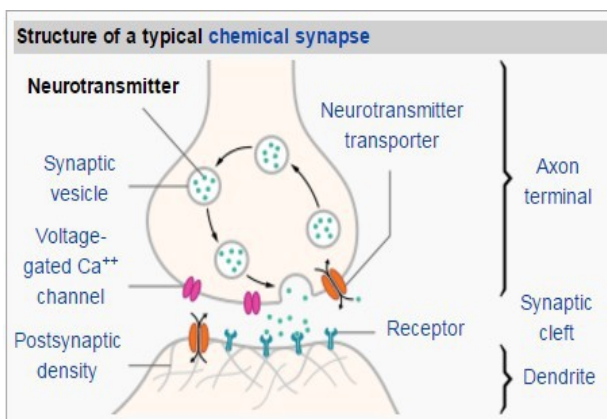
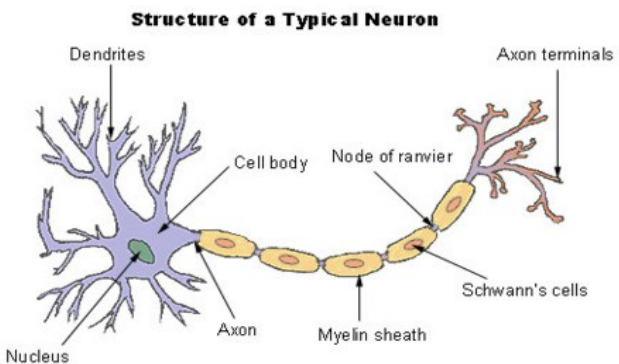
“Political” genes fall into both of these categories in that there are many genes involved and they together yield a predisposition for political viewpoints. They don’t guarantee a particular viewpoint.

To see how genetics affects our political viewpoint, we first look at one aspect of how the brain works in processing information.



Brain Activity

In the brain, there are about 100 billion neurons. They have specialized projections called dendrites and axons. Dendrites bring information to the cell body and axons send information away from the cell body. In the body of the neuron itself, this information is passed by electrical signals. Information from one neuron flows to another neuron across a **synapse**.



The synapse contains a small gap separating neurons. The information is carried by neurotransmitters, such as dopamine and serotonin, which are chemicals that carry signals from one nerve cell to another.

There are receptors in the dendrites which receive neurotransmitters from the axons of other neurons.

Research on Particular Genes

Research in 2010 from U.C. San Diego and Harvard in the Journal of Politics studied a gene, the DRD4 gene in chromosome 11, which encodes the receptor molecule for dopamine. This is probably the first research to identify a specific gene that predisposes people to certain political views.

There are two transmitters we will discuss in this talk, dopamine and serotonin. Both are necessary in the brains of all humans, but they may appear in different levels.

Dopamine plays a critical role in reward and reinforcement learning, which most of us know as feelings of pleasure and motivation. When it's released into the brain, we get that "warm glow," In a nutshell, dopamine is the brain chemical that makes us feel good.

Most liberals have genes implicated in receptors for dopamine. One such gene is a variant (allele) of DRD4 named DRD4-7R (7 repeat) which is sometimes called the "adventure gene" or the "novelty seeking gene." It causes the formation of dopamine receptors which are less efficient in receiving the dopamine from other neurons. Individuals with this gene therefore seek more reward from external sources and from their environment because they need more stimulation in order to hit a satisfying level of dopamine. Someone with another version of this gene, say DRD4-4R, may get enough dopamine as a result of their day-to-day life and not require extra dopamine. But for those who have the 7R version of the gene, the status quo doesn't do it for them.

Under normal circumstances, the neurotransmitter serotonin works for serenity and hopefulness. It operates especially in the frontal areas of the brain to inhibit the firing of the amygdala, the structure that controls fear, anger and other emotional responses.

Most conservatives have genes implicated in receptors for serotonin. Lower levels of serotonin tend to cause lack of control of the amygdala and to counteract that the individual becomes more cautious, conventional, concrete, meticulous and respectful of rules and authority. One gene which affects serotonin reception is NARG1 on chromosome 4 and it is associated with fear conditioning and aggressive behavior. Another is the 5-HTT gene on chromosome 17 which also affects serotonin receptors and produces a greater fear response and enhanced right amygdala response. Amygdala volume is significantly associated with a variation of the serotonin transporter (SLC6A4) gene and the FGF14 gene.

Even though the effects of any single gene may be small, these findings are important because the genes (collectively) give some people brains that are more (or less) reactive to threats or that produce less (or more) pleasure when exposed to novelty, change, and new experiences. These are two of the main personality factors that have consistently been found to distinguish liberals and conservatives.

Following up on Dr Fowler's work, recent research published by a team led by Dr Hatemi found a further 11 genes, different varieties of which might be responsible for inclining people towards liberalism or conservatism. These included genes involved in the regulation of three neurotransmitters — dopamine, glutamate and serotonin—and also G-protein-coupled receptors, which react to a wide variety of stimulants.

Stay tuned for further developments!!!