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Neuropsychiatric Genetics of Happiness, Friendships, and Politics: Hypothesizing Homophily ("Birds of a Feather Flock Together") as a Function of Reward Gene Polymorphisms

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Abstract

Mindful of the new evolutionary ideas related to an emerging scientific focus known as *omics*, we propose that spiritual, social, and political behaviors may be tied in part to inheritable reward gene polymorphisms, as has been demonstrated for the addictions. If so, analyses of gene polymorphisms may assist in predicting liberalism or conservatism in partisan attachments. For example, both drinking (alcohol) and obesity seem to cluster in large social networks and are influenced by friends having the same genotype, in particular the DRD2 A1 allele. Likewise, voting, voting turnout and attachment to a particular political ideology is differentially related to various reward genes (e.g., 5HTT, MOA, DRD2, and DRD4), possibly predicting liberalism or conservatism. Moreover, voters' genetic information may predict presidential outcomes more than the actual issues at hand or the presidential candidates themselves. Thus, political discussions on TV, radio, or other media may be morphed by one's reward gene polymorphisms and as such, may explain the prevalence of generations of die-hard republicans and equally entrenched democratic legacies. Indeed, even in politics, birds of a feather (homophily) flock together. We caution that our proposal should be viewed mindfully awaiting additional research before definitive statements or conclusions can be derived from the studies to date, and we encourage large scale studies to confirm these earlier reports.

Keywords: Liberalism; Conservatism; Politics; Friendships; Happiness; Reward Gene Polymorphisms

Understanding evolution in the modern genomic era may have an impact on our choice of presidential candidates as well as our friendships and ultimate happiness. Comparative genomics and systems biology offer unprecedented opportunities for testing central tenets of evolutionary biology formulated by Darwin in The Origin of Species in 1859, and expanded in the Modern Evolutionary Synthesis 100 years later into the present. According to Koonin [1] and others [2], evolutionary-genomic studies have shown that natural selection is only one of the forces that shapes genome evolution and is not quantitatively dominant; non-adaptive processes are much more prominent than previously suspected. Major contributions of horizontal gene transfer and diverse selfish genetic elements to genome evolution undermine the Tree of Life concept. Koonin [1] further suggested that an adequate depiction of evolution requires the more complex concept of a network or "forest" of life. There is no consistent tendency of evolution towards increased genomic complexity, and when complexity increases, this appears to be a non-adaptive consequence of evolution under weak purifying selection rather than an adaptation.

Setting the stage for holistic Darwinism, Corning [2] pointed out that scientists must adopt a new view of evolution based on genomic principles having an impact on happiness and friendship, as well as political attachment. These principles include: (a) appreciation for the fact that evolution is a multilevel process, from genes to ecosystems, and that interdependent co-evolution is a ubiquitous phenomenon in nature; (b) a revitalization of group selection theory, which was rejected (prematurely) by evolutionary biology over 30 years ago (groups may in fact be important evolutionary units); (c) a growing respect for the fact that the genome is not a bean bag, much less a gladiatorial arena for competing selfish genes, but a complex, interdependent, cooperating system; (d) recognition that symbiosis is an important phenomenon in nature and that symbiogenesis is a major source of innovation in evolution; (e) an array of new, more advanced game theory models, which support growing evidence that cooperation is common place in nature and not a rare exception; (f) new research that stresses the role of nurture in evolution, including developmental processes, phenotypic plasticity, social information transfer (culture), and especially behavioral innovations, as pacemakers of evolutionary change; and (g) a broad effort to account for the evolution of biological complexity — from major transition theory to a synergism hypothesis. Corning [2] further suggested that this paradigm shift has profound implications

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for the social sciences, including political theory, economic theory, and political science as a discipline.

Recently, Fowler and associates [3] pointed out that humans tend to associate with other humans who have similar characteristics. Moreover, humans are unusual as a species in that virtually all individuals form stable, non-reproductive unions to one or more friends. Along these lines, a 2002 study conducted at the University of Illinois by Diener and Seligman found that the most salient characteristics shared by the 10% of students with the highest levels of happiness and the fewest signs of depression were their strong ties to friends and family and commitment to spending time with them. "Word needs to be spread," concludes Diener. "It is important to work on social skills, close interpersonal ties and social support in order to be happy" [4].

Blum and colleagues [5] have reported evidence that family members exhibiting multiple Reward Deficiency Syndrome (RDS) types of behaviors (i.e., drug and alcohol addiction, smoking, sex addiction, pathological gambling, violence behavior, juvenile delinquency, criminal behavior, ADHD, etc.) tend exclusively to marry other individuals possessing the A1 allele of the DRD2 gene. Thus, in addiction rehabilitation clinics and mental health facilities, there is support for the old proverb, "Birds of a feather flock together." This has been referred to as homophily, has been in use since at least the mid 16th Century AD. In 1545, William Turner used a version of it in his papist satire *The Rescuing of Romish Fox*: "Byrdes of on kynde and color flok and flyeallwayes together."The first known citation in print of the currently used English version of the phrase appeared in 1599 in *The Dictionarie in Spanish and English*, which was complied by the English lexicographer John Minsheu: "Birds of a feather will flocke togither."The phrase also appears in Benjamin Jowett's 1856 translation of Plato's *Republic*. Clearly, if it were present in the original Greek text then, at around 380 BC, Plato's work would be a much earlier reference to it. What appears in Jowett's version is: "Men of my age flock together; we are birds of a feather, as the old proverb says."Plato's text can be translated in other ways, and it is safe to say it was Jowett in 1856, not Plato in 380 BC, who considered the phrase to be old. The lack of a citation of it in English prior to the 16th Century does tend to suggest that its literal translation was not present in *The Republic* — a text that was widely read by English scholars of the classics well before the 16th Century. In nature, birds of a single species do in fact frequently form flocks. Ornithologists explain this behavior as a 'safety in numbers' tactic to reduce risk of predation. In language terms, it was previously more common to refer to birds flying together than flocking together, and many early citations use that form, for example Philemon Holland's translation of *Livy's Romanehistorie*, 1600: "As commonly birds of a feather will fly together." Have we and others, especially Fowler's group, found, in part, the genetic basis for homophily? [6].

Of course, happiness is not a static state: The happiest of people — the cheeriest 10% — feel blue at times, and chronically sad people have moments of joy [7]. Moreover, happiness is subjective, and its measurement presents a challenge to social scientists. Nevertheless, interesting results were reported based on a study of 900 women in Texas who answered questions about everything they did on the previous day, including whom they were with at the time. The women rated a range of feelings during each episode (happy, impatient, depressed, worried, tired, etc.), on a seven-point scale. It turned out that the five most pleasurable and rewarding (positive) activities for these women were (in descending order) sex, socializing, relaxing, praying or meditating, and eating. Exercising and watching TV were not far behind. But way down the list was "taking care of my children," which ranked below cooking and only slightly above housework. The results of this study did not reflect the importance of the various activities to the respondents, just the activities associated with greatest feelings of pleasure.

Our overall happiness is not merely the sum of our happy moments minus the sum of our angry or sad ones. In other work, as Kahneman et al. [8] proposed, the belief that high income is associated with good mood is widespread but mostly illusory. People with above-average income are relatively satisfied with their lives but are barely happier than others in moment-to-moment experience, tend to be tenser, and do not spend more time in particularly enjoyable activities. Moreover, the effect of income on life satisfaction seems to be transient. It has been argued that people exaggerate the contribution of income to happiness because they focus, in part, on conventional achievements when evaluating their life or the lives of others [8].

Happiness goes deeper than that, Martin seligman argues in his 2002 book *Authentic Happiness* [9]. As a result of his research, he found three components of happiness: pleasure (the smiley-face piece), engagement (the depth of involvement with one's family, work, romance, and hobbies), and meaning (using personal strengths to serve some larger end). Of those three roads to a happy satisfied life, pleasure is the least consequential. He insists, "This is newsworthy because so many Americans build their lives around pursuing pleasure. It turns out that engagement and meaning are much more important." However, if one were to ask the "man on the street," a different response may turn up. One of us (KB) decided to test this notion by asking an Australian bus operator what made him happy, and the man's response was not surprising. The man replied, "*While we need a balance in our life, I am always seeking for love not just sex. But if it was only sex, what a way to go!*"

Biology, Politics, and Human Nature

One of the biggest issues in happiness and friendship research is the question of how much our happiness is under our control. In 1996, University of Minnesota researcher David Lykken published a paper looking at the role of genes in determining one's sense of satisfaction in life[10]. Lykken gathered information on 4,000 sets of twins born in Minnesota from 1936 through 1955. After comparing happiness data on identical *vs.* fraternal twins, he came to the conclusion that about 50% of one's satisfaction with life comes from genetic programming. Genes influence such traits as having a sunny, easygoing personality; dealing well with stress; and feeling low levels of anxiety and depression [11]. Lykken found that circumstantial factors like income, marital status, religion, and education contributed only about 8% to one's overall well being. He attributed the remaining percentage to "life's slings and arrows."

Because of the large influence of our genes (Figure1), Lykken proposed the idea that each of us has a happiness set point much like our set point for body weight. No matter what happens in our life — good, bad, spectacular, horrific — we tend to return in short order to our set range. According to Lykken [10], "It may be that trying to be happier is as futile as trying to be taller".

In a 1997 New York Times article on the psychology of happiness, Seligman argued, "but the cerebral virtues — curiosity, love of learning — are less strongly tied to happiness than interpersonal virtues like kindness, gratitude and capacity for love." According to Seligman [9], the real question we must ask is whether a dyed-in-the-wool pessimist

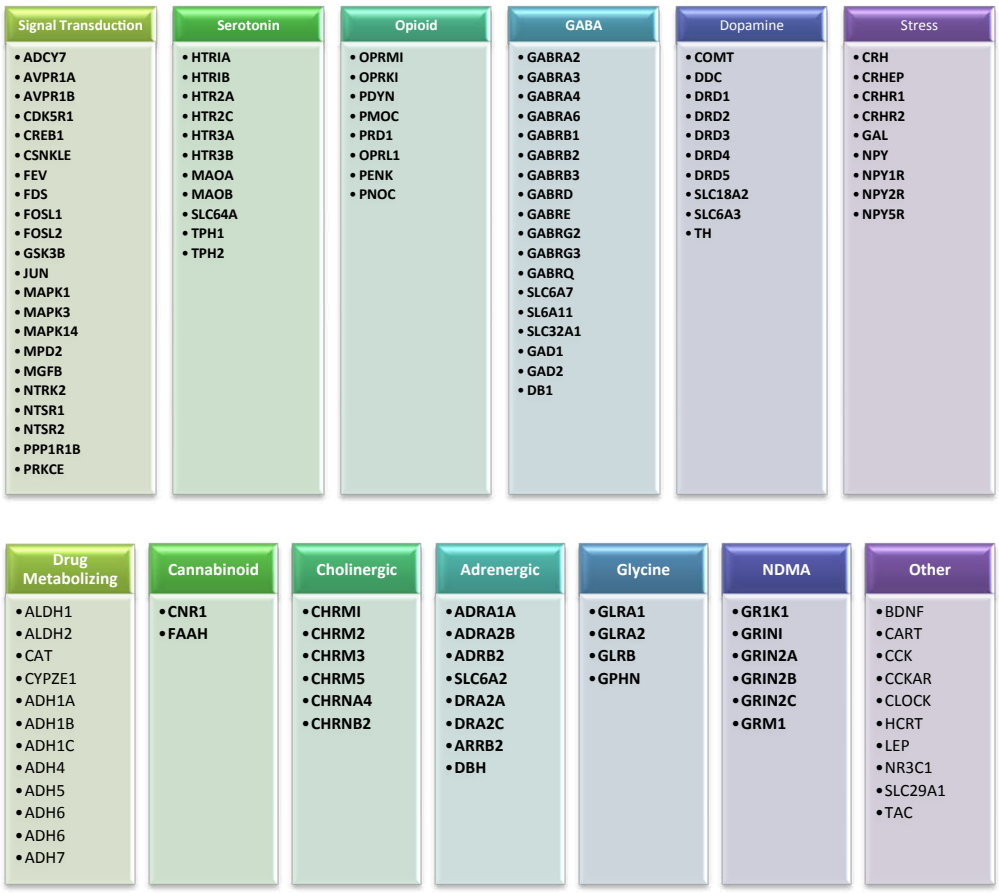

Figure 1: Haplotype Based Analysis for 130 Candidate Genes in Reward Deficiency Behaviors: Reward Dependence Pathway with a list of Candidate Genes.

can learn to see the glass as half full. The answer to some degree may reside in simple molecular rearrangement of certain genes called polymorphisms and the interaction of these polymorphic genes with environmental elements like love. There is evidence mounting that genes may play a role in everything from spirituality to politics and even to love styles.

In terms of politics, the bridge between science and public policy was highly visible in activities occurring during the Third Reich in Nazi Germany. During the Nazi period, the symbiotic relationship between human genetics and politics served to radicalize both. The dynamic between the science of human heredity and Nazi politics changed the research practice of some of the biomedical sciences housed at the Kaiser Wilhelm Institute for Anthropology, Human Heredity and Eugenics (KWIA). It also simultaneously made it easier for the Nazi state to carry out its barbaric racial program leading, finally, to the extermination of millions of so-called racial undesirables.

Can't Get No Satisfaction: "Missing the Dopamine Jackpot"

When we talk about politics and social behaviors, we must reflect on the song "Can't get no satisfaction". What do Janis Joplin, Charlie Parker (the "Bird") Billy Holiday, and Jimmy Hendrix have in common? If you want to find examples of people whose brain reward circuits have gone haywire, the world of jazz and rock stars is probably a good place to look. Earlier work supporting the "dopamine hypothesis" related to craving behavior [12,13] came as a result of work with professional athletes, rock n' roll musicians, and other celebrities [14,15]. Our first paper on the identification of polymorphisms of the dopamine (DA) D2 receptor gene and severe alcoholism led the way for the understanding of deficiencies in brain DA and sensation seeking [16]. Thus, the A1 allele yields receptors that don't work as well, and that translates into less DA firing up the reward circuits, which can lead to a tendency to abuse drugs and engage in impulsive, sensation–seeking or anti-social behavior. This includes problems forming relationships leading to low neuroticism and high extroversion [17,18].

Eisenberg and associates [19] found that carriers of the A1 allele of the dopamine D2 receptor gene were more likely to engage in early sexual activity but were less inclined to develop steady relations. This is further explained by additional work on the relationship of the DRD2 A1 allele and love styles. Others have shown that statistical analysis revealed a significant association between the DRD2 TaqI A genotypes and "Eros" (a loving style characterized by a tendency to develop intense emotional experiences based on the physical attraction to the partner), as well as between the C516T 5HT2A polymorphism and "Mania" (a possessive and dependent romantic attachment, characterized by self-defeating emotions) [20]. This putative role in attachment has attracted the attention of political scientists. Fowlers group recently published on the association of the DA DRD2 gene polymorphisms and the tendency to affiliate with a political party [21]. They hypothesized that people with more effective DRD2 receptors — that is, with one

or more A2 alleles would be more trusting and therefore more likely to join a political party. They show that individuals with the A2 allele of the D2 DA receptor gene are significantly more likely to identify as a partisan than those with the A1 allele. Further, they find that this gene's association with partisanship also mediates an indirect association between the A2 allele and voter turnout. These results are the first to identify a specific gene that may be partly responsible for the tendency to join political groups, and they may help to explain correlation in parent and child partisanship and the persistence of partisan behavior over time. This may help explain why liberals had poor voter turnout in the 2010 election. This is in agreement with the work of Comings et al. [22] whereby subjects with the G/T haplotype of the DRD2 gene tended to show a decrease in mature and an increase in neurotic and immature defense styles compared to those with the C/T haplotype. Utilizing information from the National Longitudinal Study of Adolescent Health (NLSAH), Fowlers group reported that indeed, people with two A2 alleles (and no A1 allele) were 8% more likely to form political attachments. In his landmark paper Fowler called it "the first gene ever associated with partisan attachment".

Guo et al. [23] looked for a link between social behavior (morality) and the DA D2 receptor gene by assessing delinquency rates in teenagers. The study was based on a cohort of more than 2,500 adolescents and young adults in the National Longitudinal Study of Adolescent Health in the United States. For DRD2, the trajectory of serious delinquency for the heterozygotes (A1/A2) is about 20% higher than the A2/A2 genotype and about twice as high as the A1/A1 genotype, a phenomenon sometimes described as heterosis (Comings and MacMurray 2000) (LR test, P = 0.005, 2 df). The findings on violent delinquency closely resemble those on serious delinquency and depression [23,24].

While we are cognizant of free will, we must not be so naive that we underestimate the relationship between our basic social behaviors including political persuasion and biology. The study of genes potentially promises a better understanding of the constraints imposed on basic political behavior. Thus, we agree with Fowler and associates and also argue that biologists and political scientists must work together to advance a new science of human nature [25]. This is further underscored by the work of Dev bridging the gap between biologists and physical scientists [26].

In simple terms, can we as scientists reduce the state of happiness to molecular rearrangements leading to gene polymorphisms? If this was that simple, then why not consider the following: Love relationships relate to polymorphisms of the DRD2 gene whereby carriers of A1 alleles lead to an inability to form lasting relationships involving only EROS kind of love. However carriers with the appropriate serotonin polymorphism would be potentially happier because they can form lasting relationships having romantic love styles. If that isn't enough, consider the fact that DRD2 A2 carriers are more likely to have social attachments compared to A1 carriers. This is further supported by earlier work from our lab showing the significant association of schizoid/avoidant behaviors in A1 carriers compared to A2 carriers [27]. It is well established that schizoid/avoidant behavior occurs in people that are less passionate and cannot form meaningful relationships or attachments. Couple this with genospirituality and the probability, albeit small, of genospirituality engineering, and other as yet unidentified gene polymorphisms, and what emerges is a complex map of human nature tied to the unconscious state of happiness. There are multiple genes involved in the state of happiness that are interactive and thus affect reward type of behaviors [28].

Politics and Reward Genes

Certainly anyone who has watched the Rachel MadowShow knows that liberals and conservatives butt heads when it comes to world views, but scientists have now shown that their brains are actually built differently. Specifically Kanai et al. [29] found that liberals had more gray matter in a part of the brain associated with understanding complexity, while the conservative brain was bigger in the section related to processing fear. In essence it is known that substantial differences exist in the cognitive styles of liberals and conservatives on psychological measures [30]. Variability in political attitudes reflects genetic influences and their interaction with environmental factors. Further, human beings are an incredibly social species and along with eusocial insects, engage in the largest cooperative living groups in Earth's history. Twin and family studies suggest that uniquely human characteristics such as empathy, altruism, sense of equity, love, trust, music, economic behavior, and even politics are partially hardwired. Genes such as the Arginine Vasopressin Receptor (AVP), Oxytocin Receptor (OT) and VTA neurotransmitter genes contribute to social behavior in a broad range of species from voles to man (Liu et al. 2001). Specifically, monogamous voles had higher densities of D(2)-like and OT receptor binding and lower densities of D(1)-like and V(1a) receptor binding than did promiscuous voles. Sex differences also were found; females had higher densities of OT receptor binding but lower densities of AVP(1a) receptor binding than did males in both species. Further, the laminar distribution of receptor binding indicates the possibility of an interaction between DA and OT systems in the mPFC in the regulation of social attachment [31].

Recent work has shown a correlation between liberalism and conflict-related activity measured by event-related potentials originating in the Anterior Cingulate Cortex (ACC) [30]. In a large sample of young adults, Kanai *et al.* [29]related self-reported political attitudes to gray matter volumes using structural MRI. They found that greater liberalism was associated with increased gray matter volume in the ACC, whereas greater conservatism was associated with increased volume of the right amygdala. Although their data do not determine whether these regions play a causal role in the formation of political attitudes, their results suggest a possible link between brain structure and psychological mechanisms that mediate political attitudes. Accordingly, people with a large amygdala are "more sensitive to disgust" and tend to "respond to threatening situations with more aggression than do liberals and are more sensitive to threatening facial expressions." Additionally, Kanai et al. [29] suggested that liberals are linked to larger ACC, a region that monitors "uncertainty and conflicts." Thus, it is conceivable that individuals with a larger ACC have a higher capacity to tolerate uncertainty and conflicts, allowing them to accept more liberal views.

Interestingly, the decision to vote is partly genetic, according to a study by Fowler et al. [32]. The research, by James H. Fowler and Christopher T. Dawes, of the University of California, San Diego, and Laura A. Baker, of the University of Southern California, is the first to show that genes influence participation in elections and in a wide range of political activities. Fowler and Dawes have followed this work [33] in which they identify a link between two specific genes and political participation. They show that individuals with a variant of the MAOA gene are significantly more likely to have voted in the 2000 presidential election. Their research also demonstrates a connection between a variant of the 5HTT gene and voter turnout, which is moderated by religious attendance. These are the first results ever to link specific genes to political behavior. In addition these same investigators found that

identical twins, who share 100 per cent of their genes, are significantly more similar in their voting behavior than fraternal twins who share only 50 percent of their genes on average. The results indicate that 53 per cent of the variation in voter turnout is due to differences in genes. The results also suggest that, contrary to decades of conventional wisdom, family upbringing may have little effect on children's future participatory behavior. Extensions of this research using National Longitudinal Study of Adolescent Health conducted from 1994 to 2002 supported the initial study and found that among identical twins, the researchers conclude that 72 per cent of the variance in voter turnout can be attributed to genes. Moreover, genetic-based differences extend to a broad class of acts of political participation, including donating to a campaign, contacting a government official, running for office, and attending a political rally. In a personal communication with Blum, Fowler stated, "we expected to find that genes played some role in political behavior, but we were quite surprised by the size of the effect and how widely it applies to many kinds of participation."

Furthermore, Settle et al. [34]showed, using data from the National Longitudinal Study of Adolescent Health, that among those with DA D4 receptor (*DRD4*-7R), the number of friendships a person has in adolescence is significantly associated with liberal political ideology. Among those without the gene variant, there is no association. This work is just the tip of the iceberg when confronted with multiple arrays of candidate genes affecting neurotransmission in the brain (Figure 1). All of these and possible many more second messenger genes could eventually be mapped to human nature and behaviours related to political beliefs.

Reward Gene Variations in Human Social Networks

In humans, dominance has been linked to heritable personality traits [35], and superior status interacts with multiple neurotransmitter systems such as DA D2/D3 receptor binding. High binding associates with higher social status [36-38] indicating the existence of biological systems and can be automatically and efficiently inferred [38], indicating the existence of biological systems that process social rank or social hierarchies information. A study by Zink et al. [39] provides a characterization of the neural correlates associated with processing social hierarchies in humans. Using fMRI even in the absence of explicit competition, Zink et al. demonstrated that brain responses to superiority and inferiority are dissociable, both when encountering an individual of a particular status and when faced with an outcome that can affect one's current position in the hierarchy. They found that viewing a superior individual differentially engaged perceptual-attentional, saliency, and cognitive systems, notably dorsolateral prefrontal cortex. Furthermore, social hierarchical consequences of performance were neurally dissociable and of comparable salience to monetary reward, providing a neural basis for the high motivational value of status. This work underscores the importance of hierarchy status in social networks linking status to reward circuitry a site of emotion and well-being.

In fact, according to Christakis and Fowler [40], people's happiness depends on the happiness of others with whom they are connected. They found that clusters of happy and unhappy people were visible in the network, and the relationship between people's happiness extended up to three degrees of separation (for example, to the friends of one's friends' friends). People who were surrounded by many happy people and those who were central in the network were more likely to become happy in the future. Specifically, a friend who lives within a mile (about 1.6 km) and who becomes happy increases the probability that a person is happy by 25% (95%, CI 1% to 57%). Similar effects were seen in co-resident spouses (8%, CI 0.2% to 16%), siblings who live within a mile (14%, CI 1% to 28%), and next-door neighbors (34%, CI 7% to 70%).

Using this development of a research model to define social networks [41], most recently, Fowler et al. [3] correlated genotypes in friendship networks. Using available genotype data derived from the both the National Longitudinal Study of Adolescent Health and the Framingham Heart Study they found that DRD2 A1 allele is positively correlated (homophily) and CYP2A6 (SNP rs1801272) is negatively correlated (heterophily). These unique results show that homophily and heterophily occur on an allelic level. The results suggest that association tests should include friends' genes and that theories of evolution should take into account the fact that humans might, in some sense, be metagenomic with respect to the humans around them (supporting the concept that *birds of a feather flock together* (Figure 2).

Germane to the subject of reward genes and social networks, it is important to point out the original study by Blum et al. [16] associating the DRD2 A1 allele and severe alcoholism. Further, the DRD2 A1 allele has been associated with a number of RDS behaviors [42] including body mass index (BMI) [43-47].

It is not surprising that Rosenquist et al. [48] remarkably found that clusters of drinkers and abstainers were present in the network at all time points, and the clusters extended to three degrees of separation. These clusters not only were due to selective formation of social ties among drinkers but also seemed to reflect interpersonal influence. Accordingly, changes in the alcohol consumption behavior of a person's social network had a statistically significant effect on that person's subsequent alcohol consumption behavior. The behaviors of immediate neighbors and coworkers were not significantly associated with a person's drinking behavior, but the behavior of relatives and friends was positively associated. Similarly, Christakis and Fowler [40] found that clusters of obese persons with a BMI greater or equal

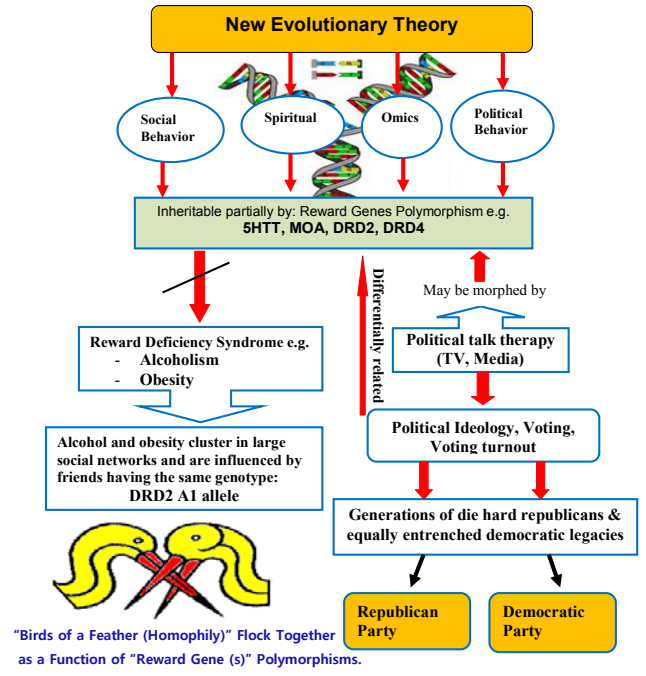

Figure 2: Genes and Politics.

to 30 were present in the network at all time points, and the clusters extended to three degrees of separation. Accordingly, these clusters did not appear to be solely attributable to the selective formation of social ties among obese persons. A person's likelihood of being obese increased by 57% (95% confidence interval [CI], 6 to 123) if he or she had a friend who became obese in a given interval. Among pairs of adult siblings, if one sibling became obese, the likelihood that the other would become obese increased by 40% (95% CI, 21 to 60). Further, if one spouse became obese, the likelihood that the other spouse would become obese increased by 37% (95% CI, 7 to 73). These effects were not seen among neighbors in the immediate geographic location. Persons of the same sex had relatively greater influence on each other than those of the opposite sex.

To reiterate, these findings are in agreement with our own findings whereby genotyping for at least the DRD2 A1 allele using RDS as a generalized phenotype in a five generational genotype study resulted in 100% of each member of the family carrying DRD2 A1 allele married a person who also carried the same genotype [49].

Conclusions

We merely have touched the surface of the complex relation of genes to friendship, happiness, and politics. We realize that over time many more gene polymorphisms will be tied to human emotions and social behaviors including happiness.

Based on a number of social science studies, it is well established that the behavioral characteristic known as attachment is tied to happiness [25]. In their book, *Loneliness: Human Nature and the Need for Social Connection* [50], modern day philosophers John T. Caioppo and William Patrick suggested that isolation could be harmful to your health, just as is smoking or a sedentary lifestyle. A large part of this effect is driven by the subjective sense of social isolation we call loneliness. New research shows that human beings are far more intertwined, hardwired, and interdependent physiologically as well as psychologically than our cultural prejudices have allowed us to acknowledge. *"If you want to go fast," says an African proverb, "go alone. If you want to go far, go together."*

Furthermore, it seems that spirituality also may be important for happiness [28]. In this case, it would be important to assess "genospirituality" polymorphisms as in the case of adrenergic and dopaminergic genes [51-54]. Keeping this in mind, if we add the associations between a number of genes, metabolic syndrome X, and/or obesity, including aberrant carbohydrate craving behavior [55] as a constraint against free will, then this will add another important barrier to happiness [56]. Certainly there is no simple winning formula to assess happiness in an individual [4]. Happiness is a transient state, but there are those who exude the positive while others dwell on the negative. It is not as simple as just being genetically programmed or hard wired at birth [19]. In essence, it is always the interaction of genes and environment that provides a Bayesian view of predictability [57]. With that said, our laboratory focused its attention to the exploration of potential genetic antecedents and nutrigenomic solutions to achieve "gene guided precision nutrition" of obesity, for example. Solve the obesity epidemic (over 30% of US population) and this will increase wellness in an individual. It is of great interest that both drinking (alcohol) and obesity seem to cluster in large social networks [5,40] and are influenced by friends who have the same genotype, in particular the DRD2 A1 allele. It is equally remarkable that voting, voting turnout and attachment to a particular political ideology is differentially related to various reward genes (e.g., 5HTT, MOA, DRD2 and DRD4).

We are cognizant that there may be other pathways involved in the very complex human trait of well-being and overall happiness. Moreover, an understanding of the dynamic relationships between the various pathways offers a potential new therapeutic paradigm on how to more effectively achieve optimal wellness; and this will better enable the improvement of cellular health, reduced drinking, fat reduction, and overall improved body composition. The findings presented herein suggest that understanding friendships and social networks may be very influential in overcoming the current alcoholism and obesity dilemma.

In terms of wellness, little is known about the genes that may regulate personality traits involved in the overall phenotype "well-being". Weiss et al. [18] used a representative sample of 973 twin pairs to test the hypothesis that heritable differences in subjective well-being are entirely accounted for by the genetic architecture of the Five-Factor Model's personality domains. Results supported this model. Subjective well-being was accounted for by unique genetic influences from Neuroticism, Extraversion, and Conscientiousness, and by a common genetic factor that influenced all five personality domains in the directions of low Neuroticism and high Extraversion, Openness, Agreeableness, and Conscientiousness. These findings indicate that subjective well-being is linked to personality by common genes and that personality may form an "affective reserve" relevant to set-point maintenance and changes in set point over time. Other results also support a differentiated view of a relationship between health and well-being, and imply that both genes and environment play important roles in their association [58,59].

Finally it is very interesting that older cultures, such as the one in Bhutan, believe that enlightenment through multiple paths, including meditation, yoga and Buddhist spiritual teachings, lead the way to satisfaction and fulfillment. In 1972 the then King of the country proclaimed that instead of measuring success by wealth or the "Gross National Product" it should be measured by "Gross National Happiness." Through many incarnations one may become enlightened and reach the ultimate state of nirvana. Buddha described nirvana as the perfect peace of the state of mind that is free from craving, anger and other afflictive states (*kilesa*). The subject is at peace with the world, has compassion for all and gives up obsessions and fixations. This peace is achieved when the existing volitional formations are pacified, and the conditions for the production of new ones are eradicated. In nirvana (*nibbana*) the root causes of craving and aversion have been extinguished such that one is no longer subject to human suffering (*dukkha*) or further states of rebirths in samsara.

Mindful of the new evolutionary theory related to the principles of the entire field known as *omics* [60], spiritual, social, and political behavior may indeed reside in part to inheritable reward gene polymorphisms predicting liberalism or conservatism partisan attachments. An important implication of these results is that genetic structure in human populations may result not only from the formation of reproductive unions, but also from the formation of friendship unions within a population governed by allelic levels.

Based on this new exciting field, the genetic evidence is providing key information pertaining to dissecting political behaviors of the American population (Tables 1 and 2). These kinds of genetic studies may unravel some of the mysteries associated with voting behaviors including turnout and partisan attachments. Wealth in the United States is conserved to include individuals with an income of $100,000 or more, which according to 144 million IRS tax returns, comprises only the top 10% of the population. Having this knowledge whereby higher status economically (10% of the working population) associates with

DRD2 - A1 allele carriers	DRD2 - A2 allele carriers
• Have tendency to abuse Drugs • Impulsive behavioral • Sensation seeking or anti-social behavior • Early sexual activity • Less inclined to develop steady relation, involving only in "Eros" kind of love • Intensive emotional experiences based on the physical attraction to the partner. • Less likely to identify as a partisan • Less likely to have social attachment • Are positively correlated (Homophily) • Significant association of schizoid/avoidant behaviors in A1 carriers compared to A2 carriers	➢ More trusting and more likely to join a political party ➢ More likely to identify as a partisan ➢ The gene's association with partisanship also mediates an indirect association between the A2 allele and voter turnout ➢ More likely to have social attachment, people with two A2 alleles (and no A1 allele) were 8% more likely to form political attachments.

Table 1: Characteristics of DRD2 - A1 and DRD2 - A2 allele carriers.

Liberalism	Conservatism
◊ Have more Gray matters in the Lateral Cingulate Cortex (LCC), the part of the brain associated with understanding complexity, and monitor(s) uncertainty and conflicts.	➢ Brain is bigger in the section related to fear (Right amygdale),
◊ Liberals have a higher capacity to tolerate uncertainty and conflicts, allowing them to accept more liberal views.	➢ People with a large amygdala are "more sensitive to disgust" and tend to "respond to threatening situations with more aggression than do liberals and are more sensitive to threatening facial expressions."
◊ *Dopamine D4 receptor (DRD4-7R),* is associated with *the number of friendships a person has in adolescence is significantly associated with liberal political ideology.*	➢ Dopamine A2 allele (DAD2-A2, is present powerfully in this group.
◊ *In America* over one-third of the population carry the DRD 2 A1 allele and tend to be poorer, vote for liberal candidates, and have poorer voter turn-out, may on a "molecular genetics" level, help explain why Republican's took hold of the House in the 2011 election.	➢ Carriers of DAD2-A2 vote for conservative party and have better voter turnout.

Table 2: Differences between Liberals and Conservative party in USA.

normal compliment of DAD2 receptors whereby these carriers of the DRD2 A2 allele and the DRD4 7R allele tend to vote for conservative candidates, help explains political behavior of these individuals. The evidence also points to a better voter turnout for these carriers as well. Thus, it is tempting to speculate that in the USA, because over one-third of the population carry the DRD 2 A1 allele and tend to be poor, vote for liberal candidates, and have low voter turnout, this may on a "molecular genetic" level reflect how Republicans took hold of the House in the 2010 election. This genetic information to an important degree may be more socially predictive in determining presidential outcomes, for example in 2012, than the actual issues at hand and/or the presidential candidates. Thus, political discussions on TV, radio, and other media may be morphed by one's reward gene polymorphisms and, as such, may help to explain the prevalence of generations of die-hard republicans and equally entrenched democratic legacies. In any case, before definitive statements or conclusions can be derived from the research findings to date, we caution that our proposal should be viewed in conjunction with results of additional forthcoming investigations, and we encourage large scale studies to confirm the earlier reports.

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