ABSTRACT

One of the most central discourses of modern philosophy identifies human beings as “causal animals” in a perpetual search for underlying causes of different occurrences they encounter. The last few decades witnessed the science of genetics advancing in leaps and bounds accompanied by increased media attention on and societal fascination with these sequences of deoxyribonucleic acid. This increased exposure to genetics has arguably increased perceptions of genetic etiology for different aspects of our lives. Regardless of the veracity of some of these genetic etiological accounts, recent emerging advances in theoretical and empirical research indicate that these etiological perceptions appear to introduce social cognitive fallacies that amount to what has been termed “genetic essentialism.” According to this framework genetic attributions increase the likelihood that an outcome is perceived as immutable, predetermined, and natural. The framework also identifies devaluation of alternative etiological accounts when genetic attributions are made salient. Lastly, according to this framework genetic attributions activate stronger discrimination based on social categorizations such as gender, race, and ethnicity. One of the common threads of these biases is the effect on perceived agency and evaluations of personal choice. Thus, perceptions of personal control and choice are reviewed through the lens of the genetic essentialism framework utilizing qualitative and quantitative research to demonstrate deleterious attitudinal, intentional, and behavioral consequences. Potential future directions to ameliorate these effects are discussed.
“I will feel so indebted to you, I couldn't possibly consider killing you,” assures the scorpion. The frog finally agrees to aid the scorpion. The scorpion hops on the frog’s back, and the frog proceeds to paddle vigorously, keeping the scorpion well above the water to prevent him from drowning. As the frog reaches midstream, however, the scorpion suddenly and viciously stings him.

As the two “companions” begin to submerge, the frog manages to croak, “You son of a scorpion! Why on earth would you do such a thing?”

“I couldn’t help it, my friend,” replied the drowning scorpion. “It's my nature.”

This known fable, often identified with Aesop, highlights the powerful constraints one’s nature is perceived to have on one's ability to choose freely. The longevity of this fable illustrates an additional element - the resonance that such an explanation may have among the readers. The true nature, or essence, of various organisms, such as lower vertebrates, four legged mammals, or even people, may have been hypothesized to sit in different parts of the organisms’ bodies throughout history. However, the belief in the choice-restricting properties of such perceived essence is arguably as persistent and prevalent today as it has ever been.

Consistent with a number of theoretical accounts (e.g., Dar-Nimrod and Heine, 2011a; Gelman, 2003; Medin and Ortony, 1989) and empirical evidence (Brescoll and LaFrance, 2004; Dar-Nimrod, Heine, Cheung, and Schaller, 2011; Gil-White, 2001; Sousa, Atran, and Medin, 2002) many people, like the scorpion, often trace behavior back to “nature”. They tend to attribute others' behavior to intrinsic, fundamental properties and, in turn, group individuals with perceived shared essence (e.g., Prentice and Miller, 2006). These classifications aid people in constructing lay theories in order to better understand themselves and others (Rothbart and Taylor, 1992). This cognitive construct, termed psychological essentialism, postulates that “people (children and adults) maintain a dual assumption: (a) that the world has a natural order that is not imposed by the observer; (b) that the symbolic system humans use to represent the world (namely, concepts and words) maps onto this natural order” (Gelman and Diesendruck, 1999, pp. 92).

A more specific essentialist framework called genetic essentialism focuses on the tendency to infer an individual's characteristics and behaviors from his or her genetic makeup – a view which may be encapsulated by the catch phrase, “you are your genes.” This framework identifies a slew of misconceptions regarding the nature of outcomes borne from genetic attributions. Dar-Nimrod and Heine (2011a) enlist and elaborate on the social cognitive biases that seem to follow such attributions. First, and perhaps most important in our discussion of choice, belief in the genetic etiology for an outcome may lead people to view the outcome as immutable and determined. Such a biased perception increases the likelihood that the relevant outcome is perceived to unfold based largely on some unseen, yet powerful, genetic processes. This perception in turn results in the devaluation of competing etiological accounts that focus on the environment, personal experiences, and - most relevant to our discussion - choices individuals make.

Second, perception of genetic etiology increases the likelihood that the outcome will be viewed as a natural process (Dar-Nimrod and Heine, 2011a). For example, it may be viewed as natural for a person who has a gene that is purportedly associated with risk-taking tendencies to engage in certain behaviors such as bungee jumping or deep sea diving. The tendency to perceive behavior that is associated with genes as a natural element may incite the naturalistic fallacy, which refers to the development of a relationship between ethics and natural properties of the individual - that is, the ought is confounded with what is (Moore, 1903). In some domains, elements considered to be natural tendencies are therefore judged as more morally permissible or acceptable than tendencies considered unnatural or artificial. The naturalistic fallacy can vary in its “activation” based on the perceived agency associated with the behavior. For example, the fallacy will emerge more prominently during consideration of criminal behavior than of biological sex. Criminal behavior allows for some element
of volition or choice, while sex cannot be controlled. The natural “component” of genetic essentialism, therefore, relies heavily on perceived volition. Behaviors seemingly devoid of any personal control or choice are more likely to be deemed morally permissible in as much as they are viewed as “natural”, gaining more acceptance than those seen as springing from forces that are not grounded in one’s nature. Indeed, perceived genetic propensities for specific behaviors have been empirically associated with the naturalistic fallacy (Ismail, Martens, Landau, Greenberg, and Weise, 2011).

Third, perceived genetic etiology increases the likelihood that people will gauge outcomes as having a specific etiology, which infers a one-to-one relationship between a relevant gene and outcome (Dar-Nimrod and Heine, 2011a). The presence of a certain gene or genes is often taken as an indication of the presence of a certain condition. This may also work in the opposite manner in which the absence of a gene or genes is taken as an indication of the absence of a condition (e.g., in as much as a ‘gene for homosexuality’ exists, a person who does not possess the relevant allele is judged as heterosexual; the absence of the gene is an indication of the absence of the condition). This specific etiology bias, as does the immutability bias, leads to a significant downplay of potentially relevant external influences like the environment and choice.

Lastly, genetic attributions increase the likelihood that people will view groups with a shared genetic basis as more homogeneous and discrete from other groups (Dar-Nimrod and Heine, 2011a). Simply put, members of a group that is perceived to share relevant genes are viewed as more similar to one another, and as having an increased potential to manifest a particular condition in a way that differentiates them from out-group members. Such a bias may also affect the perception of the ability of group members to exercise an unconstrained choice in the relevant domain (e.g., people who are perceived as having genetic susceptibility for obesity are more likely to be viewed as individuals who have reduced ability to control their diet).

Genetic essentialist biases encompass the deterministic element infused into public understanding of genes. Popular media serves as the principal means by which people receive information about scientific advancements in the field of genetics (Conrad, 1997). The media often oversimplifies the plethora of research to make it approachable to the public, detracting from the complexity that aids in its accuracy (Conrad, 1997, 2002; Dar-Nimrod, 2007). Media outlets may also insert their own agenda into, and manipulate, the findings for their own distinct intents and purposes (Brescoll and LaFrance, 2004). Additionally, scientists quoted in the media often speak of “the gene” that can provide definitive answers to all of our burning questions. Its identification, they claim, is enough to revamp a number of interventions to combat whatever ailment the “hot gene” influences. The media can be a highly effective tool to promote essentialist thinking, whether intentional or not.

These essentialist biases contribute to an inclination to falsely use “strong genetic explanations” (Turkheimer, 1998, p. 786) in discussions of genotype-phenotype interconnectivity. Strong genetic explanations, which refer to the assumption that a condition is most likely to be present merely due to the existence of a specific gene, can certainly account for certain monogenic disorders, such as Huntington's disease, and other disorders that involve few genes. It is acceptable to say that conditions with a relatively clear biochemical causal chain have a specific etiology, are natural, and are largely determined by the individual's genetic disposition. The biased reaction is evident when people extrapolate from strong genetic explanations to delineate the origin of a multitude of biological, social, and cognitive human conditions that do not have as clear-cut of a biochemical causal chain. In reality, only a minute subset of disorders calls for such strong genetic explanations (approximately 2%; Jablonka and Lamb, 2006). Even disorders that have a strong link to a specific gene possess a rich biological complexity that scientists do not entirely understand even after years of dedicated research (Pearson, 2009). The majority of genetic conditions at best have “weak genetic explanations” (Turkheimer, 1998, p. 786); that is, a condition may have some semblance of a genetic root, but its presentation may also depend on a number of environmental and developmental factors. Despite the
weak-strong distinction, many still single genes out more strongly as etiological causes compared to other valid explanations (i.e., the environment, personal experience, etc.) for a number of human phenomena in line with the genetic essentialist framework (Hinshaw and Stier, 2008).

Genetic essentialism most directly affects our perception of personal agency. Again, by neglecting the situational, cultural, and other social influences, we often submit to a deterministic perception of genes. If the bases are sequenced or the chromosomes are arranged in a certain fashion, individuals may see little that can alter the supposedly unalterable, including free will. Genetic fatalism, the term given to this thinking style, suggests that a behavior that possesses some sort of genetic component is perceived as stable and uncontrollable (Alper and Beckwith, 1993). These behaviors cannot be “helped,” as the scorpion divulged to the frog in its last breath. Generally, characteristics or behaviors explained in terms of genetics are offered as alternatives to will-directed behaviors. For example, genetic information for a health risk, compared to family history and medical test results, correlates with the greatest sense of reduced control over the manifestation of that health risk (Claassen et al., 2010). Smokers given a genetic explanation for their unhealthy habit cited less perceived control over smoking initiation, highlighting a reduction in their evaluation of their own choice in the behavior (Wright et al., 2007). Furthermore, parents of children at risk for developing familial hypercholesterolaemia (FH), an inherited predisposition to heart disease, viewed the screening results as more inescapable and life-threatening if they interpreted the risk as stemming from genetic causal origins (Senior, Marteau, and Peters, 1999).

Fatalistic biases can also affect the judicial system in evaluation of the source of deviant behavior. One striking example recounted by Cooper Dreyfuss and Nelkin (1992) compared two similar court cases in which two attorneys accused of misappropriating their clients’ funds faced disbarment at the same high court in California. Both defendants identified alcoholism as the primary reason behind the misdemeanor; however, one of the attorneys argued that he had a genetic predisposition to the disease. The court ultimately placed him on probation and allowed him to continue his practice, while the other attorney, who did not mention a genetic predisposition, was disbarred. Mirroring these actual events, in a more controlled laboratory setting, Monterosso et al. (2005) presented subjects with scenes depicting various criminal or frowned upon behaviors and described each act as having either a biological or experiential cause. When the behaviors were explained by alluding to experiential causes they elicited less sympathy for the culprits, induced more perceived volition on the part of the culprits, and increased punitive tendencies toward the culprit compared with biological/genetic explanations. Once genes enter the equation, the perception of control and its correlate, perceived unconstrained choice, are seemingly affected.

A perceived lack of volition, in particular, leads to a number of ramifications that can influence the way in which we view others’ behaviors. Dar-Nimrod et al. (2011) investigated the impact of evolutionary explanations for male sexual misconduct (e.g., rape) versus social constructivist explanations, which look to social and cultural experiences to explain human behavior. Male participants exposed to a social constructivist explanation for an account of date rape judged the aggressor more harshly and supported harsher punishment in the form of more prison time for the accused compared with men in the evolutionary condition, which emphasized the effects of genes and inheritance. In accordance with the above-mentioned framework that highlights the relationship between genetic attributions and choice, the data indicated that the aggressor’s behavior was judged more harshly partially because the participants evaluated the aggressor as having less control over his

1 Interestingly, however, the belief in reduced personal agency did not deter subjects from attempting to quit (Wright et al., 2007).
behavior (e.g., less choice in the way he behaved) in the evolutionary condition compared with the social constructivist condition.

Genetics research has had an overwhelming impact on the way in which people come to view mental illness. Essentialist beliefs originating from such research can have a two-fold effect on the perception of mental illness. A genetic explanation for mental illness can lead to the naturalistic fallacy, inducing greater sympathy for those suffering from mental illness, less perceived control, and greater perceived immutability (Angermeyer and Matschinger, 2004; Baker and Menken, 2001; Weiner, Perry, and Magnusson, 1988). Alternatively, these assumptions may widen the gap between those who do and do not have a mental illness and may cause people to view the undesirable behaviors associated with mental illness as unyielding (Haslam, 2011; Phelan, Cruz–Rojas, and Reiff, 2002; Schnittker, 2008). Phelan (2005) analyzed the effect of genetic causality on attitudes towards mental illness. Genetic attributions were associated with a view of the illness (in this instance, either schizophrenia or major depression) as more severe, persistent, and transmittable to relatives of the person in question compared with other etiological explanations. Genetic models of mental illness elicit a grab-bag of cognitive and behavioral outcomes on the part of “onlookers”. Most notably for our discussion of choice, genetic essentialist biases engender the notion of mental illness as discrete, immutable, and derived from a specific etiology, which leads to overall reduced perceived agency on the part of the mentally ill individual. Stripping the individual of his or her volition to act according to his or her own (arguably rational) choice, such perception is likely to have affected the observed increased association between schizophrenia and dangerousness when genes were used as an etiological explanation.

The discovery and popularization within the media of “the gay gene” (which followed Hamer et al., 1993 influential paper that identified a genetic marker associated with homosexuality among men) have arguably contributed to a phenomenon in which many people began to view homosexuality through a genetically skewed lens. Such knowledge of purported genetic causality can lead to decreased prejudice towards homosexuals (Horvath and Ryan, 2003; Jayaratne et al., 2006; Landen and Innala, 2002). Consistent with Weiner et al. (1988), the perceived immutability of homosexuality once it is believed to emerge from one’s DNA may also diffuse anti-gay sentiments. This particular essentialist bias leads people to view the sexual orientation and the associated behaviors as uncontrollable, which arguably brings about more sympathy and less repudiation (Weiner et al., 1988). Under the present political climate genetic essentialism may act to increase acceptance of homosexuality. However, increased perception of genes as THE cause of homosexuality also raises eugenic concerns (i.e., prenatal genetic testing design to “determine” the fetus’s sexual orientation and allow the expecting parents to make pregnancy termination decisions). Such concerns are helping to move the discussion about homosexuality away from the etiological realm (e.g., Hegarty, 2002).

Essentialism does not affect our perception of the external world alone. It can alter our own intentions and behaviors as well. According to the Theory of Planned Behavior (Azjen, 1991), intentions are the best predictors of a person’s behavior. There are three fundamental factors that contribute to intention: belief in the contingency between one's behavior and a given outcome; the perceived social pressure to engage in a behavior; and perceived ability (control) to complete a behavior. Beauchamp, Rhodes, Kreutzerc, and Rupert (2011) tested the consequences of various causal explanations on intent to exercise in generally inactive individuals. Subjects in this study were presented with one of two fictional news reports – an account that documented the discovery of a genetic variable associated with physical inactivity, or an account that provided an experiential account for inactivity. Results indicated that subjects given an experiential explanation exhibited greater perceived self-efficacy and intent to exercise than those given a genetic explanation. Participants in the experiential condition judged themselves to have more personal control over their exercising habits and more drive to initiate exercise for the two-week period following the experiment.
Participants in the genetics condition scored on par with the control group, indicating no increased desire to exercise or confidence in their ability to do so.

The effects of genetic essentialism can extend beyond intention to the actual behaviors put forth by individuals. While a number of such behaviors can be assessed, Dar-Nimrod and Heine (2006) evaluated actual performance with important academic implications. In one of their studies, one hundred and thirty-two women completed a GRE-like exam (similar to the standardized exam that serves as a key component in admission to graduate school) with a verbal section and two math sections. Following the first math section, the verbal section consisted, among other tasks, of an essay with one of the following accounts: (1) a genetic account for sex differences in math ability which supports the stereotype that women have inferior ability in mathematics compared with men; (2) an experiential account for the same stereotype-consistent sex difference; (3) an unrelated gender prime, activating the gender concept among the participants in a manner that has been shown to decrease performance (see Stereotype Threat- Steele and Aronson, 1995); and (4) a scientific account which indicates that there are no math-related performance differences between the sexes. Following the verbal section with its integrated manipulation the participants had to complete a second math section. The results indicated that women who read the experiential and no-difference essays scored markedly better on the second math exam than did the women who read the genetic and gender prime (this is consistent with the Stereotype Threat phenomenon in which activating the membership in a stereotype group leads individuals to show stereotype-consistent behavior). Women who received a genetic explanation for the difference were arguably more discouraged by the hard math test, as they judged their difficulties as an indication of an immutable reduced ability in mathematics. This lends to a sort of “self-fulfilling prophecy”, in that women who experience reduced control over their mathematic performance which stems from reading the genetic account may ultimately manifest the stereotyped behavior (i.e., performing less than optimally on a math exam), whereas women who learn of an alternative account for the same stereotype do not show such debilitating effects.

Moe and Pazzaglia (2010) extended this line of research and sought to examine the effect of stressing the importance of personal effort versus genetically driven ability on a Mental Rotation Test’s (MRT) performance from high school students. Participants who received instructions containing effort-based support (e.g., “Anyone can succeed on this task by putting in the effort and using the right strategies.”) scored significantly higher on the MRT than participants who received instructions containing genetic information (e.g., “Based on genetics research, some individuals can succeed in this task without any effort, while others are unable to improve their performance, despite the effort put forth”). These results suggest that explanations of success that champion effort as the prominent factor give people a sense of control over important outcomes. They believe their actions and motivation level will directly influence goal attainment. Therefore, they will feel more inclined to put forth the necessary effort to achieve their goals. When told that their genes determine their rate of success, however, people will view outcomes as independent of their personal control. They may think to themselves, “I’m stuck with this skill set that is never going to change, so why should I even try to improve?” As a result, the less effort put in may result in reduced eventual success.

The association between perceived genetic etiology and performance on academic or aptitude tests may have an additional implication for the study of choice. Much research has indicated that women play a much smaller role in STEM (science, technology, engineering, and mathematics) professions (e.g., Hill, Corbett, and St Rose, 2010). The choice of professions is undoubtedly affected by perceived competence to succeed in the chosen vocation. This perceived competence as we have reviewed is malleable and is arguably affected by etiological attributions. Given much of the effort that is being exerted on increasing women’s representation in STEM professions by the creation of infrastructure that supports women’s choice of these professions (e.g., Inkelas, 2011), it may be of much importance to address the cognitive biases that seem to accompany genetic attributions in such a
manner that even if some sex differences in math will be found to have unequivocal research support (as some scholars have been strongly arguing: Benbow and Stanley, 1981; Pinker, 2005) the professional choices of women will not be adversely affected.

The association between perception of genetic etiology and choice can also affect other important behaviors, not least among them, health behaviors. Wang and Coups (2010) surveyed individuals about their views on the origins of obesity, as well as their physical activity levels and healthy food intake. The majority of those surveyed endorsed individual lifestyle choices as the root of obesity (72%). The belief in obesity stemming from people making a conscious, self-perpetuated decision correlated with greater instances of self-reported physical activity. A minority of the participants (19%) who cited genes as the primary etiological cause for obesity, in contrast, reported lower levels of physical activity and healthy food consumption. This arguably reflects a lack of perceived control over the onset of the condition, leading to more fatalistic behavior. Such associations are potentially alarming to the extent that they indicate that a belief in a genetic underlying basis for obesity causes an increase in unhealthy behaviors. It suggests that people evaluate their lifestyle choices as less important in determining their weight once genetic attributions enter the picture, and subsequently may engage in deleterious behaviors.

**CONCLUSIONS AND FUTURE DIRECTIONS**

As we have noted, genetic essentialism can produce some detrimental effects, particularly with respect to our perception of volition, autonomy, and personal choice. A number of recent research findings indicate that an increased perception of genetic etiology leads to a reduction in the sense of personal agency and ultimately the sense that one can choose freely in an unconstrained manner. However, such associations are reflective of cognitive biases more than indicators of current scientific understanding of the actual genotype-phenotype relationships (Charney, in press). As such effects influence important aspects of people lives such as performance on tests, evaluations of outgroup members, and health behaviors to name a few, it is vital to explore methods designed to reduce these biases (Dar-Nimrod, in press).

Dar Nimrod and Heine (2011b) strongly endorse an emphasis on the interactionist perspective, which highlights the current scientific consensus that most outcomes are a function of interactions between genes and environment, as a way to reduce the genetic essentialist biases and increase personal sense of agency. There is not much research to test this proposition, but early indications suggest it might be a worthy avenue to explore. Walker and Read (2002) found, similar to other abovementioned studies, that exposure to a genetic explanation for schizophrenia led to increased negative attitudes towards people with schizophrenia and perceptions of dangerousness and unpredictability. However, these researchers also included an additional condition in their study in which people learned of an interactionist explanation focusing on the combined effect of both genetic and environmental factors. Walker and Read's results indicated that this interactionist account not only served as a better portrayal of our current scientific understanding of these illnesses, it also did not increase negative evaluations of schizophrenia as the genetic account did. Such findings, which are unique in the research literature, suggest that more intricate, detailed explanations that describe the rich relationship between genotypes and phenotypes will lead to reduced essentialist thinking, bringing back to the forefront people's sense of the relevance of personal choice.
REFERENCES


