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## The Perennial Debate: Nature, Nurture, or Choice? Black and White Americans' Explanations for Individual Differences

**Toby Epstein Jayaratne,**

University of Michigan, Ann Arbor

**Susan A. Gelman,**

University of Michigan, Ann Arbor

**Merle Feldbaum,**

University of Michigan, Ann Arbor

**Jane P. Sheldon,**

University of Michigan, Dearborn

**Elizabeth M. Petty, and**

University of Michigan, Ann Arbor

**Sharon L.R. Kardia**

University of Michigan, Ann Arbor

### Abstract

This paper examines three common explanations for human characteristics: genes, the environment, and choice. Based on data from a representative sample of White and Black Americans, respondents indicated how much they believed each factor influenced individual differences in athleticism, nurturance, drive, math ability, violence, intelligence, and sexual orientation. Results show that across traits: 1) Black respondents generally favor choice and reject genetic explanations, whereas White respondents indicate less causal consistency; 2) although a sizeable subset of respondents endorse just one factor, most report multiple factors as at least partly influential; and 3) among White respondents greater endorsement of genetic explanations is associated with less acceptance of choice and the environment, although among Black respondents a negative relationship holds only between genes and choice. The social relevance of these findings is discussed within the context of the attribution, essentialism and lay theory literature. The results underscore the need to consider more complex and nuanced issues than are implied by the simplistic, unidimensional character of the nature/nurture and determinism/free will debates — perennial controversies that have significance in the current genomic era.

### Keywords

attributions; nature/nurture; determinism/free will; genetic explanations

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“Infidelity? It may be in our genes.” - *Time* magazine cover story, 1995

“I’m depraved on account I’m deprived.” - “Gee, Officer Krupke” (*West Side Story*)

“Is being hooked a choice?” - *Salon* article, 2000

Why do people behave the way they do? Why do individuals have particular talents, skills, and abilities? Although various causal factors have been proposed, three explanations with strong social relevance have emerged as prominent: genes, the environment, and personal choice. These three factors play a central role in two major ongoing debates. The first, commonly termed the “nature/nurture” question, is typically conceptualized as a contrast between genetic (nature) and environmental (nurture) explanation. The second debate, frequently referred to as “determinism/free will,” generally focuses on whether human nature is controlled by natural laws (genetic factors) and is therefore somewhat “determined,” or is influenced by free will (personal choice). Although scholars note the obvious fallacies of framing these controversies in stark, “either/or” terms (e.g., Moore, 2001), it is crucial to understand the relative roles of these factors in people’s everyday construals, especially given that commonsense explanations that people provide have important implications for how they react to their own and others’ behaviors (Buchanan & Seligman, 1995; Weiner, 1986). This paper addresses two key questions: (1) which explanatory factor(s) do people offer to explain human characteristics? and (2) what are the interrelations among the perceived causal factors? Furthermore, given that causal beliefs often differ by ethnicity and social group (e.g., Marcus & Kitayama, 1991), our analysis considers the potential effect of ethnic group on these perceptions.

What is the significance of our questions? First, burgeoning genetic research and the ensuing media coverage touting genetic discoveries for a wide range of human characteristics have likely influenced popular opinion about the origins of human traits, in the form of causal explanation (Brescoll & LaFrance, 2004). Causal explanations have significant consequences as they are linked to numerous attitudes, beliefs, and behaviors in the social and political domains (e.g., Dweck, Chiu, & Hong, 1995; Weiner, 1986). For example, genetic explanations are associated with stereotyping and prejudice (Keller, 2005), environmental explanations are linked to policy decisions regarding poverty initiatives (Hughes & Tuch, 2000), and choice explanations predict anti-gay attitudes (Jayaratne et al., 2006). Second, the interrelationships among causal factors are significant because, if factors are perceived as correlated, then beliefs about one factor will affect beliefs about other, correlated factors (e.g., genetic implies non-environmental). Furthermore, because it is widely accepted among scientists that genes and the environment interact in complex ways to account for virtually all human characteristics (e.g., Moore, 2001), lay beliefs about the association between these factors have significance for scientific literacy.

Despite their potential importance, these questions have received scant attention in the research literature. The few polls or surveys that explore these issues (e.g., Gallup Organization, 2004; Gene Media Forum, 2001) are limited in that they generally: 1) assess beliefs about one or two causal factors, but not all three, 2) ask people to select among explanatory factors, rather than measuring various causal beliefs independently, 3) explore beliefs about causal influences on only one or two traits, and 4) employ small, select samples of respondents whose views do not necessarily represent those of most Americans. Addressing each of these limitations, we investigated more fully how Black and White Americans think about the contribution of genes, the environment, and personal choice to seven human characteristics: athleticism, nurturance, drive to succeed, math ability, tendency toward violence, intelligence, and sexual orientation. We selected these traits for their strong social relevance and because each has been featured in theoretical debates about nature/nurture or determinism/free will (e.g., Malik, 2000; Alper et al., 2002). Furthermore, several of these traits have figured prominently in recent research on essentialism (e.g., Haslam et al., 2000) and attribution theory (e.g., Fields & McNamara, 2003).

## Predictions from Theoretical and Popular Perspectives

Genetic, environmental, and choice explanations for individual differences function as both attributions and lay theories. We therefore employed the literature in these domains to help frame the broader conceptual issues in our investigation. Additionally, we considered how these causal factors are portrayed in popular culture, since such information likely reflects, as well as influences, public opinion.

Attribution research, much of it in the area of achievement motivation, demonstrates that it is not so much the causal explanation itself that is significant, but rather underlying causal dimensions associated with an explanation that provide meaning (Weiner, 1986, 1995). The most prominent and useful causal dimensions implied by genetic, environmental, and choice explanations are stability and controllability<sup>1</sup> (see Anderson, Krull, & Weiner, 1996; Taylor & McKirnan, 1984). Traditionally, genetic characteristics are considered stable and uncontrollable, whereas characteristics due to choice are perceived to be malleable and controllable. Unlike either genetic or choice factors, environmental causes vary more in terms of how much stability and controllability they typically imply. However, the environment tends to be seen as relatively malleable and controllable, more akin to choice than genes. These conventional interpretations of causal dimensionality are reflected in the media (e.g., Scott, 1993), in popular literature (e.g., March, 1954), in scholarship on social and ethical issues (e.g., Andrews, 1999), and in advocacy for social policy (e.g., Wood & Bartkowski, 2004). An extensive research literature documents that beliefs about the stability and controllability of traits function to support a multitude of social and political attitudes, beliefs, and ideologies (e.g., Dweck et al., 1995; Weiner, 1995).

### Preference for explanations

The dissimilar causal dimensionality of genetic, environmental, and choice explanations suggests that these factors may function in distinct ways. For example, because genetic explanations imply stability, they can be associated with stigma (e.g., genetic defects; Phelan, 2005) or can serve as a rationale for the current social order (e.g., Kevles, 1985; Lerner, 1992). Genetic explanations, implying uncontrollability, can also minimize blame (Monterosso, Royzman, & Schwartz, 2005; Weiner, 1995). Choice, signifying controllability, might be favored to assign credit or blame for outcomes, and thus is used for moral emphasis (Sousa, 2006). Environmental explanations have commonly been employed to call for social change through policy, but can take on many uses, in part, depending on what environmental component is targeted (Hughes & Tuch, 2000). In sum, preference for an explanation ought to be linked to its functional meaning and so reflect cultural, personal, political, and social group values.

Lay causal beliefs may also be influenced by and affect popular discourse. For instance, emphasis on genetic contributions to certain traits in the mainstream media may increase public receptivity to genetic explanations (Brescoll & LaFrance, 2004; Nelkin & Lindee, 1995). For other traits, public discussion tends to focus on environmental explanations. For example, news reports concerning acts of violence often note the perpetrator's upbringing, social dynamics, or proximate precipitating factors (McManus & Dorfman, 2002). For behaviors commonly framed as moral issues (e.g., sexual orientation), choice explanations are often salient in public dialogue because choice implies moral responsibility (Jayaratne et al., 2006). Finally, for some traits, multiple causal factors are frequently offered. This appears to be the case with

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<sup>1</sup>Although a third causal dimension, internality/externality or causal locus, is discussed in the literature, it is problematic for the case of genetic explanations because genes can be physically internal but function as if they were psychologically external entities (akin to contagious agents—relatively uncontrollable and thus apart from oneself; see Schmitt & Branscombe, 2002 for other concerns about this causal dimension).

athleticism, where coaching or parental encouragement (environment), natural talent or physical attributes (genetic), and motivation or hard work (implying choice) have all been invoked.

Based on these differences across traits, we expect causal accounts to vary by characteristic. However, in light of the fact that 1) genetic explanations have historically been linked to racism (e.g., Rushton & Jensen, 2005; also see Kevles, 1985), and 2) individuals in disadvantaged groups tend to prefer structural or environmental explanations (Hunt, 2004; also see Crocker et al., 1999), thus placing blame for their low status on the system, we also expect Black Americans as a group will generally shun genetic accounts (consistent with work by Schnittker, Freese, & Powell, 2000) and favor environmental ones.

We also predict that typically *multiple* factors will be endorsed. This finding would be consistent with research indicating that people often access a variety of causal frameworks (Evans, 2001; also see Rosengren, Johnson, & Harris, 2000). Although invoking more than one factor (e.g., genes and choice) may sometimes appear contradictory, people are creative in forming explanatory accounts to suit their needs and values (Legare & Gelman, in press).

### Interrelations among causal factors

The opposing character of the traditional causal dimensions (stable vs. malleable, controllable vs. uncontrollable) suggests that most people will perceive genetic and choice factors as inversely related. Even though some scholars have argued that determinism and free will can co-exist (e.g., Alper, 1998), we expect that for a lay sample, the more one factor is offered as an explanation, the less the other will be seen as influential (see Davies, 2004). We also expect the same inverse relationship between genes and the environment. Although scientists have made clear their interactive relationship (e.g., Moore, 2001), we suspect that, given the cognitive complexity of the concept of “interaction” (Rose, 1997) and the longstanding dominance of the “nature versus nurture” model in popular accounts (e.g., Booth, 1990), genetic and environmental causes will be seen in opposition to one another.

## Method

### Sample

Respondents were selected using two separate sampling methods. An initial sample was obtained using random digit dialing (RDD) methods, drawing from the continental United States (Whites  $N=600$ , Blacks  $N= 58$ ). A second, oversample was obtained, using RDD methods within targeted population areas of higher Black density (30% or greater) (Blacks  $N= 542$ ). The final sample of respondents (combining the initial sample and oversample) included 600 Black and 600 White Americans aged 18–90, evenly divided between men and women (see Table 1 for descriptive information on the sample). Respondents were slightly older and slightly more educated than individuals in the U.S. population, based on comparison with census data. To adjust for sample representativeness, we created post-stratification weights for age and education, within the race and gender of the respondent.

### Procedure

Trained interviewers from Market Strategies International conducted telephone interviews, averaging 40 minutes in length. After obtaining a listing of the number of adult men and women within each household, a respondent was selected randomly by computer. The race of the respondent was assessed during an initial series of screening questions. Only individuals who identified primarily as White or Black (or African-American) were asked to participate in the study.

## Measures

**Genetic, environmental, and choice explanations**—As part of a larger study exploring Black and White Americans' understanding of genetic issues, we assessed each respondent's beliefs about the extent to which genes, the environment, and personal choice<sup>2</sup> influence individual differences in seven behavioral traits: athleticism, nurturance, drive to succeed, math ability, tendency toward violence, intelligence, and sexual orientation. A series of two questions focused on each characteristic/attribution. We first asked if the difference between individuals (comparing those with and without the characteristic, or, in the case of sexual orientation, comparing heterosexuals and homosexuals) was due, at least in part, to the causal factor. Respondents who answered "yes" were then asked if that causal factor explained very little, some, a lot, or just about all of this difference. We combined the answers to these two questions, resulting in a scale for each characteristic and attribution that measured the respondent's estimate of the amount of difference due to the causal factor: 0="none," 1="very little," 2="some," 3="a lot," 4="just about all." To investigate conceptual overlap between characteristics (e.g., between intelligence and math), we ran correlations among the characteristics, within each set of explanations. All coefficients were significant, ranging from .20 to .52. These results suggest moderate consistency in the use of particular explanations across characteristics, but not strong conceptual overlap between characteristics.

The first set of questions determined each respondent's *genetic* explanations for each of the seven traits. These questions were followed by questions about *environmental* causes and then questions about *personal choice*. We presented the explanations in this order, because we were most interested in genetic explanations and wanted them to be uncontaminated by responses to the other dimensions. Pretest data suggested that when personal choice or environmental causes were presented first, social desirability effects were evident. Furthermore, traits were ordered as above, to minimize the likelihood that strong opinions about the most controversial traits (e.g., sexual orientation) would influence beliefs about the other traits.

## Results

### Preference for Explanations

To determine which causal factor was preferred for each trait, across traits, we conducted a 3-way ANOVA with respondent's race as a between-subjects variable, and attribution and trait as within-subjects variables<sup>3</sup>. All of the main effects and interactions were significant. The partial eta squared values (effect size<sup>4</sup>) range from .01 to .19. The highest are for attribution (.19), trait (.17), and attribution  $\times$  trait (.16). All the remaining values, which involve race, range from .01 to .05. To test our hypotheses concerning preference for causal factors *within race*, we conducted post-hoc pairwise comparisons (Bonferroni) based on the ANOVA analysis. Specifically, we contrasted the three attributions for each trait (i.e., genes vs. environment, genes vs. choice, and choice vs. environment) separately for Black and White respondents.

Table 2 presents the mean values for each causal factor and trait, and shows which causal factor (if any) was significantly higher or lower than the other two. The findings demonstrate variability across traits, more so for Whites than Blacks. Most traits were reported as being influenced significantly more or less by a single factor, compared to the other two. Among

<sup>2</sup>In the interview, we defined genes as "someone's biological make-up that they get from their mother and father," people's environment as "the society in which they live, the people in their lives, and how they were raised," and personal choice as "how much someone chooses to be one way or another."

<sup>3</sup>In this analysis, we only included respondents who endorsed *at least one* of the three explanations (genetic, environmental, or choice) for a trait. The belief pattern of respondents who rejected all three causal factors was difficult to interpret. Because of the number of dropped cases, we conducted a re-analysis including all respondents and found no differences from the reported results.

<sup>4</sup>All eta-squared ( $\eta^2$ ) results that we report use the partial eta-squared formula ( $SS_{\text{effect}}/SS_{\text{effect}} + SS_{\text{error}}$ ). Tabachnick & Fidell (1989) suggest that partial  $\eta^2$  is an appropriate alternate computation of  $\eta^2$ .

White respondents, genetic factors were reported as most influential in explaining intelligence and math aptitude, whereas environmental explanations were strongest for nurturance and violence. Personal choice was preferred only for sexual orientation. Genetic factors were least likely to explain drive, nurturance, and violence, and choice was least influential for intelligence. In sum, for White respondents no single attribution dominates across the characteristics, consistent with our hypothesis.

Among Black respondents, however, a different pattern emerged, the most obvious being that personal choice was the only factor that dominated. Choice was perceived as most influential for math, athleticism, drive, and sexual orientation. No single cause was perceived as prevailing in explaining intelligence, nurturance, or violence. Additionally, genetic factors were reported to be least influential for all characteristics except intelligence and math aptitude. Overall, then, Black respondents tended to reject genetic explanations, as we predicted. However, in contrast to our expectation, Black respondents did not favor environmental explanations, but rather offered choice as their preferential causal factor.

### The Use of Multiple Causal Factors

Table 3 shows the percentage of Black and White respondents reporting one, two, or three factors that had at least “some” influence on each trait. Compared with respondents who reported two or three attributions, far fewer indicated that any of the traits were due to a single factor. For example, among both Black and White respondents, the *modal* response in explaining intelligence, math, athleticism, and violence was to offer all three factors as causes. The modal response for drive and nurturance included both environment and choice, although a sizable percentage mentioned all three explanations. The only exception to this general pattern was found among Black respondents, where the largest percentage reported that personal choice was the only factor explaining sexual orientation. Thus, for the most part, as we anticipated, respondents indicated that multiple factors were influential.

Despite general support for our hypothesis, a small but sizable minority of White respondents reported genes as the only influence on intelligence (22%) and sexual orientation (20%). Similarly, a noticeable number of Black respondents mentioned choice as the only factor explaining sexual orientation (33%), as previously mentioned. Thus, although there is a clear preference for multiple explanations, some respondents maintain allegiance to single causal factors.

### Relationships among Causal Factors

Figure 1 shows the interrelationships (correlations) among genetic, environmental, and personal choice explanations for each trait, separately for Black and White respondents<sup>5</sup>. For both groups of respondents, a significant negative association between genetic and choice attributions was found for the majority of the traits. For Whites, the association is significant for all traits except drive and nurturance; for Blacks it is significant for all traits except violence and nurturance. Thus, in general, as expected, the more genes are thought to influence a trait, the less that trait is attributable to choice and vice versa.

Among White respondents, there was also a significant negative association between genetic and environmental explanations, for all traits except violence. In contrast, among Black respondents, the association between these two factors is negative only for nurturance (and then only weakly). Moreover, Black respondents perceived no relationship between these factors for all other traits. Thus, our hypothesis regarding the association between genes and the environment holds among White, but not Black respondents.

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<sup>5</sup>Respondents were included in this analysis only if they endorsed at least one of the explanations *for each trait*.

## Discussion

The present research provides a new perspective on lay causal beliefs, with broad application. Three aspects of the study design are notable. First, our study simultaneously and independently assessed three primary causal categories: genes, environment, and choice. We know of no other study that does so. Second, our assessment of people's causal beliefs targeted a *range* of characteristics. This is important because causal judgments can vary substantially by trait. Third, this study included a representative, national sample of White and Black Americans. Much of the literature has targeted more selective samples that tend to be relatively homogeneous in background and ethnicity (e.g., college students). However, causal attributions—especially those involving genes—are likely to be influenced by a person's background, education, and experiences. Thus, a more representative sample is critical.

Psychological essentialism is the doctrine that members of a category share deep, underlying properties that may not be observable in ordinary interactions. Essentialism includes several beliefs that would be compatible with genetic determinism, that is, that a category is inborn, biologically based, and immutable (e.g., Gelman, 2003; Medin, 1989). Similarly, entitativity occurs when one perceives a group of people as having an underlying, immutable trait (e.g., those with high intelligence), sharing the same observable characteristic (e.g., skin color), or holding consistent attitudes (Lickel et al., 2000; Yzerbyt, Judd, & Corneille, 2004). Although the current study does not directly compare genetic causation with essentialism or entitativity, research by Haslam, Rothschild, and Ernst (2000) suggests that at least one aspect of essentialism includes biological explanation in that it reflects the belief in “naturalness, necessary characteristics, immutability, discreteness, and historical stability” (p. 120) (also see Prentice & Miller, 2007).

In sum, the goal of this research is to understand how Black and White Americans think about genetic, environmental, and personal choice as explanations for a range of human characteristics, with a focus on two questions: 1) Which explanations are offered? 2) What are the relationships among explanations? The results reveal several systematic patterns in people's attributions, providing a rich source of information about how human characteristics are explained.

### Preferences for Causal Factors

**Black respondents' patterns of preference**—Based on historical use of genetic explanation to justify social inequalities (e.g., Rushton & Jensen, 2005; see Kevles, 1985), we predicted that Black respondents would renounce such accounts. The results strongly support this hypothesis. Genetic explanations imply that group divisions are permanent and essential (see Prentice & Miller, 2007), thereby serving “to legitimize social arrangements and to provide ideological support for social and political systems” (Jost & Major, 2001, p. 4). Moreover, biological attributions that imply stability are linked to stereotyping and prejudice (Jayaratne et al., 2006; Keller, 2005). We posit, therefore, that Black respondents' rejection of genetic explanations for most traits may stem, in part, from an awareness of racism, both past and present.

We also predicted that Black respondents would embrace environmental causal factors, which we construed as structural. Research has shown that individuals from lower status groups prefer structural explanations (Hunt, 2004). However, this prediction received no support in the present study. Instead, Black respondents favored choice explanations. What might explain this preference? One possibility is that structural explanations have often been defined as institutional (see Kluegel & Smith, 1986), but our wording of the question about environmental influences included both structural *and* interpersonal factors. If Blacks were hesitant to endorse interpersonal causal factors, it might explain why our results differ from previous research.

Additionally, although the environment has traditionally been portrayed as malleable and controllable, one's perspective may depend on whether one has power to manipulate the environment; for those with fewer resources, the environment may seem relatively stable and uncontrollable. If this was the case among Black Americans, they might hold less favorable views about environmental explanations.

Finally, Black respondents' preferences for choice explanations, which imply the malleability and controllability of traits, may serve to protect and empower those whose choices, as a group, have been limited. In this way, choice attributions imply agency. Moreover, with Black Americans traditionally holding a strong religious orientation (Taylor, Chatters, Jayakody, & Levin, 1996), the notion of "choice," which underscores the importance of morality, may be particularly salient.

**White respondents' patterns of preference**—In contrast to the attribution patterns among Black respondents, we anticipated and found no consistent preference among White respondents, where explanations clearly varied as a function of trait. With no apparent overriding issues influencing their preferences across traits, it is likely that among Whites, the specific cultural or popular context associated with each trait tends to exert a strong influence on preferences. Perhaps the clearest illustration of this contextual effect occurs for intelligence, for which White respondents invoked genetic explanations significantly more than other causal factors, consistent with prior work on essentialism and lay theories (e.g., Dweck et al., 1995; Gelman, Heyman, & Legare, 2007).

One likely reason for the greater endorsement of genetic causes for intelligence is that intelligence has a number of the characteristics that one associates with "natural kinds" (such as biological species, e.g., Keil, 1989) and consequently is more susceptible to essentialist types of explanations (including genes). For example, signs of intelligence are often viewed as emerging early in life (e.g., math or music prodigies), intelligence is viewed as highly stable over time, and perceived sex differences in certain aspects of intelligence are commonly viewed as relatively fixed (see Summers, 2005). Likewise, a distinction is made between outward behavior, which is viewed as amenable to instruction and motivation, and inner competence (intelligence *per se*), which is not. Cultural practices encourage this view. For example, IQ tests, in which "intelligence" is assessed in a single testing context, are assumed to be predictive of future behaviors. Relatedly, studies attempting to determine the extent of genetic contribution for psychological characteristics, historically, have often focused on intelligence (Gould, 1981). In addition to these factors, intelligence is perceived as a strong status indicator (believed to be correlated with success), and thus is a useful trait on which to base a genetic justification for the maintenance of the status hierarchy. In sum, our findings for both Black and White respondents likely reflect the depth to which the genetic basis for intelligence permeates the American cultural fabric.

A second illustration of the importance of trait context on attributional preferences occurs for sexual orientation, the only characteristic that *both* Black and White respondents report as predominantly due to choice. Because public discussion about sexual orientation focuses primarily on homosexuality, choice attributions imply that homosexuality is voluntary. Only for voluntary behavior can one be held responsible (see Weiner, 1995). For example, Jayaratne et al. (2006) found that those who disapprove of homosexuality tend to invoke choice explanations while those who support gay rights tend to offer genetic explanations. Despite a preference for choice in accounting for sexual orientation, it is noteworthy that a sizable subset of White respondents endorsed genes as the only causal factor. Genetic explanations deflect blame because they imply that homosexuality is not chosen. Paradoxically, although genetic explanations can be used to promote gay rights, such accounts have also been associated with stigma (see Hegarty, 2002; Sheldon, Pfeffer, et al., 2007). We expect that a closer examination



of beliefs about the origins of sexual orientation would reveal ways in which explanatory frameworks are used to justify or reinforce one's social and political values, an issue we address below.

### Use of Multiple Causal Factors

As predicted, most respondents reported multiple factors as explanatory, with the specific combination of factors varying somewhat by trait, and, for the most part, little difference between Black and White respondents. However, several smaller groups of both Blacks and Whites offered a single explanation. This occurred among Black respondents for sexual orientation (choice) and among White respondents for sexual orientation and intelligence (both genetic). It is clear that reporting a single causal explanation for a trait represents a strong causal perspective, and thus we argue that, in many cases, this viewpoint derives from more than just cultural values or personal observations, but may reflect an ideological stance, as noted above. For example, using only genes or only choice to explain sexual orientation, may reflect support for either tolerance or intolerance toward gay people, respectively (Jayaratne et al., 2006).

Furthermore, although genes and the environment are commonly accepted among today's geneticists as scientifically valid explanatory factors for complex human traits (with little attention to choice; Sarkar, 1998), among our respondents, there was no trait where the combination of genes and the environment was given as the modal response. In only one case, among White respondents for intelligence, was the combination of genes and the environment offered by a more than a small percentage of individuals. This points to a divide between scientific and lay understanding of the effect of genes on human behavior.

Overall, then, most Americans explain a range of human traits by invoking multiple causes. This suggests that they acknowledge the complexity of human attributes and that genetic explanations do not necessarily imply genetic determinism in its most stringent form, that is, the belief that genes act alone as blueprints, directing development (see Condit, 1999).

### Interrelationships among Causal Factors

**Black respondents – genes and environment—**Among Black respondents, only for nurturance was there a negative relationship between genetic and environmental factors (and then only a weak one). This finding is consistent with our suggestion, above, that Blacks may tend to see the environment as relatively stable and uncontrollable, and therefore not in direct contrast to genetic factors. It may also reflect Blacks' questioning of the notion of genes as deterministic. In previous research Black respondents expressed both positive and negative views about genetic science, depending on how it is used (medical context vs. supporting racism; Sheldon, Jayaratne, Feldbaum, DiNardo, & Petty, 2007).

**White respondents – genes and environment—**Among White respondents, we found, as anticipated, an inverse association between genetic and environmental causal factors, for all but one trait. This oppositional relationship parallels much of the popular media coverage of genetics, but contrasts with the scientific position that supports a more interactive relationship (Moore, 2001). This disparity may have important implications for science education, suggesting the need for educators to better address this aspect of genetics in the classroom.

**Black and White respondents – genes and choice—**Unlike the nature/nurture issue, the relationship between genetic and choice explanations is seen by *both* Black and White respondents as inverse for the majority of traits. We interpret this as indicating the perceived controllability and malleability implied by choice attributions compared with the uncontrollability and stability of genetic explanations, resulting in attributions that function in

opposite ways. This is most clearly illustrated with explanations for sexual orientation, where the negative relationship between choice and genetics is especially strong.

The use of a zero-sum model to explain the relationship between genes and choice has potential implications for how socio-political arguments are framed and might help us to understand a recent shift in the way anti-Black sentiment has been manifest. In the past few decades, justifications for White racism have changed from those predominantly based on the genetic inferiority of Blacks to those in which Blacks are blamed for their lack of motivation to achieve (Sears & Henry, 2003). One possible interpretation of this shift is that as people became more aware of the racially sensitive implications of genetic explanations (e.g., to justify racial inequality), the more they accepted what they saw as the logical alternative, choice, which, like genetics locates the causal source in the individual rather than the society (environment).

### Limitations and Future Research

Perhaps the most obvious limitation in this research is that we used certain terms (“genes”, “environment”, “choice”) that may mean different things to different people (see Lanie et al. 2004), despite our offering a definition when these terms were introduced. This is potentially an especially important problem when comparing responses by race. It would be valuable to determine, in greater depth and more directly, the various meanings of these terms and what they imply about the characteristics they explain. Relatedly, we obtained no direct assessment of the respondents’ perceptions regarding the causal dimensionality of genetic, environmental, and choice attributions. Considering possible race differences in these perceptions (Crocker et al., 1999) and that the social implications of these attributions rests on their causal dimensionality, the significance of this issue is central.

Given the dearth of research using a conceptual framework that incorporates genetic, environmental, and choice explanations for human characteristics, we consider this study an initial investigation of an important issue that will continue to have significance in light of the enormous interest and investment in genetic science. As this science flourishes, it is critical to monitor its social and political impact. A broad array of future research possibilities should be considered, including an examination of 1) the effects of a range of background variables, such as education, age, religiosity, or political orientation, that likely influences genetic, environmental, and choice explanations, 2) the attitudinal and behavioral consequences of the use of these explanations, 3) the development of these beliefs in childhood, an issue that should shed light on mechanisms of belief transmission, 4) the explanatory perspectives of those whose judgments have significant social impact (e.g., doctors, teachers, parents, politicians), 5) potential cross-cultural variability in the use of these causal explanations, and 6) beliefs about the genetic, environmental, and choice influences on health and disease. Although much of this work focuses on racial differences, we believe it is critical to understand the basis of these differences, and not to reify them as being inherently racial per se. For example, because Black respondents tend to be disadvantaged in their environment, they may tend to view the environment as more stable and less controllable, compared to White respondents.

### Conclusion

It is likely that genetic explanations will play an increasingly important role in Americans’ understanding of human characteristics, given the resonance of the gene as a cultural icon (Nelkin & Lindee, 1995), the value of genetic explanations as an ideological tool (Keller, 2005), and the tendency for people to posit essentialist explanations (Gelman, 2003; Medin, 1989). Our research suggests that such a shift may signal additional changes in how Americans think about environment and choice as influences. A broad literature on attributions, lay theories, essentialism, and entitativity suggests that these three explanations, in various combinations, are potent in their inductive potential, in that they are implicated in an enormous

array of personal, social, and political phenomena. The findings presented here document how Black and White Americans employ genetic, environmental, and choice explanations. But perhaps the most important result of this study is that it underscores the need to go beyond simple nature/nurture and determinism/free will debates, to a consideration of more complex interactive relationships.

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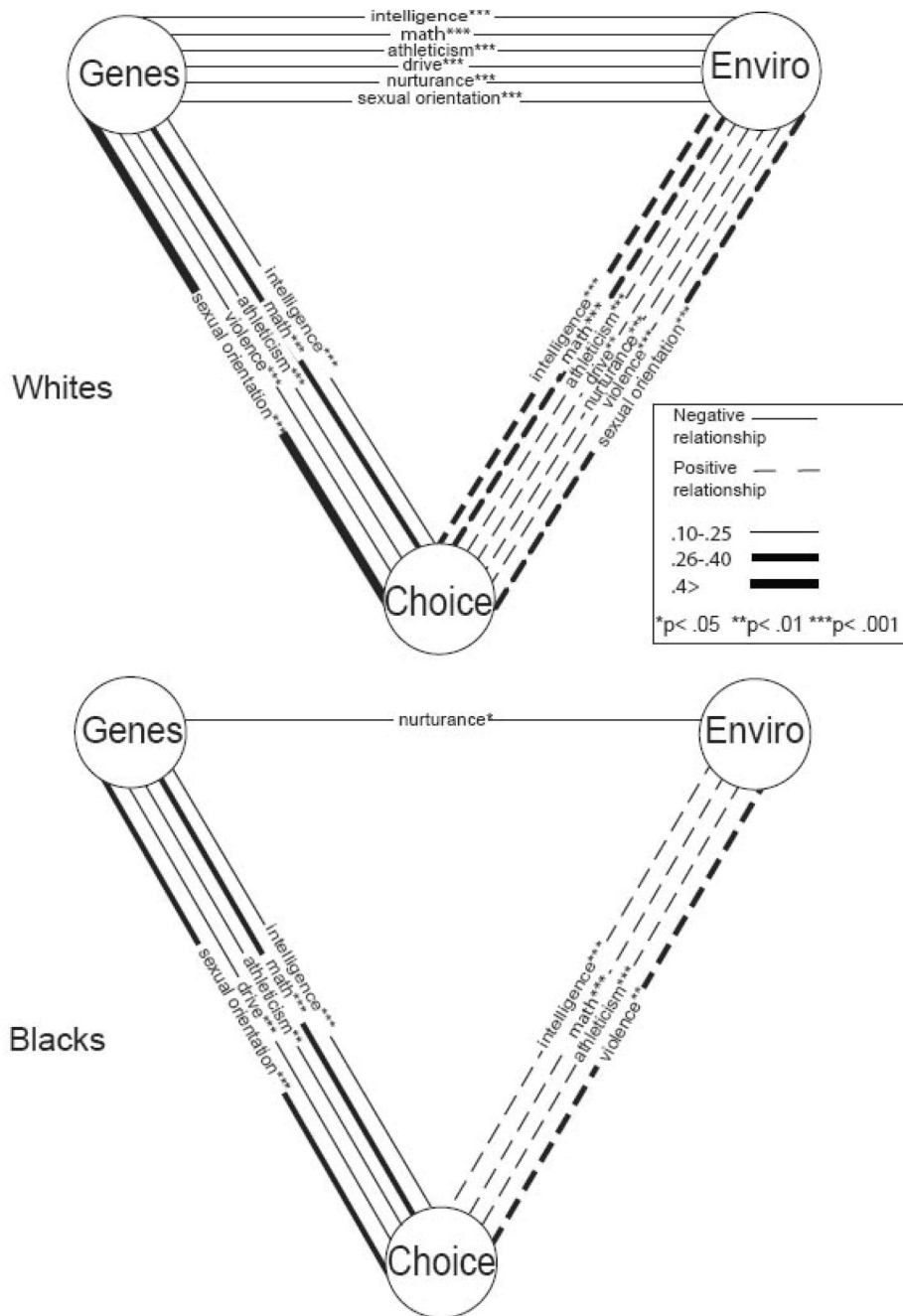
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**Figure 1.** Correlations between Genetic, Environmental, and Choice Explanations (*N* for White respondents ranges from 513–587; *N* for Black respondents ranges from 493–568). Enviro = environmental.

**Table 1**

## Demographic Characteristics of Respondents

	Whites (n = 600)	Blacks (n = 600)
<u>Gender</u>		
Men	50%	50%
Women	50%	50%
<u>Education</u>		
Less than 12 <sup>th</sup> grade	10%	15%
Graduated HS, GED	24%	28%
Some college	33%	37%
Bachelor's degree	22%	12%
Advanced degree	11%	8%
<u>Political Orientation</u>		
Liberal or somewhat liberal	28%	33%
Middle-of-the-road	33%	26%
Conservative or somewhat conservative	39%	41%
<u>Religiosity</u>		
Very religious	24%	35%
Somewhat religious	54%	52%
Not very religious or Not at all religious	22%	13%
<u>Age (Mean)</u>	47 (SD =17.55)	42 (SD =15.92)
<u>Income range (Median)</u>	\$40,000–\$50,000	\$20,000–\$30,000

**Table 2**

Mean Comparisons of Genetic (G), Environmental (E), and Choice (C) Explanations Repeated Measures ANOVA; trait and attribution repeated factors; bonferroni adjustment)

	White respondents						Black respondents												
	Means			Low			High			Means			Low			High			
	G	E	C	G	E	C	G	E	C	G	E	C	G	E	C	G	E	C	
Intelligence	2.3	1.8	1.4	C			G	1.8	1.7	1.9									
Math	2.0	1.7	1.7				G	1.4	1.6	2.1									C
Athleticism	2.3	2.2	2.3					1.7	2.1	2.6									C
Drive to Succeed	1.3	2.7	2.7	G				1.1	2.4	2.8									C
Nurturance	1.3	2.8	2.2	G			E	1.1	2.4	2.5									
Violence	1.6	2.7	2.4	G			E	1.4	2.5	2.6									
Sexual Orientation	1.3	1.5	2.1				C	1.0	1.4	2.5									C

Note. White respondents n=507; Black respondents n=371; Low = significantly lower than both other explanations; High = significantly higher than both other explanations



Table 3

Percent of Respondents Reporting One, Two, or Three Causal Factors

Respondents who reported...	Intelligence		Math		Athleticism		Drive to Succeed		Nurturance		Violence		Sexual Orientation	
	W	B	W	B	W	B	W	B	W	B	W	B	W	B
Genes only	22	15	18	12	6	6	1	2	2	4	2	3	20	9
Environment only	3	6	3	5	2	5	3	4	10	10	4	7	4	3
Choice only	3	12	6	18	2	11	4	12	3	12	2	7	19	33
Genes and environment only	23	11	14	8	10	5	4	3	8	4	11	7	5	3
Genes and choice only	8	13	10	11	8	11	4	4	3	6	2	5	8	9
Environment and choice only	8	13	14	22	15	26	44	45	38	39	30	35	28	29
Genes, environment, and choice	33	30	35	24	57	36	40	30	36	25	49	36	16	14
Total percent	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Note. Respondents categorized as genetic, environmental or choice if they reported that at least "some" of the characteristic was due that causal factor; W=White respondents B=Black respondents; bold, italicized percentages indicate modal response.