

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

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The authors examine 3 common explanations for human characteristics: genes, the environment, and choice. A representative sample of White and Black Americans indicated how much they believed each factor influenced individual differences in athleticism, nurturance, drive to succeed, math ability, tendency toward violence, intelligence, and sexual orientation. Results show that across traits (a) Black respondents generally favored choice and rejected genetic explanations, whereas White respondents indicated less causal consistency; (b) although a sizable subset of respondents endorsed just 1 factor, most reported multiple factors as at least partly influential; and (c) among White respondents, greater endorsement of genetic explanations was associated with less acceptance of choice and the environment, although among Black respondents a negative relationship held 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

Infidelity? It may be in our genes. (Wright, 1995)  
I'm depraved on account I'm deprived.—(Sondheim, 1956)  
Is being hooked a choice? (Dehnart, 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) explanations. 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 whether it is influenced by free will (personal choice). Although scholars have noted 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). In this article, we address two key questions: Which explanatory factor(s) do people offer to explain human characteristics and 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 because 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

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(Hughes & Tuch, 2000), and choice explanations predict antigay 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) have been limited in that they generally (a) assess beliefs about one or two causal factors, but not all three; (b) ask people to select among explanatory factors rather than measure various causal beliefs independently; (c) explore beliefs about causal influences on only one or two traits; and (d) use 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., Alper et al., 2002; Malik, 2000). Furthermore, several of these traits have figured prominently in recent research on essentialism (e.g., Haslam, Rothschild, & Ernst, 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 used 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 because such information likely reflects, and influences, public opinion.

Attribution research, much of it in the area of achievement motivation, has demonstrated that it is not so much the causal explanation itself that is significant but rather the 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; D. M. Taylor & McKirnan, 1984). Traditionally, genetic characteristics are considered stable and uncontrollable, whereas characteristics resulting from 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 to 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 has documented 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 used 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 athleticism, for which coaching or parental encouragement (environment), natural talent or physical attributes (genetic), and motivation or hard work (implying choice) have all been invoked.

On the basis of these differences across traits, we expect causal accounts to vary by characteristic. However, in light of the fact that (a) genetic explanations have historically been linked to racism (e.g., Rushton & Jensen, 2005; also see Kevles, 1985) and (b) 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 Schnitker, Freese, & Powell, 2000) and favor environmental ones.

We also predict that multiple factors will typically be endorsed. This finding would be consistent with research indicating that

<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 though they are 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).

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 coexist (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 as being in opposition to one another.

## Method

### Sample

Respondents were selected by using two separate sampling methods. An initial sample was obtained using random-digit dialing methods, drawing from the continental United States (Whites,  $n = 600$ ; Blacks,  $n = 58$ ). A second (oversample) was obtained using random-digit dialing 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 the oversample) included 600 Black and 600 White Americans ages 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 poststratification weights for age and education, within respondent race and gender.

### Procedure

Trained interviewers from Market Strategies International conducted telephone interviews, averaging 40 min 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 respondent indicated his or her race 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

Table 1  
*Demographic Characteristics of Respondents*

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

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 combination of a characteristic and an attribution. Respondents were first asked whether the difference between individuals (comparing those with and without the characteristic or, in the case of sexual orientation, comparing heterosexual and homosexual people) was due, at least in part, to the causal factor. Respondents who answered "yes" were then asked whether 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 resulting from 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

<sup>2</sup> In the interview, genes were defined 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."

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 three-way analysis of variance 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-square values (effect size<sup>4</sup>) ranged from .01 to .19. The highest were for attribution (.19), trait (.17), and Attribution  $\times$  Trait (.16). All the remaining values, which involve race, ranged 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 analysis of variance. 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 for Blacks. Most traits were reported as being influenced significantly more or less by a single factor as compared with the other two. Among White respondents, genetic factors were reported as most influential in explaining intelligence and math aptitude, whereas environmental explanations were strongest for nurturance and tendency toward violence. Personal choice was preferred only for sexual orientation. Genetic factors were least likely to explain drive to succeed, nurturance, and tendency toward violence, and choice was least influential for intelligence. In sum, for White respondents no single attribution dominated 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 to succeed, and sexual orientation. No single cause was perceived as prevailing in explaining intelligence, nurturance, or tendency toward 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.

### *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 the result of a single factor. For example, among both Black and White respondents, the modal response in explaining intelligence, math, athleticism, and tendency toward 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 maintained 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, we found a significant negative association between genetic and choice attributions for the majority of the traits. For Whites, the association was significant for all traits except drive to succeed and nurturance; for Blacks, it was 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 was 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.

## Discussion

This 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

<sup>3</sup> In this analysis, we included only 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 reanalysis including all respondents and found no differences from the reported results.

<sup>4</sup> All eta-square results that we report use the partial eta-square formula [ $SS_{\text{effect}} / (SS_{\text{effect}} + SS_{\text{error}})$ ]. Tabachnick and Fidell (1989) suggested that partial eta-square is an appropriate alternate computation of eta-square.

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

**Table 2**  
*Mean Comparisons of Genetic (G), Environmental (E), and Choice (C) Explanations (Repeated Measures Analysis of Variance; Trait and Attribution Repeated Factors; Bonferroni Adjustment)*

|                          | White respondents (n = 507) |     |     |     |      | Black respondents (n = 371) |     |     |     |      |
|--------------------------|-----------------------------|-----|-----|-----|------|-----------------------------|-----|-----|-----|------|
|                          | Ms                          |     |     | Low | High | Ms                          |     |     | Low | High |
|                          | G                           | E   | C   |     |      | G                           | E   | C   |     |      |
| Intelligence             | 2.3                         | 1.8 | 1.4 | C   | G    | 1.8                         | 1.7 | 1.9 |     |      |
| Math aptitude            | 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 | G   | C    |
| Drive to succeed         | 1.3                         | 2.7 | 2.7 | G   |      | 1.1                         | 2.4 | 2.8 | G   | C    |
| Nurturance               | 1.3                         | 2.8 | 2.2 | G   | E    | 1.1                         | 2.4 | 2.5 | G   |      |
| Tendency toward violence | 1.6                         | 2.7 | 2.4 | G   | E    | 1.4                         | 2.5 | 2.6 | G   |      |
| Sexual orientation       | 1.3                         | 1.5 | 2.1 |     | C    | 1.0                         | 1.4 | 2.5 | G   | C    |

*Note.* Low = significantly lower than both other explanations; High = significantly higher than both other explanations.

primary causal categories: genes, environment, and choice. We know of no other study that has done 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 is based on research with 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 our study did not directly compare genetic causation with essentialism or entitativity, research by Haslam et al. (2000)

has suggested 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 was 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: Which explanations are offered and 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.* On the basis of the 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

**Table 3**  
*Percentage of Respondents Reporting One, Two, or Three Causal Factors*

| Respondents who reported       | Intelligence |           | Math aptitude |           | Athleticism |           | Drive to succeed |           | Nurturance |           | Violence  |           | Sexual orientation |           |
|--------------------------------|--------------|-----------|---------------|-----------|-------------|-----------|------------------|-----------|------------|-----------|-----------|-----------|--------------------|-----------|
|                                | White        | Black     | White         | Black     | White       | Black     | White            | Black     | White      | Black     | White     | Black     | White              | Black     |
| 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                 | <b>33</b> |
| 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        | <b>44</b>        | <b>45</b> | <b>38</b>  | <b>39</b> | 30        | 35        | <b>28</b>          | 29        |
| Genes, environment, and choice | <b>33</b>    | <b>30</b> | <b>35</b>     | <b>24</b> | <b>57</b>   | <b>36</b> | 40               | 30        | 36         | 25        | <b>49</b> | <b>36</b> | 16                 | 14        |

*Note.* Respondents categorized as genetic, environmental, or choice if they reported that at least “some” of the characteristic was the result of that causal factor. Percentages in bold indicate modal response.

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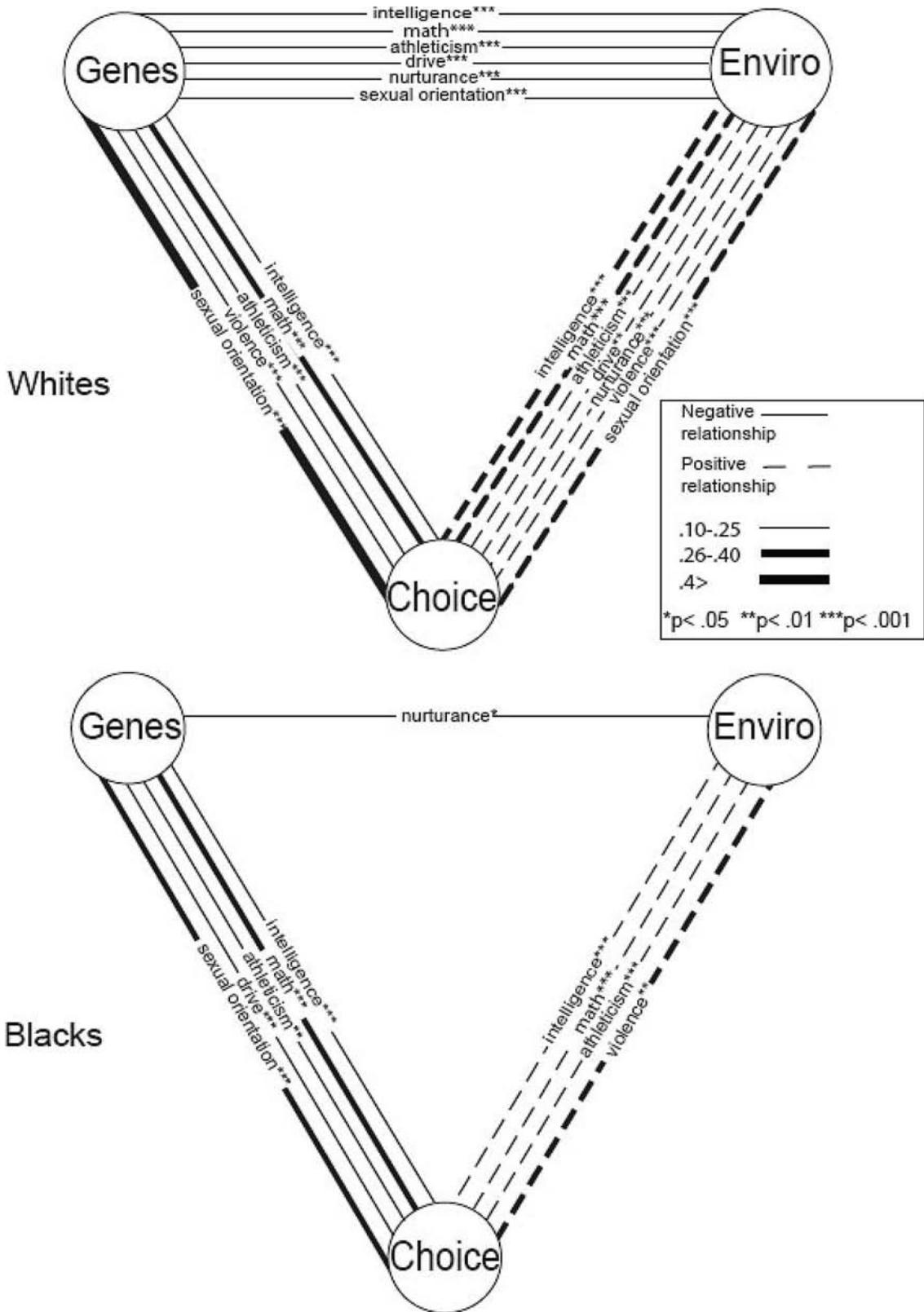


Figure 1. Correlations between genetic, environmental, and choice explanations (*n* for White respondents ranges from 513–587; *n* for Black respondents ranges from 493–568). Enviro = environmental.

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& 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 this 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, this might explain why our results differ from those of previous research. Additionally, although the environment has traditionally been portrayed as malleable and controllable, one's perspective may depend on whether one has the 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 (R. J. 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, whose 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 occurred 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 to psy-

chological characteristics have historically 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 resulting from 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, whereas 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, Petty, Feldbaum, & Jayaratne, 2007). We expect that a closer examination of beliefs about the origins of human characteristics would reveal ways in which explanatory frameworks are used to justify or reinforce one's social and political values.

### *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 of 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 for which 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 earlier suggestion 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 in the society (environment).

### *Limitations and Future Research*

Perhaps the most obvious limitation in this research is that we used certain terms (*genes, environment, and choice*) that may mean different things to different people (see Lanie, Jayaratne, Sheldon, Kardia, & Petty, 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, 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 (a) the effects of a range of background variables, such as education, age, religiosity, or political orientation, that likely influences genetic, environmental, and choice explanations; (b) the attitudinal and behavioral consequences of the use of these explanations; (c) the development of these beliefs in childhood, an issue that should shed light on mechanisms of belief transmission; (d) the explanatory perspectives of those whose judgments have major social impact (e.g., doctors, teachers, parents, and politicians); (e) potential cross-cultural variability in the use of these causal explanations; and (f) 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 as compared with 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 use genetic, environmental, and choice explanations. Perhaps the most important result of this study, however, 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.

## References

- Alper, J. S. (1998). Genes, free will, and criminal responsibility. *Social Science & Medicine*, 46, 1599–1611.
- Alper, J. S., Ard, C., Asch, A., Beckwith, J., Conrad, P., & Geller, L. N. (Eds.). (2002). *The double-edged helix*. Baltimore: Johns Hopkins University Press.
- Anderson, C. A., Krull, D. S., & Weiner, B. (1996). Explanations: Processes and consequences. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 271–296). New York: Guilford Press.
- Andrews, L. B. (1999). Predicting and punishing antisocial acts: How the criminal justice system might use behavioral genetics. In R. A. Carson & M. A. Rothstein (Eds.), *Behavioral genetics: The clash of culture and biology* (pp. 116–155). Baltimore: Johns Hopkins University Press.
- Booth, W. (1990, October 15). Genetics: Separated twins, environment and IQ. *Washington Post*, p. A2.
- Brescoll, V., & LaFrance, M. (2004). The correlates and consequences of newspaper reports of research on sex differences. *Psychological Science*, 15, 515–520.
- Buchanan, G. M., & Seligman, M. E. P. (1995). *Explanatory style*. Hillsdale, NJ: Erlbaum.
- Condit, C. M. (1999). How the public understands genetics: Non-deterministic and non-discriminatory interpretations for the “blueprint” metaphor. *Public Understanding of Science*, 8, 169–180.
- Crocker, J., Luhtanen, R., Broadnax, S., & Blane, B. E. (1999). Belief in U.S. government conspiracies against Blacks among Black and White college students: Powerlessness or system blame? *Personality and Social Psychology Bulletin*, 25, 941–953.
- Davies, P. (2004). Undermining free will. *Foreign Policy*, 144, 36–38.
- Dehnart, Andy (2000, January 10). Is addiction a choice? *Salon*. Retrieved Dec. 28, 2008, from <http://archive.salon.com/health/books/2000/01/10/addiction/index.html>
- Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories: Elaboration and extension of the model. *Psychological Inquiry*, 6, 322–333.
- Evans, E. M. (2001). Cognitive and contextual factors in the emergence of diverse belief systems: Creation versus evolution. *Cognitive Psychology*, 42, 217–266.
- Fields, S. A., McNamara, J. R. (2003). The prevention of child and adolescent violence: A review. *Aggression and Violent Behavior*, 8, 61–91.
- Gallup Organization. (2004, May 2–4). Survey by Gallup Organization. Retrieved April 4, 2005, from [http://roperweb.ropercenter.uconn.edu.proxy.lib.umich.edu/cgi-bin/hsrun.exe/Roperweb/iPOLL/StateId/DPAjzms2Ril5bOIbvePZYNNZZ8Zy-4UME/HAHTpage/Summary\\_Link?qstn\\_id=518368](http://roperweb.ropercenter.uconn.edu.proxy.lib.umich.edu/cgi-bin/hsrun.exe/Roperweb/iPOLL/StateId/DPAjzms2Ril5bOIbvePZYNNZZ8Zy-4UME/HAHTpage/Summary_Link?qstn_id=518368)
- Gelman, S. A. (2003). *The essential child: Origins of essentialism in everyday thought*. New York: Oxford University Press.
- Gelman, S. A., Heyman, G. D., & Legare, C. H. (2007). Developmental changes in the coherence of essentialist beliefs about psychological characteristics. *Child Development*, 78, 757–774.
- Gene Media Forum. (2001, March 8). Survey by Gene Media Forum and Zogby International. Retrieved September 27, 2007, from [http://roperweb.ropercenter.uconn.edu.proxy.lib.umich.edu/cgi-bin/hsrun.exe/Roperweb/iPOLL/StateId/DPApMIsIc615bonbveWr6cjZ8ZC-VbNW/HAHTpage/Summary\\_Link?qstn\\_id=455457](http://roperweb.ropercenter.uconn.edu.proxy.lib.umich.edu/cgi-bin/hsrun.exe/Roperweb/iPOLL/StateId/DPApMIsIc615bonbveWr6cjZ8ZC-VbNW/HAHTpage/Summary_Link?qstn_id=455457)
- Gould, S. J. (1981). *The mismeasure of man*. New York: Norton.
- Haslam, N., Rothschild, L., & Ernst, D. (2000). Essentialist beliefs about social categories. *British Journal of Social Psychology*, 39, 113–127.
- Hegarty, P. (2002). “It’s not a choice, it’s the way we’re built”: Symbolic beliefs about sexual orientation in the US and Britain. *Journal of Community and Applied Social Psychology*, 12, 153–166.
- Hughes, M., & Tuch, S. A. (2000). How beliefs about poverty influence racial policy attitudes. In D. O. Sears, J. Sidanius, & L. Bobo (Eds.), *Racialized politics: The debate about racism in America* (pp. 165–190). Chicago: University of Chicago.
- Hunt, M. O. (2004). Race/ethnicity and beliefs about wealth and poverty. *Social Science Quarterly*, 85, 827–853.
- Jayaratne, T. E., Ybarra, O., Sheldon, J. P., Brown, T. N., Feldbaum, M., Pfeffer, C. A., et al. (2006). White Americans’ genetic lay theories of race differences and sexual orientation: Their relationship with prejudice toward Blacks, and gay men and lesbians. *Group Processes & Intergroup Relations*, 9, 77–94.
- Jost, J. T., & Major, B. (2001). Emerging perspectives on the psychology of legitimacy. In J. T. Jost & B. Major (Eds.), *The psychology of legitimacy: Emerging perspectives on ideology, justice, and intergroup relations* (pp. 3–32). New York: Cambridge University Press.
- Keil, F. C. (1989). *Concepts, kinds, and cognitive development*. Cambridge, MA: MIT Press.
- Keller, J. (2005). In genes we trust: The biological component of psychological essentialism and its relationship to mechanisms of motivated social cognition. *Journal of Personality and Social Psychology*, 88, 686–702.
- Kevles, D. J. (1985). *In the name of eugenics: Genetics and the uses of human heredity*. Berkeley: University of California.
- Kluegel, J. R., & Smith, E. R. (1986). *Beliefs about inequality: Americans’ views of what is and what ought to be*. New York: Aldine de Gruyter.
- Lanie, A. D., Jayaratne, T. E., Sheldon, J. P., Kardia, S. L. R., & Petty, E. M. (2004). Exploring the public understanding of basic genetic concepts. *Journal of Genetic Counseling*, 13, 305–320.
- Legare, C. H., & Gelman, S. A. (in press). Bewitchment, biology, or both: The co-existence of natural and supernatural explanatory frameworks across development. *Cognitive Science*.
- Lerner, R. M. (1992). *Final solutions: Biology, prejudice, and genocide*. University Park: Pennsylvania State University Press.
- Lickel, B., Hamilton, D. L., Uhles, A. N., Wierzchowska, G., Lewis, A., & Sherman, S. J. (2000). Varieties of groups and perception of group entitativity. *Journal of Personality and Social Psychology*, 78, 223–246.
- Malik, K. (2000). *Man, beast and zombie: What science can and cannot tell us about human nature*. New Brunswick, NJ: Rutgers.
- March, W. (1954). *The bad seed*. New York: Dell.
- Marcus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224–253.
- McManus, J., & Dorfman, L. (2002). Youth violence stories focus on events, not causes. *Newspaper Research Journal*, 23, 6–15.
- Medin, D. L. (1989). Concepts and conceptual structure. *American Psychologist*, 44, 1469–1481.
- Monterosso, J., Royzman, E. B., & Schwartz, B. (2005). Explaining away responsibility: Effects of scientific explanation on perceived culpability. *Ethics & Behavior*, 15, 139–158.
- Moore, D. S. (2001). *The dependent gene: The fallacy of “nature vs. nurture.”* New York: Freeman.
- Nelkin, D., & Lindee, M. S. (1995). *The DNA mystique: The gene as a cultural icon*. New York: Freeman.
- Phelan, J. (2005). Geneticization of deviant behavior and consequences for stigma: The case of mental illness. *Journal of Health and Social Behavior*, 46, 307–322.
- Prentice, D. A., & Miller, D. T. (2007). Psychological essentialism of human categories. *Current Directions in Psychological Science*, 16, 202–204.
- Rose, S. (1997). *Lifelines: Biology beyond determinism*. New York: Oxford University Press.
- Rosengren, K. S., Johnson, C. N., & Harris, P. L. (2000). *Imagining the impossible: Magical, scientific, and religious thinking in children*. Cambridge, England: Cambridge University Press.
- Rushton, J. P., & Jensen, A. R. (2005). Wanted: More race realism, less moralistic fallacy. *Psychology, Public Policy, and Law*, 11, 238–336.
- Sarkar, S. (1998). *Genetics and reductionism*. Cambridge, England: Cambridge University Press.

- Schmitt, M. T., & Branscombe, N. R. (2002). The internal and external causal loci of attributions to prejudice. *Personality and Social Psychology Bulletin*, 28, 620–628.
- Schnittker, J., Freese, J., & Powell, B. (2000). Nature, nurture, neither, nor: Black-White differences in beliefs about the causes and appropriate treatment of mental illness. *Social Forces*, 78, 1101–1130.
- Scott, J. (1993, December 8). The latest parenting debate. *Los Angeles Times*, pp. E1, E6.
- Sears, D. O., & Henry, P. J. (2003). The origins of symbolic racism. *Journal of Personality and Social Psychology*, 85, 259–275.
- Sheldon, J. P., Jayaratne, T. E., Feldbaum, M. B., DiNardo, C. D., & Petty, E. M. (2007). Applications and implications of advances in genetic science: Perspectives from a group of Black Americans. *Community Genetics*, 10, 82–92.
- Sheldon, J. P., Pfeffer, C., Petty, E. M., Feldbaum, M., & Jayaratne, T. E. (2007). Beliefs about the etiology of homosexuality and about the ramifications of discovering its possible genetic origin. *Journal of Homosexuality*, 52, 111–150.
- Sondheim, Stephen (1956). Gee Officer Krupke [Music by Leonard Bernstein]. On West Side Story [album]. Sony: Nashville, TN (1960).
- Sousa, P. (2006). On folk conceptions of mind, agency, and morality. *Journal of Cognition and Culture*, 6, 1–23.
- Summers, L. H. (2005). *Remarks at NBER Conference on Diversifying the Science & Engineering Workforce*. Retrieved August 21, 2006, from <http://www.president.harvard.edu/speeches/2005/nber.html>
- Tabachnick, B. G., & Fidell, L. S. (1989). *Using multivariate statistics*. Philadelphia: Harper & Row.
- Taylor, D. M., & McKirnan, D. J. (1984). A five-stage model of intergroup relations. *British Journal of Social Psychology*, 23, 291–300.
- Taylor, R. J., Chatters, L. M., Jayakody, R., & Levin, J. S. (1996). Black and white differences in religious participation: A multisample comparison. *Journal for the Scientific Study of Religion*, 35, 403–410.
- Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.
- Weiner, B. (1995). *Judgments of responsibility: A foundation for a theory of social conduct*. New York: Guilford Press.
- Wood, P. B., & Bartkowski, J. P. (2004). Attribution style and public policy attitudes toward gay rights. *Social Science Quarterly*, 85, 58–74.
- Wright, Robert (1994, August 15). Infidelity — It may be in our genes. *Time*, 144, 44–53.
- Yzerbyt, V., Judd, C. M., & Corneille, O. (2004). Perceived variability, entitativity, and essentialism: Introduction and overview. In V. Yzerbyt, C. M. Judd, & O. Corneille (Eds.), *The psychology of group perception* (pp. 1–22). New York: Psychology Press.

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