IMPLICIT ESSENTIALISM: GENETIC CONCEPTS ARE IMPLICITLY ASSOCIATED WITH FATE CONCEPTS

by

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Abstract

Genetic essentialism is the tendency for people to think in more essentialist ways upon encountering genetic concepts. The current studies assessed whether genetic essentialist biases would also be evident at the automatic level. In two studies, using different versions of the Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998), we found that participants were faster to categorize when genes and fate were linked, compared to when these two concepts were kept separate and opposing. In addition to the wealth of past findings of genetic essentialism with explicit and deliberative measures, these biases appear to be also evident with implicit measures.
Preface

Chapters 2 and 3 are based on work conducted in UBC’s Culture and Self Lab by Dr. Steve Heine and Wren Gould. We collaborated in choosing and revising our study materials, and I am primarily responsible for the data collection and analysis that are reported.

A version of Chapter 2 and 3 has been published in PLoS ONE. Gould W.A. & Heine S. J. (2012) Implicit essentialism: Genetic concepts are implicitly associated with fate concepts. PLoS ONE 7(6): e38176.doi:10.1371/journal.pone.0038176. Again, I was primarily responsible for the data collection and analysis. I also wrote the first draft of the manuscript, and Dr. Heine and I revised it.

This research received ethics approval from the University of British Columbia Behavioural Research Ethics Board. The certificate number for this project is H10-02602.
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1 Introduction

1.1 Of Essences and Placeholders

In 1991, Simon Levay provided evidence that sexual orientation may be linked to brain structures. In particular, he showed that gay men’s third interstitial nucleus of the anterior hypothalamus (INAH3) were approximately the same size as the INAH3 of straight women and were much smaller than those of straight men. Presumably, here was evidence that might explain the similar sexual predilections of gay men and straight women (insofar as they’re both attracted to men). However, he cautioned that he had not found genetic evidence, and thus his results should not be used to conclude that “gay men were born that way” (Nimmons, 1994). One year previously, Hamer, Hu, Magnusson, Hu, and Pattatucci (1993) had actually provided that evidence, showing X-chromosome linkages to gay men’s sexuality. At last, linkages to region Xq28 provided evidence that homosexuality was in-born. Regardless, linkages between adult homosexuality and Xq28 were published despite the lack of replication of these findings. Upon replication, the Xq28 region has shown almost no association with gay men’s sexuality (Mustanski, DuPree, Nievergelt, Bocklandt, Schork & Hamer, 2005). Genome-wide research has suggested that genes on chromosomes 7,8, and 10 may contribute to male homosexuality, instead. Thus, one genetic region (much less one gene, as ballyhooed in the media; Horton, 1995) does not seem to be solely responsible for gay male sexuality. Instead, genes on at least three chromosomes have shown significant linkages. This is consistent with emerging evidence that genes often do not act alone, but often in interaction with other genes that are sometimes on other chromosomes (Johnson, 2007; Johnson, 2010; McCrae, Scally, Terracciano, Abecasis, & Costa, 2010).

The use of this genetic information to suggest that a trait is in-born, essential, and immutable may lead scientists and lay people astray. Instead, the portrayal of genetic evidence
in the mass media may reveal bias. The biased evaluation of these genes seems to reflect several systematic qualities, all of which refer back to the perceived essence of particular traits. As reflected in Le Vay’s evaluations of genetic evidence, genes are seen as natural and inherent, and as producing stable, life-long traits (Dar-Nimrod & Heine, 2011). Furthermore, they may be seen as absolving people of personal responsibility for their actions. Several studies have shown that genetic evidence make criminals seem less responsible for their crimes (Monterosso, Royzman & Schwartz, 2005; Dar-Nimrod, Heine, Cheung, & Schaller, 2011) presumably because they had no choice over the stable, life-long characteristics they were born with. This same logic may explain reductions in prejudice when making genetic attributions for gay men’s sexual orientation (Haslam & Levy, 2006), since gay men cannot be held responsible for something they did not choose. And last, an appeal to Xq28 may reflect assumptions that one genetic region discretely produces individual behaviours. Because of an appeal to stable, inherent, discrete, and natural qualities, genetic attributions may reflect more widespread cognitive biases that share these features (Haslam, Rothschild, & Ernst, 2000). Especially, they may be functionally related to psychological essentialism.

Psychological essentialism is the perception that perceived objects have deep, underlying qualities that produce surface characteristics (Medin & Ortony, 1989). Medin and Ortony (1989) describe essentialism as an antidote to the limitations of similarity-based categorization processes. These earlier notions of human cognition suggested that people judged the similarity of target objects to prototypical exemplars, and thereby made categorical judgments about whether or not an object overlapped enough with the prototype for a specific category (Rosch & Mervis, 1975). These categories were bounded by perceived covariance between features, and people made probabilistic inferences based on surface similarities. Given this argument, a sparrow may be categorized as a bird because, like birds, it has wings, can fly, has a beak, and so
forth. It shares particular covarying characteristics with other organisms that are assigned to the “bird” category. This particular theory fell short, though, in describing the scope of a category and what defined the boundaries of a particular category. Psychological essentialism suggested that there may be firmer boundaries that delineate a specific category. Indeed, category members may be sorted based on deep, underlying, and hidden features, and assuming these deep features allow people to perceive some fundamental reality to the objects they are actually perceiving and categorizing (Medin & Ortony, 1989; Kashima, Kashima, Bain, Lyons, Tindale, Robins, Vears, & Whelan, 2010). For instance, even if a bird-like creature undergoes a transformation such that it looks like an insect-like creature, many still see this new insect-looking creature to be inherently bird-like (Rips, 1989). Because participants disregard surface features, this may stand as evidence that participants inferred some stable bird-like essence that was unchanged. Medin and Ortony (1989) might suggest that people use this essence to reify concepts that otherwise might be seen as merely perceived.

There may be evidence to doubt this theory, though. Rips (1989) included information about offspring in the above study such that a transformed bird-like creature would still have bird-like offspring. Removing this information leads most people to categorize strictly based on what a creature looks like (Hampton, Estes, & Simmons, 2007). If this is the case, people may be less concerned with the inherent metaphysical reality of the objects they perceive, as Medin and Ortony (1989) imply when discussing psychological essentialism. Instead, people may at times be social constructionists (DeLameter & Hyde, 1998; Bohan, 1992) given their relative lack of concern with underlying reality. In any case, they may be more invested in the similarity-based judgments that Rosch and Mervis (1975) emphasize.

Similarity does not necessarily indicate an absence of essentialism, though. In fact, people automatically associate others who share their attitudes with family (Park & Schaller,
2005), which suggests that people may implicitly infer some inherent genetic bonds in simply perceiving similarity. There is evidence that people consider different underlying mechanisms, and make individual assessments of whether or not these underlying causal mechanisms are working properly. Rehder and Burnett (2004) show that Bayes’ nets generally fit well with participants’ reasoning about underlying causal mechanisms. They are making probabilistic assessments about whether or not certain underlying mechanisms may be influencing surface features, and these considerations have strong considerations for ultimate categorization. Indeed, if enough features are not working properly, a specific target may be judged a poor fit for the category. Participants may make probabilistic assessments not only of the presence or absence of surface features, but also of the underlying causal mechanisms that lend themselves to those surface features. Given this evidence, participants may be making dynamic inferences, assessing how well underlying causal features are operating from moment to moment (Hampton, et. al., 2007). These assessments may yield judgments that would be comparable to the similarity-based judgments of Rosch and Mervis (1975). Instead of deciding that two targets that look alike must be in the same category, though, participants may be deciding that these two targets both have underlying causal networks intact. These underlying networks would cause surface similarity. Thus, similarity does not contradict essentialism.

Regardless, there is emerging evidence that people infer underlying causes for external features. For instance, participants who are presented with an underlying cause for surface features actually disregarded how many traits a target has in common with other category members, were less likely to generalize non-causal traits to other category members, and were less likely to see common features as being diagnostic of belonging in a category (Rehder, 2006). This evidence suggests that causes of features hold some primacy in categorical decision-making. Participants also see an ultimate cause as more central to categorization in a chain of
causes (Rehder & Kim, 2006), suggesting that this first cause may absorb some qualities of inferred essences. Furthermore, category features become more central to categorization if associated with some underlying cause (Proctor & Ahn, 2007; Ahn, Kim, Lassaline, & Dennis, 2000). Proctor and Ahn (2007) especially argue that the influence of causal knowledge disrupts purely associative accounts, as outlined by Rosch and Mervis (1975). Presumably, how causal a feature is must be modeled within associative networks as well, which disrupts the purely probabilistic account offered by these associative construals.

Critical to these theories about psychological essentialism, though, has been the notion that essences are vague and ambiguous (Medin & Ortony, 1989; Gelman, 2003). Because essences are so poorly understood (despite broad adherence to them), people may require a material placeholder to explain essentialist perceptions. Several researchers have suggested that genes may be just such a placeholder (Dar-Nimrod & Heine, 2011). Individuals often report genetic attributions for individual characteristics (Conley, 1997). Even so, individuals rarely understand how genes cause these ultimate outcomes (Lanie, Jayaratne, Sheldon, Kardia, Anderson, Feldbaum, & Petty, 2004), and essentialist children and adults are less likely to believe in within-species variation, which is critical to most models of natural selection and evolution (Schtulman & Schulz, 2008). This contrast suggests that how genes produce ultimate outcomes and how genes relate to natural selection processes are precisely not what individuals are trying to explain. Instead, individuals may be invoking genes to explain essentialist beliefs. The role of genes as a placeholder may explain why lay people consider genes the final arbiters regarding whether or not a trait is “in-born.” As mentioned above, these ultimate causes are often seen as most influential in determining category status and feature centrality within the category (Rehder & Kim, 2006). As Rehder and Kim (2006) suggest, genes may be taking on the qualities of perceived essence because essences are so broadly defined and ambiguous on
their own. This association with psychological essences has been used to coin the term “genetic essentialism” to describe biases in considering the presumed fatalistic, natural, discrete, and inherent implications of genes (Keller, 2005; Dar-Nimrod & Heine, 2011).

1.2 Why Genes?

Medin and Ortony (1989) suggested that individuals share epistemic motivations to see some fundamental reality to one’s perceived universe. These motivations lead individuals to seek out material placeholders for perceived essences. Indeed, there is some evidence that essentialism may emerge from simple dyadic conversations, suggesting that individuals in dyads may use essentialism to ground themselves (and others) in a shared reality (Kashima, et. al., 2010). Furthermore, reification (or entitativity) has been considered one of two core factors of essentialist belief (Haslam, Rothschild, & Ernst, 2000; Yzerbyt, Corneille, & Estrada, 2003). Even so, Medin and Ortony do little to clarify the qualities that might characterize these placeholders. The only constraint seems to be that these placeholders must be considered real or material by the perceiver. If placeholders must only be material, then quite a lot of matter might make suitable candidates for essence placeholders. There is some evidence that people may essentialize their social experiences (Rangel & Keller, 2011), perceived “souls” (Richert & Harris, 2006; Richert & Smith, 2010) and brains (Haslam, 2011; Mahalingam, 2003). Even so, genes may be supreme among these placeholders, possibly because of how they appeal to the other core factor of essentialist belief—perceived naturalness. This perception of naturalness coincides with perceptions of immutability and stability across time, and is a core factor of essentialist belief (Haslam, et. al., 2000; Keller, 2005). Because of this stronger appeal to an important domain of essentialist belief, genes may be in a better position to explain perceived essences than other placeholders.
Associations between genes and essences may be especially close because psychological essentialism may have emerged in order to explain reproductive processes. Thus, genes may seem more plausible than other placeholders when a category is perceived as highly natural because genes are tied to precisely the natural processes that essences are designed to explain. It does seem plausible that evolution might provide learning short-cuts in particular domains that might be relevant to human survival (Norenzayan, Schaller, & Heine, 2006). Reproductive processes might be one such learning short-cut. Indeed, perceptions of essences that unite natural kind categories (such as animals and plants) may constitute a “folk biology” that would have been instrumental in animal husbandry and agriculture (Medin & Atran, 2004; Medin & Atran, 1999; Atran, 1998). Being able to perceive some fundamental essence that is shared among animal and plant species would allow humans to make predictions about the inherent qualities of novel category members and also of future generations of particular plant and animal species. So, psychological essentialism may allow children to predict that a cow is particularly likely to give birth to calves who will maintain bovine biological properties throughout their lives. Indeed, people are much more likely to make these sorts of assumptions about natural kind groups than even highly natural social categories, like gender (Taylor, Rhodes, & Gelman, 2009).

There is some converging support from the developmental literature as well as non-human primate literature which suggest that essentialist perceptions may emerge early. Five-year old children, for instance, are likely to see animals as maintaining their inherent characteristics despite being raised by animals of other species (Taylor, Rhodes, & Gelman, 2009). They are likely to see their physical and behavioural characteristics as stable and unchanging regardless of these contexts. Thus, they make inferences about essentialized insides that cannot be changed by outside circumstances or experiences (Taylor, et. al., 2009; Gelman,
Gelman and Heyman (1999) have suggested that descriptors, when operationalized as generic nouns (i.e. “carrot-eaters,” “ball-kickers,” etc.), lend themselves to making inferences about enduring, stable traits that generalize across contexts. In short, they have many essential features, given their immutability and generalization across contexts (Haslam, Rothschild, & Ernst, 2000). Children seem to resort to these generic noun-phrases with very little prompting from parents by the age of 2, which suggests that they are independently making inferences about stable and enduring traits (Gelman, Goetz, Sarnecka, & Flukes, 2008).

Furthermore, rhesus monkeys, who are close human relatives, seem to make essentialist inferences as well. These monkeys seem motivated to pursue pieces of fruit despite changes to surface appearance (Phillips, Shankar, & Santos, 2010). Much like humans, they perceive underlying characteristics to be more real than surface transformations (Rips, 1989). There is also evidence that essentialist assumptions about social groups extend across cultures (Gil-White, 2001), which lends support to the proposition of early emerging, evolved cognitive modules that are designed to promote essentialist perceptions. This evidence together suggests that genes may be ideal placeholders for perceptions that emerged to explain genetic processes because perceptions of high naturalness would make both more tenable in people’s minds.

Close linkages between genes and perceived naturalness would also make genes ideal candidates as placeholders for social category essences, as well. For instance, Gil-White (2001) suggests that essentialist beliefs about ethnic groups may rely on the “species-like” characteristics of ethnic groups. Because people of the same ethnic category inherit shared, distinctive cultural norms from their parents, and because marriage outside of one’s ethnic category is rare, Gil-White suggests that individuals may infer essences to explain the boundaries of ethnic group as well as inter-generational transmission. Gil-White (2001) presents evidence of these essentialist attitudes across several, non-Western ethnic groups (i.e. Kazakhs and
Mongols) via open-ended survey, adapting a common adoption paradigm (Taylor, Rhodes, & Gelman, 2009). Kazakhs and Mongols see members of their respective groups as inherently Kazakh or Mongol, despite surface similarity. Even adoption by the other ethnic group would not alter one’s inherent, and internal, Mongol- or Kazakh-hood. This suggests that inferences about essentialized “insides” may extend beyond Western samples. Furthermore, “species-like” perceptions would suggest that people may perceive ethnic groups as highly natural, which might legitimize using genes as placeholders due to closer linkages with reproductive processes.

Social groups may also be perceived as highly natural and immutable because these perceptions may be especially useful in legitimizing stereotyping and prejudice. Genes may be especially useful in explaining away these naturalistic perceptions, given their actual, status-justifying motivations. Many sociologists and social psychologists have illustrated how essentialist arguments have been used historically to suggest that members of marginalized groups are not just inferior, but that they are inherently inferior and that that can never change (Haslam, 2011; Hirschfeld, 1997; Gil-White, 2001). These arguments may thus be used to legitimize the supremacy of an oppressing group. “Essentialism” has subsequently become a dirty word in anthropology and sociology, since making essentialist claims has been so linked to historical oppression within those fields (Gil-White, 2001). Nonetheless, several researchers have suggested a ready armistice (Mahalingam, 2007; Gil-White, 2001). They recommend that researchers begin considering the intricate connections and interactions between inherent cognition, which has been the traditional approach to essentialism work in psychology (Gelman, 2003), and social hierarchy, which has been the traditional approach in sociology and other social sciences (Mahalingam, 2007).

Several researchers have been hot on this research trail, demonstrating close linkages between biological theorizing, essentialism, stereotyping and prejudice. Brescoll and LaFrance
(2004) demonstrate that when both men and women read about an arbitrary gender difference in “plant identification,” they are more likely to support gender stereotypes when those differences are framed as biological, as opposed to socio-cultural. Simply learning of an arbitrary difference one shares with somewhat of the opposite gender prompts inductive inferences about the inherent differences between men and women (Prentice & Miller, 2006). This generalization has been framed in terms of the assumed, inherent shared characteristics of members of the same genders. Bastian and Haslam (2006) have also demonstrated that essentialist beliefs may be instrumental in bolstering stereotypes of Jews, Aboriginals, Japanese, doctors, lawyers, politicians, men, women, and homosexuals. However, they suggest that essentialist beliefs may be used to explain stereotypes as residing in deep, underlying traits, rather than one’s own biases. Morton, Postmes, Haslam, and Hornsey (2009) have also suggested this sort of motivational explanation. They show that when men are led to believe that the gender gap is closing, they show more support for genetic research into the fundamental differences between men and women. Even white people who are motivated to essentialize race will de-essentialize race when white people are the ones being excluded, suggesting that essentialism may be recruited to satisfy exclusionary motivations (Morton, Hornsey, & Postmes, 2009). Even so, essentialist attitudes lead participants to remember stereotype-consistent information over stereotype inconsistent information (Bastian & Haslam, 2007).

Essentialism may also be instrumental in prejudice—in unwarranted negative or positive evaluations of one’s own or other social groups (to take Gordon Allport’s definition; 1954). Williams and Eberhardt (2008) have shown that exposing White participants to biological explanations for race differences causes them to seek social distance from Black targets. Furthermore, participants’ own biological and genetic beliefs about the antecedents of race predict this social distancing even when controlling for self-reported racism. Furthermore,
people who hold essentialist beliefs are more likely to spontaneously approach in-group cues, again when holding out-group attitudes constant (Bastian, Loughnan, & Koval, 2011).

Essentialist attitudes also predict negative attitudes about people with mental disorders (Howell, Weikum, & Dyck, 2011; Haslam & Ernst, 2002).

However, anti-essentialist beliefs may also be linked to prejudice (Haslam, Rothschild, & Ernst, 2002; Haslam & Levy, 2006). Indeed, reifying social categories via essentialism may actually serve minority interests, for instance in the case of gay men and lesbians. Essentialist beliefs about homosexuality would suggest that same-sex sexuality may be concrete, natural, unchanging, and especially outside of one’s own control. Thus, gay men would not be seen as responsible for their same-sex sexuality. Furthermore, perceptions of naturalness, which are tied to essentialist belief, may prompt the naturalistic fallacy that what is natural is morally good. This association would establish pathways by which homosexuality might be seen as morally good (Dar-Nimrod & Heine, 2011; Frankena, 1939). Thus, anti-essentialist beliefs may be better predictors of anti-gay bias. This logic may extend to social groups that are perceived as relatively more “chosen,” such as fat people (Crandall, 1994). There is still some speculation about which essentialist beliefs may be most instrumental in prejudice reduction, though. As implied above, naturalness and immutability beliefs may be critical to prejudice reduction due to implications about how likely any one trait can change, as well as perceptions of moral goodness and responsibility. Prejudice may also rely on discreteness beliefs, though. Hegarty (2010) has suggested that beliefs in the fluidity of sexual orientation and in the lack of distinction between different sexual orientation categories may be more instrumental to reducing anti-gay prejudice than reducing immutability beliefs.

Other researchers have considered how essentialist beliefs affect experiences of prejudice. Dar-Nimrod and Heine (2006) have illustrated how framing gender differences in
math as biological can elicit stereotype threat effects (Steele & Aronson, 1995; Spencer, Steele, & Quinn, 1999), which may hurt women’s performance in math domains. Biological theories may especially bring stereotypes of women’s underperformance to mind, perhaps taxing working memory (Schmader & Johns, 2003) and causing actual underperformance. Even so, biological theories may be used to consolidate marginalized groups and potentially motivate collective action (Mahalingam, 2007). For instance, gay men and lesbians may use essentialist beliefs to suggest the validity of their groups to a largely straight mainstream and to demand equality (Morton & Postmes, 2009). This strategy may backfire, though, insofar as recent immigrants who are also essentialist tend to have fewer acculturative experiences. Thus, consolidating a marginalized identity may lead to less adjustment to a majority culture, even if that is desirable (Bastian & Haslam, 2008). As mentioned previously, essentialism may be invoked to serve exclusionary motivations. Those who are excluded, though, are likely to feel like they have less “human nature” (Bastian & Haslam, 2010), which means that they feel that there are fewer, underlying, essential links that connect them to human categories. Indeed, this subtle exclusion from fundamental humanity may be instrumental in out-group prejudice (Bain, Park, Kwok, & Haslam, 2009).

There seem to be strong linkages between biological theorizing, essentialism, stereotyping, and prejudice throughout the stereotyping and prejudice literature. Appealing to immutable, natural qualities may be used to serve motivations to unite marginalized groups, reinforce status hierarchies, or to absolve oneself of responsibility for negatively stereotyped traits. But most especially, genes and fundamental biology seem especially suited to prompting assumptions about stable, natural, and immutable qualities. These close linkages would emerge because genes are precisely the process that essences are designed to explain. Considering how genes may be seen as more “natural” than social experiences and souls, there may be more
evidence that genes may have an especially successful candidacy, when running against other placeholders.

1.3 Automaticity and Genetic Essentialism

Given the evidence that genes may be non-arbitrarily associated with underlying essence more so than other matter, it is still unclear in which manner these two may be associated. There seems to be evidence for explicit, deliberate, and conscious associations. However, there may also be reason to think that these associations may be implicit, automatic, and unintended. A substantive literature has been dedicated to disentangling implicit and explicit associations in social cognition. Explicit associations are often construed as the deliberate and controlled responses that may be reflected in self-report surveys. Implicit associations are often described as the uncontrolled brand of responses that may be reflected in response latencies, as well as other non-verbal behaviours (Gawronski & Bodenhausen, 2006; Greenwald, Poehlman, Uhlmann, & Banaji, 2009). For instance, priming participants with a target category (i.e. old people) may lead them to behave consistently with stereotypes regarding that category (by walking slowly) without their knowledge or awareness (Bargh, Chen, & Burrows, 1996). Any one behavior, though, may not be easily categorized as implicit or explicit. Indeed, any behavior may have aspects that are implicit and others that are explicit. Bargh (1994) suggested early on that attitudes and behaviors may vary to the extent that they are controllable, intentional, conscious, and efficient. Any of these behaviors may reflect automaticity to a certain extent. Thus, driving one’s car may be thought of as somewhat automatic because it is done efficiently and with little conscious deliberation, despite also being controllable (one hopes) and well within one’s intentions.

The literature on implicit cognition has since grown to include research on implicit attitudes (Fazio, Jackson, Dunton, & Williams, 1995; Greenwald, McGhee, & Shwartz, 1998;
Baron & Banaji, 2006), implicit stereotypes (Nosek, Banaji, & Greenwald, 2002; Nosek, Smyth, Hansen, Devos, Lindner, Ranganath, Smith, Olson, Chugh, Greenwald, & Banaji, 2007; Cvencek, Meltzoff, & Greenwald, 2011), and automatic goals (Bargh, Lee-Chai, Barndollar, Gollwitzer, & Trotschel, 2001). Attending to the faces of black people, for instance, facilitates response times to “bad” words (Fazio, et. al., 1995), while both adults and children are faster to place black faces in the same category as “bad” words when compared to placing white faces in the same category as “bad” words (Baron & Banaji, 2006; Greenwald, et. al., 1998). These differences are often only fractions of a second. Furthermore, participants are faster to place women in the same category as the humanities, while slower to place them in the same category as math, suggesting that stereotypes about women’s lack of ability in math may have implicit consequences (Nosek, et. al., 2002).

Scrutiny is often directed to these findings, though, since it is sometimes unclear what these sorts of measures predict. Several researchers have suggested that they only reflect cultural attitudes that are well-rehearsed. This rehearsal establishes strong implicit connections between math and masculinity, for example, though this says nothing for participant’s explicit attitudes and beliefs (Arkes & Tetlock, 2004). Others have speculated that implicit associations may arise from the pressures of evolutionary adaption, as well as being learned and rehearsed via culture (Millar, 2009). Gawronski and Bodenhausen (2006) have suggested that explicit processes may be the arbiters of the accuracy of automatic associations that become present in working memory. When implicit associations leap to mind, explicit processes allow participants to reflect on the accuracy of these associations. This is somewhat related to the notion that explicit processes may inhibit the expression of implicit associations, if individuals are explicitly convinced of the “falseness” of an implicit association (Devine, 1989). In these circumstances, explicit associations tend to show little or no relation with implicit associations (Fazio & Olson,
2000). However, when there is no good reason to inhibit the expression of implicit associations, there tend to be moderate or robust correlations between implicit and explicit measures (Fazio & Olson, 2000). Similarly, when there are no reasons to inhibit automatically activated goals, they tend to influence behaviour regardless of explicit goals (Bargh, et. al., 2001).

Since genetic essentialism is a relatively well-established, well-rehearsed cultural attitude that may serve inherent psychological essentialist biases, it seems plausible that genetic essentialist associations may also be present at implicit, automatic levels. The present studies assess just this possibility. We hypothesize that participants will show automatic associations between genes and fatalistic outcomes on the Implicit Association Test (IAT; Greenwald, et. al., 1998), which would suggest that participants are making assumptions about the inherent, immutable nature of genes in predicting predetermined outcomes. Considering that there would be no reason to inhibit implicit associations, we should expect to find moderate to robust correlations between these implicit measures and more explicit measures of genetic essentialist belief.
2 Study 1

2.1 Background

In our first study, we used the IAT to measure the automatic connections between genes and fate. The IAT has shown relatively robust test-retest reliability (Nosek & Greenwald, 2001) and predictive validity (Greenwald, Poehlman, Uhlmann, & Banaji, 2009), and has become a standard measure of implicit associations in the psychological literature.

The IAT asks participants to place words into one of two opposing categories, such as flowers vs. insects using keys on the left and right side of a keyboard. It then asks participants to do the same with two other opposing categories, for instance, the evaluative judgment good vs. bad. Participants then complete trials in which “flower” words are paired with “good” words, while “insect” words are paired with “bad” words, as quickly as they possibly can. They are then asked to do the reverse: pairing “flower” words with “bad” words and “insect” words with “good” words. If the mean response times (in milliseconds) diverge between these different trials, then there are likely automatic associations between these categories, such that participants may more quickly associate “flower” words with “good” words. Presumably, these very small differences between trials (on average less than half a second), would be impossible to consciously control. Indeed, this is exactly what researchers have found in conducting a flowers vs. insects IAT (Greenwald, McGhee, & Shwartz, 1998). We expected that participants may pair “gene” words with “fate” words in the same way that they automatically pair “flower” words with “good” words.
2.2 Method

2.2.1 Participants

Thirteen men and 34 women were recruited by Amazon.com’s Mechanical Turk, which compensates participants with Amazon.com merchandise in return for completing on-line tasks. Data recruited from Mechanical Turk have been shown to be comparable to data collected by more traditional, lab-based methods (Buhrmester, Kwang, & Gosling, 2011). Indeed, samples tend to be slightly more representative of the general US population than traditional, university samples. Compensation rarely affects the reliability or quality of the data. Furthermore, classical psychology findings, such as the conjunction fallacy, replicate in Mechanical Turk samples with comparable effect sizes (Paolacci, Chandler, & Ipeirotis, 2010). Participants’ ages ranged from 20 to 58 (M=39), and the majority (n= 37) were of European descent. Two others were East Asians, one was Middle-Eastern, and the rest described themselves as “white” or as “multi-racial.” All were citizens of the United States. In IAT studies, it is expected that we exclude participants if more than 10 percent of their responses fall below the 300 ms. No such exclusions were necessary in Study 1.

2.2.2 Materials and Procedure

Subjects completed an IAT that was specifically adapted to capture associations between genes, socialization, fate, and choice. Unlike many other IAT’s, this particular task required that the researchers find a natural opposite for “fate” and “genes.” This is unusual since the IAT usually deals with clear opposites (good vs. bad, male vs. female, etc.; Greenwald, et. al., 1998; Nosek, et. al., 2002). In considering the opposite of “fate,” two alternatives presented themselves: chance and choice. Whereas fate might be considered constraining, chance may be considered
random and undetermined. However, the researchers decided to avoid this particular category since people may see seemingly chance events as relatively fateful and determined (Paulhus & Carey, 2011). “Choice” had few of these constraints, since fates are explicitly assigned and not chosen. Presumably, choice may be seen as a completely undetermined act of free will (Paulhus & Carey, 2011). Though some people seem to see determinism and free will as peacefully co-existing, philosophers and lay people sometimes construe determinism and free will as being incompatible, which legitimizes the inclusion as “choice” as an opposite of “fate” (Feltz, Cokely, & Nadelhoffer, 2009). We chose “socialization” as a clear opposite for genes, since nature (i.e. genes) and nurture (one’s socialization) have long been juxtaposed as alternative categories (Voland, 2000). The words chosen for any of these categories were often synonyms or near-synonyms for the category name, and so we expected they would be closely identified with each other. This is relatively standard for implicit measures. Thus, “choice” words included “free-will,” “decision,” “option,” “selection,” “freedom,” “preference,” and “opinion.” These are all near-synonyms of “choice,” though “selection” may admittedly have evoked problematic associations with “natural selection.” Participants may have conceived of genes as random mutations that have essential and deterministic implications due to natural selection processes. Thus, there may have been one “choice” word that had oddly fate-like implications. The “fate” words included “God,” “destiny,” “certainty,” “plan,” “necessity,” “permanence,” and “blueprint.” These words were chosen because they evoked the idea that the future is pre-determined and pre-destined, which is consistent with particular religious notions (thus the inclusion of “God”). The “gene” words included “genome,” “DNA,” “heredity,” “double-helix,” “cell,” “blood-line,” and “chromosome,” and the “socialization” words were “nurture,” “training,” “experience,” “tradition,” “lifestyle,” “learn,” and “develop.”
Participants practiced sorting these words into their proper categories on the right or left by typing corresponding keys on the keyboard. Dichotomous categories were situated to the right or left of the screen, and participants were asked to place words into them via the “E” and “I” keys on the computer screen as they came up on the center of the screen. Participants were directed to go as quickly as possibly.

Participants completed two practice blocks, during which they placed words into gene vs. socialization categories for 20 trials before they placed words into fate vs. choice categories for another 20 trials. Participants then proceeded onto another practice block, during which they placed words into Fate + Genes vs. Choice + Socialization dichotomies for 20 trials. They then completed a critical block during which they placed words into the same Fate + Genes vs. Choice + Socialization for 40 trials. Participants then practiced placing words into Genes vs. Socialization dichotomies again for 20 trials, though this time their positions were switched on the computer screen. This switch was to avoid lateralization effects due to right- or left-handedness. Participants then completed another practice block, during which they placed words into Fate + Socialization vs. Genes + Choice dichotomies for 20 trials. Participants concluded by completing a final critical block where they placed words into Fate + Socialization vs. Genes + Choice dichotomies for 40 trials. The practice and critical blocks where participants placed words into paired categories (i.e. Fate + Genes vs. Choice + Socialization), were counter-balanced to avoid order effects.

2.2.3 Results and Discussion

Response times were analyzed with the most recent scoring algorithm (Greenwald, Nosek, & Banaji, 2003). This algorithm requires that mean latencies be computed for both the critical blocks. However, Greenwald, et. al. (2003) found that biases that arose in the critical blocks
were also present in the practice blocks. Thus, the practice blocks (each including 20 trials) were included in analyses. Means were calculated for both the practice blocks and for the critical blocks, though any response times over 10,000 ms were not included in the calculation of these means. Furthermore, as recommended by Greenwald, et. al. (2003), if a participant produced response times that were less than 300 ms more than 10% of the time, those participants were excluded from analysis. No exclusions were necessary in this data. A difference score was calculated for both the practice blocks and the critical blocks by substracting the mean from Fate + Genes vs. Choice + Socialization blocks from the mean of the Fate + Socialization vs. Genes + Choice blocks. These two difference scores were then divided by the pooled standard deviation for both of the blocks. The mean of these two standardized difference scores was then computed, yielding a standardized D-score for every participant. The IAT actually alerts participants to when they have pressed the wrong key, at which point participants must press the correct key to continue on with the task. This assigns an error penalty, since participants must take longer than they might have in order to respond correctly. Thus, these longer latencies may be used to indicate weaker associations, given IAT task constraints and reliance on response latencies.

We used a one-sample t-test to assess whether or not D-scores per participant generally differed from zero. Though there is some speculation as to whether or not a zero on IAT measures indexes having “no bias” (Blanton & Jaccard, 2006), it does suggest that there is no difference between IAT blocks. The results confirmed our hypothesis, $t(46)=8.45$, $p<.001$. The average D-score was substantial ($M=0.43$, $SD=0.35$), and the difference between the mean for the two trials was 320 ms. This D-score is about the same size as that found for more established IAT’s that assess implicit negative evaluations of Black people and also implicit associations between masculinity and science (Nosek, Greenwald, & Banaji, 2005). Participants were slower
to categorize words when genes were paired with choice, and socialization with fate, suggesting that these were not implicitly associated as closely as when genes were paired with fate and socialization with choice. Thus, this is evidence that genetic concepts are more implicitly associated with fate than with choice, in comparison with socialization concepts.

Since the IAT relies on dichotomies, however, we cannot be certain that genetic associations with fate were driving the effect. An alternative interpretation may be that socialization is particularly associated with choice, which might result in the particular differences in response times we found in this study. Study 2 disentangles this problem by using a single-target version of the IAT.
3 Study 2

3.1 Background

In Study 2, we adapted a single-target version of the IAT to look more closely at the associations between genes and fate vs. genes and choice. Like the original IAT, this version has shown good reliability and validity (Wigboldus, Holland, & van Knippenberg, 2006; Bluemke & Friese, 2006; Penke, Eichstaedt, & Asendorpf, 2006). Unlike the original, though, it relies on only one group of dichotomous categories. For instance, it pairs insect words with “bad” words while asking participants to place “good” words in a category of its own. Subsequently, it pairs insect words with “good” words while asking participants to place “bad” words in its own category. By comparing these two different blocks, we can more carefully assess whether or not insects are more closely associated with good or bad evaluations. Thus, this task was ideal for assessing how closely genes were associated with fate, as compared to choice.

3.2 Method

3.2.1 Participants

One hundred and thirty-five participants completed this study, however the results of 7 participants were excluded because more than 10% of their responses fell below the cut-off of 300 ms recommended in IAT studies (Greenwald, Nosek, & Banaji, 2003). This left 87 women, 40 men, and 2 participants who did not specify their genders, who were all recruited by Mechanical Turk. Their ages ranged from 18 to 67 ($M=36$), and the majority ($n=99$) were of European descent. The rest were East Asian ($n=7$), African ($n=6$), South-east Asian ($n=2$), Middle Eastern ($n=4$), with nine who self-reported races as Hispanic ($n=2$), Caucasian ($n=2$), Native American ($n=1$), American ($n=1$), as mixed race ($n=1$), or as not knowing ($n=2$). Two declined to respond. Again, all participants were citizens of the United States.
3.2.2 Materials and Procedure

For this study, we adapted a single-target Implicit Association Test (ST-IAT). With this ST-IAT, participants were asked to learn associations with the same genetic words as in Study 1 via practice blocks. In the first practice block, participants placed words that came up on the middle of the screen into Fate vs. Choice dichotomies at the right and left of their computer screen using the “E” and “I” keys for 20 trials. They were asked to complete the task as accurately as possible, and were given feedback about their performance on this practice block. Participants then practiced placing words into Fate + Genes vs. Choice dichotomies for 24 practice trials. Notably, participants did not have the opportunity to rehearse genetic words. Participants then completed a critical block during which they placed words into Fate + Genes vs. Choice dichotomies for 40 trials. Another practice block followed during which participants placed words into Fate vs. Genes + Choice dichotomies for 36 trials. These extra trials allowed participants to acclimate to changes in the task demands. Participants then completed a critical block during which they placed words into Fate vs. Genes + Choice dichotomies over 40 trials. Again, the critical blocks and their respective practice blocks were counterbalanced to avoid order effects. However, there was no switching of position to avoid lateralization due to left- or right-handedness. By comparing the response times between the critical blocks, we can get a clearer sense of how genes are related to fate, as opposed to choice, without invoking a comparison to socialization.

Participants also completed several explicit measures of genetic determinism, such as the Belief in Genetic Determinism Scale (Keller, 2005) and the Genetics, Disease, & Stigma Survey (Shostak, Freese, Link, & Phelan, 2009). Correlations between these explicit measures and the IAT would demonstrate discriminant or convergent validity between these measures and would offer some insights into whether or not these measures are assessing distinctly different attitudes.
The Belief in Genetic Determinism scale asks participants to agree or disagree to 18 statements about genetic determinism on a seven-point scale with 4 as the neutral point. Sample items include “I believe that children inherit many of their personal traits from their parents,” “I am convinced that very few behavioral traits of humans can be traced back to their genes” (reverse scored), “In my view, many forms of human behavior are biologically determined and can therefore be seen as instinctual,” “The fate of each person lies in his or her genes, and “I am convinced that the analysis of the genetic predispositions of an embryo allows good predictions as to which characteristic and abilities the child will develop.”

The Genetics, Disease, & Stigma Survey asks participants their opinions of 8 statements related to the utility of genetic research on a 4 point scale. Thus, the neutral point would be most closely approximated by 2.5, since 2 and 3 usually designated some opinion on the issue. For the first five items, participants rated how important (from “1- very important” to “4- not at all important”) they expected one’s genetic make-up to be for various outcomes. The specific items are: “How important do you think a person’s genetic makeup is in influencing the major illnesses they will develop in life?,” “How important do you think a person’s genetic makeup is in influencing whether or not they will develop a serious mental illness?, "How important do you think a person’s genetic makeup is in influencing their personality?, ""How important do you think a person’s genetic makeup is in influencing their intelligence?, "How important do you think a person’s genetic makeup is in influencing their success in life?.” The last three asked participants to rate "Overall, do you think the Human Genome Project and other research on human genetics is likely to be helpful or harmful?,” “Every person should be required to have a genetic screening test before he or she can get married,” “When thinking about choosing a marriage partner, it is important to know whether the person has a history of mental illness in the family."
Participants also completed measures assessing their level of general education, which ranged from a high school education to a PhD-level of education. Presumably, genetic determinist biases may be reduced on explicit measures if participants are more educated about how genes actually work. However, these biases may emerge on the IAT regardless of level of education if these attitudes are genuinely operating below conscious awareness and presumably below the level of consciously learned knowledge.

3.2.3 Results & Discussion

As before, we adopted the scoring algorithm most often used in analyzing IAT data (Greenwald, Nosek, & Banaji, 2003), which computes an individual, standardized measure of one’s bias. However, practice blocks were not included in analyses, since there was no evidence that practice trials may show the same bias in ST-IAT’s as they do in other IAT measures. Thus, the D-score was the difference score between critical blocks, divided by the pooled standard deviation. As mentioned previously, seven participants were not included in analyses because their response times fell below 300ms more than 10% of the time.

Again, we conducted a one-sample t-test on participant’s D-scores to see if a consistent bias arose on this standardized difference measure. Indeed, participants showed a significant bias ($M=0.13$, $SD=0.36$), such that they responded more quickly when genes were related to fate and “choice” was considered separately, $t(128)=4.26$, $p<.001$. The bias was smaller than observed in Study 1, though this may be expected since we did not contrast genes with socialization. Indeed, participants did not have an opportunity to practice the gene words, which may have weakened associations prior to the critical blocks. The average participant responded to the Gene + Fate/ Chance block 133.76 ms faster than they responded to the Gene + Chance/ Fate block.
Consistent with expectations, education level did not correlate with participants’ D-scores, $r = -.04, p = .66$, though education level did marginally correlate with participants’ scores on the Genetics, Disease, & Stigma Survey, $r = -.15, p = .09$. This suggests that as participants’ education levels increased, scores on the Genetics, Disease, & Stigma Survey became more essentialist (since lower scores indicated a higher weighting of genes for life outcomes). Though we might expect scores to become less essentialism as education levels increased, higher education levels may indicate increasing access to genetic concepts and so more genetic essentialism.

Participants’ D-scores were uncorrelated with either of the explicit measures – the Belief in Genetic Determinism Scale, $r = .02, p = .79$, and the Genetics, Disease, & Stigma Survey, $r = -.03, p = .75$, which is consistent with the notion that these attitudes are separate processes. Additionally, the two explicit scales correlated moderately with each other, $r = .59, p < .001$, demonstrating convergent validity. Near-zero correlations between implicit and explicit measures suggest the lack of relation between implicit associations and explicit genetic essentialism. This lack of relationship is most often found between implicit and explicit measures in domains that may evoke socially desirable responding on explicit measures (Fazio & Olson, 2000). Presumably, the reason they often do not relate to each other is because explicit measures are susceptible to conscious control, whereas implicit measures are not. So, explicit measures may not reflect one’s real explicit attitudes, whereas implicit measures may be real reflections of one’s implicit associations. This lack of relationship may stand as evidence that genetic essentialism is actually a domain in which participants respond in socially desirable ways.

There are few reasons to think that genetic essentialist vs. anti-essentialist responses may be more socially approved. It may be plausible that participants are aware of how essentialist responses may be linked to stigma, by suggesting that people are hard-wired with socially
undesirable attributes (as in the case of the mentally ill; Haslam & Ernst, 2002). In this case, participants may have avoided essentialist responses in order to appear unprejudiced and explicit responses would have been skewed in anti-essentialist directions. However, very little research has considered lay perceptions of the connection between genetic essentialism and prejudice. In the case of the Genetics, Disease, and Stigma Survey, participants may be motivated to declare that genes are inconsequential to life outcomes because they hope that they have some influence over whether or not these outcomes will come to pass. In this case, participants may be voicing an anti-essentialist bias on that measure because they hope that genes will not triumph over their own free will. Participants may also want to avoid looking like naïve arbiters of scientific evidence, and so suggest neutral explicit attitudes in order to suggest that they are judicious. They may also suggest neutral explicit attitudes because they feel they have little expertise in genetics and so little basis for expressing attitudes about genes.

Our data suggest that these biases may have emerged on our explicit measures. In Study 2, the mean response for the Belief in Genetic Determinism Scale (Keller, 2005; \( M=4.04, SD=.90 \)) as well as the Genetics, Disease, & Stigma Survey (Shostak, Freese, Link, & Phelan, 2009; \( M=2.98, SD=.38 \)) were close to the neutral point of 4 and 2.5 for those scales, respectively. One sample t-tests, though, suggest that responses on the Belief in Genetic Determinism Scale only, \( t(128)=.54, p=.59 \), was not significantly different from its mid-point. Whereas there was a clear bias toward genetic essentialism on implicit measures, participants were generally unbiased on this explicit measure. These differences may lend some insights into why there was almost no correlation with implicit measures. There may be a response bias on the Belief in Genetic Determinism Scale such that participants are more inclined to report moderate responses, which may explain the lack of association between explicit and implicit genetic essentialism measures.
Indeed, participants may want to avoid looking like naïve arbiters of scientific information, though future research is necessary to disentangle this possibility empirically.

Responses on the Genetics, Disease, & Stigma Survey, \( t(128)=14.39, p<.001, \) were significantly different from the scale mid-point of 2.5 and were decidedly in the direction of discounting genetic background for a variety of outcomes. Thus, these results seem to conform best to the notion that anti-essentialist biases may sometimes be most socially desirable. When asked about how important genes were for intelligence, the development of mental or physical disorders, life successes, and so forth, participants were most likely to insist that genes were irrelevant. Thus, participants may be voicing a motivated belief that their own free will has more sway on life outcomes.

Thus, neither explicit measure may have assessed participants explicit attitudes due to specific social desirability biases. This may explain why there was no association with IAT measures, and it does suggest that the attitudes assessed via IAT may have been actively suppressed on measures where active deliberation holds more sway.

Study 2 confirms that genes and fate are more closely linked than genes and choice. Thus, the findings in Study 1 were likely driven in part by an association between genes and fate. This is evidence that the automatic connection between genes and fate is stronger than its connection with opposing constructs, which may bias more deliberative judgments about the properties of genes.
4 Concluding Chapter

4.1 Overview and Limitations

Over two studies, participants implicitly associated genes with fate more than they did with choice. These implicit associations lend depth to understanding how and in which ways people associate genes with fatalistic outcomes. Indeed, explicit associations (e.g., Brescoll & LaFrance, 2004; Dar-Nimrod & Heine, 2006; Keller, 2005) may be completely unrelated to implicit associations. Furthermore, this suggests that there are rapid, associative associations between genes and fate that may become present in working memory simply by invoking genes. As Gawronski and Bodenhausen (2006) suggest, these rapid associations may influence explicit processes by entering working memory and causing people to evaluate the truth value of these associations. Thus, these associations may meaningfully guide explicit evaluations of genes.

The conclusions that can be drawn from these studies are restricted, though, due to limitations. Because we exclusively used IAT-like tasks, our results relied on the dichotomies inherent in the IAT. Although people implicitly associate genes with fate words more than choice, it is quite possible that genes may not prompt fate-like constructs on their own. The contrast between fate and choice may be critical for the current results. Indeed, the average D-score for participants in Study 1 was larger and more robust than the D-Score for participants in Study 2, suggesting that contrasts may be critical for these effects. Other implicit tasks, such as subliminal priming tasks, scrambled sentence tasks, and prime articles (Bargh & Chartrand, 2000) may be useful in disentangling the unique relationships between genes and fate. However, contrasts would need to be invoked in subliminal priming, scrambled sentence tasks, and in prime articles, as well. Presumably, these tasks may assess associations between fate and some neutral category that would not be expected to show associations with fate whatsoever.
Furthermore, the IAT has been criticized for being process impure, such that explicit bias may elaborate upon performance (Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005). Indeed, whether or not explicit attitudes are consistent with implicit attitudes may have performance outcomes on IAT measures. Again, it may be plausible that explicit genetic essentialist attitude measures exhibited some social desirability effects, which seems to have led to moderate or neutral responding. If social desirability did influence explicit responding, then their effects on implicit measures may not have been abetted by explicit cognitive intervention. However, there may be some reason to expect the intervention of explicit attitudes on this implicit task. Especially, response latencies were often close to 1,000 ms, which is relatively standard for an IAT (Greenwald, et. al., 2003). This suggests that some inhibition of automatic responses may be possible, since there would have been enough time for explicit processes to interfere. Future research may adapt a process dissociation model that uses error latencies to account for the probability that an association has been activated, the probability that participants were attending to the stimuli and could discriminate between them, the probability that participants were good at guessing, and the probability that participants were inhibiting their automatic responses via controlled processes (Conrey, et. al., 2005). Other process dissociation models may be more suitable to subliminal and supraliminal priming studies that use response latencies as dependent measures, as may be used to more closely assess implicit gene-fate linkages (Payne, 2008).

4.2 Future Directions

Even so, there may be several fruitful directions for future research. Researchers may consider the stability of these implicit genetic attitudes over time. Though there is some evidence for the test-rest reliability of IAT measures in general (Greenwald & Nosek, 2001), there is currently no
evidence that implicit genetic essentialist biases may generalize across time. We’ve also demonstrated some level of discriminant validity in showing null correlations with explicit genetic essentialism measures. However, there is currently no evidence for convergent validity, if only because there are very few closely associated measures that currently exist. Researchers may lend their expertise to developing more measures of implicit genetic essentialism, drawing from the usual social psychological toolbox (supra- and subliminal priming studies, scrambled sentence tasks, and so forth). As mentioned above, these tasks may allow us to disentangle whether or not there is a strict gene-fate association, while also providing grounds for establishing convergent validity with the current IAT task.

The usefulness of the Gene-Fate IAT may also be better established if it clearly predicts behavior. Another important future direction for this line of research is demonstrating clear associations with behavior. Because of historical linkages between essentialism and stereotyping (Brescoll & LaFrance, 2004; Prentice & Miller, 2006; Bastian & Haslam, 2006), perhaps being predisposed to see the world as predetermined by genes may also lend itself to persistent stereotyping. This predisposition for perceiving inherent causality related to genes may also index strengthened perceptions of inherent causes in a more domain-general sense. As Proctor and Ahn (2007) suggest, perceptions of inherent cause may strengthen connections between categories and their features. Thus, this disposition toward perceiving inherent cause may lead to strengthened associations between perceived social groups and historically essentialized features. In this case, implicit genetic essentialist biases may predict implicit stereotyping of social groups. Furthermore, the Gene-Fate IAT may predict the subtle, non-verbal behaviors that are most often predicted by IAT’s (Greenwald, et. al., 2009).
Future research may also consider which circumstances exaggerate or diminish these implicit gene-fate linkages. As mentioned previously, essentialist perceptions may be relatively fluid and context dependent (Morton, et. al., 2009). People may explicitly essentialize other social groups more or less depending on whether these strategies are most useful in the present moment. Notably, several of the studies that have addressed this relationship have used explicitly genetic dependent measures. When men learn that the gender gap is closing, they defend the privileges associated with their gender by supporting genetic research into the fundamental differences between men and women (Morton, et. al., 2009). Thus, when people are motivated to perceive group differences, they may show more support for genetic research that “grounds” those differences. Perhaps the motivation to perceive these group differences may also affect implicit associations between genes and fate. Presumably, if people are more motivated to see differences between a group, associations between genes and fate may be activated more strongly and more automatically in order to legitimize group differences. The necessary conditions for the motivation to perceive group differences may actually be quite small. Simply learning of an arbitrary difference between oneself and a member of an out-group may lead people to make vast, inductive generalizes about entire social groups (Prentice & Miller, 2006). Perhaps these conditions may enhance automatic gene-fate linkages.

Another route for future research may be considering when these automatic linkages may be meaningful mediators. For instance, Dar-Nimrod and Heine (2006) found that exposing women to biological theories regarding gender differences in math hampered their performance compared to controls and to participants who read about socio-cultural theories. Perhaps hearing these biological theories activated automatic gene-fate linkages, which may have led participants to see underperformance in math as even more central to one’s social group (because an
essentialized characteristic is seen as a more defining characteristic; Proctor & Ahn, 2007). This may have caused an exaggerated implicit conflict between one’s identity as a woman and one’s identity as a math student, which is one hypothesized pathway that may cause stereotype threat effects (Schmader, Johns, & Forbes, 2008).

Future research may also consider other essentialist associations. The current studies assessed implicit associations between genes and fate. These linkages are most closely associated with the naturalness factor of essentialist perception (Haslam, Rothschild, & Ernst, 2000). Especially, they invoke immutability as an important component of essentialist attitudes. However, there may be implicit linkages relating to entitativity, as well. Entitativity has largely been defined as the “groupness” of a group. It has also been described as the perception of social influence within a group and seems to relate to collective responsibility for the actions of any one individual within the group (Denson, Lickel, Curtis, Stenstrom, & Ames, 2006). Keller (2005) suggests that discreteness may be a key feature of entitativity, along with the informativeness and inherence of the group. However, discreteness may be instrumental in the perceptions of genes. Considering that lay people often perceive one gene as relating to one ability (rather than one protein, as is actually the case), genes may be seen as leading to well-defined, discrete outcomes (Plomin, 1995; Conrad, 1997). Thus, another study may consider implicit linkages between genes and discreteness. Genes may even be seen as more discrete than social experiences, which may be seen as multiply determined and complicated in comparison.

Other lines of research may consider the relationship between genes and other placeholders, and the implications for implicit cognition. As demonstrated in the current study, genes may be seen as more fateful than social experiences at implicit levels. Nonetheless, these social experiences, as well as souls and brains, may serve as adequate placeholders if genetic
accounts are not available (for instance, in accounting for the differences between different nations that are close genetic relatives). Perhaps implicit fate-like links to these other placeholders may become more exaggerated if there is some relevant context for using them. Another line of research may consider when these implicit attitudes emerge. Children begin essentializing social categories before the age of 10 and may essentialize natural kinds even earlier (Taylor, et. al., 2009). However, they may not be actively seeking for placeholders to explain their essences at such young ages. Future research may disentangle when children begin invoking explanations for their essentialist attitudes and when these attitudes become automatic.

4.3 Conclusion

Genetic essentialism emerges out of the need for some placeholder to explain otherwise ambiguous essences. By taking on the qualities of an essence, individual genes may be perceived as underlying causes that make people who and what they are. Across two studies, we have shown how deep these associations run. They may be so well-established and well-rehearsed that they have become automatic, even in comparison to other placeholders such as social experiences. There are quite a few realms for future research, but that may be because of the broad inter-disciplinary appeal of essentialism as a topic. As mentioned above, essentialism has captured the imagination of social psychologists, developmental psychologists, cognitive psychologists, sociologists, and anthropologists. These diverse perspectives may require speaking to multiple levels of analysis, including genetic, neurobiological, cognitive, institutional, and cultural levels. Inter-disciplinary partnerships, as well as garnering inter-disciplinary expertise may be critical in considering the development of essentialism.
For instance, Gelman (2003), while drawing from the developmental literature, has suggested that essentialism is an innate perceptual system that even children may use to reason about natural kinds. She has suggested that institutional oppressions that are legitimized by essentialism may be little more than accidental by-products of inherent perceptual biases. However, several scholars writing outside of and sometimes between psychological traditions (Hirschfeld, 1997; Gil-White, 2001; Mahalingam, 2007) have suggested that the groups that are essentialized are non-arbitrary, and that understanding the intimate linkages between individual cognition and institutional oppression may require thinking from many different fields. In these cases, interdisciplinary work has enriched our knowledge of the complex routes by which perceptions of essence relate to institutions and cultures.

Scholars are beginning to consider the social life of genes and the part that they may play as essence placeholders (Medin & Ortony, 1989; Keller, 2005; Dar-Nimrod & Heine, 2011). The current studies stand within this tradition of considering how genes may offer critical vantage points for understanding the complex inner-workings of essentialist biases. More importantly, they offer another level of analysis that deepens our understandings of how essences are enacted and understood.
Bibliography


Taylor, M. G., Rhodes, M. and Gelman, S. A. (2009), Boys will be boys; Cows will be cows: Children’s essentialist reasoning about gender categories and animal species. *Child Development, 80*, 461–481. doi: 10.1111/j.1467-8624.2009.01272.x

