Americans' Attitudes on Racial or Genetic Inheritance:

Which Is More Predictive?

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Americans have debated for centuries whether the concept of "race" and distinctions among presumed racial groups are based in biological differences, humans' urge toward classification, or some combination. They similarly debate whether behaviors, values, or physical characteristics are usefully associated with "racial" or ethnic categories, or whether such associations are misleading at best and pernicious at worst. Most American social scientists and legal scholars now concur that the concept of race (like that of ethnicity), boundaries between groups, and purported racial characteristics are socially constructed, with minimal or no biological basis. But many members of the American public do not agree, and many life scientists and medical professionals see group differentiation as a mixture of biological and societal components.

The debate over biological or social foundations of race or ethnicity is not, of course, only a disagreement about taxonomy, epistemology, scientific explanation, or even policy or medical prescription. It has strong normative components. Most social constructionists see themselves as progressives and express strong commitments to human rights and intergroup equality. They fear that any association of race or ethnicity with biology will bring back the evils of nineteenth century racial science or reinforce contemporary group hierarchies. They are supported in that fear by the fact that scholars who invoke biology when discussing race sometimes do seek to show that one group is innately superior to another along some dimension. Thus Charles Murray, to choose only the best-known example, who describes himself and his co-author, Richard Herrnstein, as being "on the right" and "moderately conservative" respectively (Herrnstein and Murray 1996): 555), concludes that "American blacks and whites continue to have different mean scores on mental tests . . . usually about . . . fifteen IQ points . . . . A legitimate scientific debate on the topic ["the relationship of genes to race differences in

intelligence"] is underway; it is scientifically prudent at this point to assume that both environment and genes are involved, in unknown proportions" (ibid., pp. 562-563). More generally, Ann Morning spends much of her recent book asking "is a nonracist essentialism possible?" She concludes that one can hold "essentialist" views of race without being racist, but it is neither easy nor common [(Morning 2011). She does not probe or even note the logically symmetrical possibility of a racist constructivism.]

Whether racial or ethnic groups, and/or characteristics associated with a given group, are entirely invented by societies will become an even more important topic as biology becomes increasingly salient in the public arena over the next few decades. Most knowledgeable observers predict that the life sciences will play the role in the twenty-first century that the physical sciences played in the twentieth century: debates about everything from abortion rights to the likelihood of conviction in the criminal justice system, collective responsibility for individual disease, the right to immigrate, and meritocracy in higher education or employment (among many other things) are developing a biological inflection.

Many social constructionists especially fear that the new science of genomics will have the effect if not the intention of essentializing race and reifying racial categories. In research, "DNA molecules . . . are increasingly made to carry the self-reported US racial descriptor of their donor as they leave his or her body and enter the laboratory. The DNA is then analyzed with the racial label attached for the duration of its life in the lab and beyond" (Fullwiley 2007): xxx). In recreational uses, DNA ancestry testing "reinforces three central myths about race: that there are pure races, that each race contains people who are fundamentally the same and fundamentally different from people in other races, and that races can be biologically demarcated . . . . Defining identity in genetic terms creates a biological essentialism that is antithetical to the

shared political values that should form the basis for unity" (Roberts 2011): xxx). In medicine, "the confluence of . . . diverse factors is driving the re-emergence of race as a biological construct. This is certainly problematic, given our nation's long history of racial injustice and oppression, but it also has implications both for the responsible conduct of scientific research and for the allocation of scarce resources to deal with the very real problem of persistent health disparities in this country" (Kahn 2013): 4). Not all social constructionists are wary of genomic science. But linking genomic science and a biological understanding of group categories is not difficult to do -- and from that point, the next link, between genetically-based group categories and genetically-based group hierarchy seems all too easy to make. As Kenneth Prewitt warns us, history is not encouraging on societies' ability to break that chain: "reputable geneticists today can insist that their science does not imply or impute racial inferiority, but they are mistaken if they think that others will forego the racist ammunition they are providing" (Prewitt 2012): 297).

As one might expect, those who see a biological component in race offer responses to these concerns. "Certain diseases and treatment responses cluster by ethnicity. Recognizing these patterns can help us diagnose disease more efficiently and prescribe medications more effectively" (Satel 2002): 56). Jay Cohn concurs: "the debate . . . should not be over the existence of population differences, but how to describe those differences with more precision . . . Railing against what some claim are misguided efforts to use racial, ethnic, or geographic distinctions does not make the differences disappear" [(Cohn 2006): 553). See also (Risch et al. 2002), and for a more cautious version of this argument, (Collins 2004)]. As Esteban Burchard puts it, "Race is a complex construct. It includes social factors; it includes self-identity factors; it includes third-party factors of how you view me. But it also includes biological factors" (quoted in (Bliss 2012): 107).

Some geneticists go even further, reversing the social constructionists' normative assertion about the best way to promote racial justice. [1] Bliss points out that to many scientists committed to "a larger social justice struggle for minority health," the idea of a "race-free genomics is the same as the colorblind rhetoric that contributed to racism in the South" (Bliss 2012): 107). In this view, despite the fact that humans are almost identical genetically, the phenotypic expression of even a small genotypic difference can be of great consequence. If people who identify with a given group are more likely to have a particular illness or a different response to a drug than are others, paying no attention to that fact risks sacrificing individuals' health to willfully blind political correctness. Thus Neal Risch is quoted as saying that ignoring race in gene studies will "lead to the disservice of those who are in the minority" [quoted in (Wade 2002)].

Passions can rise despite, or perhaps because, both sides are deeply committed to promoting racial justice. In the Acknowledgments to his book about the first (and so far only) drug licensed for use by self-identified blacks, Jonathan Kahn thanks Dorothy Roberts for being his "comrade in arms who was with me . . . when we were accused at one meeting of 'killing people' with our critiques of BiDil" (Kahn 2013: ix).[2] Two people involved in BiDil's

[1] It is perhaps worth reiterating, with Ann Morning (Morning 2011) that not all social scientists are social constructionists, nor do all geneticists agree that something like "race" is a useful term for helping to understand human biological differences. We are referring in this discussion to a dominant tendency in a given field or discipline.

[2] Like Roberts, Kahn is a pure social constructionist: "race is not a coherent genetic concept; rather, it is best understood as a complex and dynamic social construct" (Kahn 2013: 2).

development and sales do in fact describe Kohn's book as a "diatribe, . . . [that] disregards the facts:"

> By railing against the idea that blacks were singled out for this study, which was designed based on compelling biological and preliminary clinical trial data, Mr. Kahn has contributed to a backlash that has impeded clinical use of the drug. It is unfortunate that we do not have a better criterion for selecting individuals whose biology makes them responsive to BiDil, but it is tragic that thousands of patients are dying because their doctors are not prescribing the drug despite the ease of their identification (Worcel and Cohn 2012).

That is not quite an accusation of "killing people" – but it is not far off. Social constructionists, conversely, come close to accusing those who accept that race has a biological component of racism, or at best of such naïveté that they are opening the door to racism.

Our summary thus far, like the debate itself, focuses on the elite actors who are the main protagonists. But as Prewitt's article reminds us, how the issue of a possible genetic component of race or ethnicity is framed in the public arena – not in the confines of academic journals -- will shape what happens politically with regard to genomics, medicine, and race. So it is essential to explore how the American public conceptualizes these links. This chapter begins that exploration. Do ordinary individuals who have no biological or social science expertise attribute traits, illnesses, or behaviors to genetics, racial identity, or something divorced from both such as the environment or individual choice?[3] If people see a genetic but not a racial cause for a

[3] As readers know, individual choice and the environment are not sharply separable, causally or conceptually, from genes and race. However, we separated the concepts in order to design tractable survey questions, and we maintain the separation in the analysis of the survey results.

person's disease, trait, or behavior, that perhaps signals receptiveness to individualized genomic medicine for physical and mental illnesses. If they see race or ethnicity as important in explaining a person's disease, trait, or behavior, that suggests a focus on group rather than individual identity; if genetics is also important, that arguably implies agreement that race has a biological component. If they accept neither a genetic nor a racial explanation for a given disease, trait, or behavior, they are either pure environmental determinists (in that arena) or they have a strong conviction of individual autonomy or free will.

We remind the reader that the views of the public are not necessarily right, or wrong, and that this chapter does not aim to resolve the debate about the genetic or social origins of race and racial attributes. Our interest lies in the way in which the dispute will play out in the political and policy realms, and for that, public opinion will matter.

We proceed as follows. We first lay the groundwork for exploring possible relationships between genetics and race in the eyes of the public. We develop several hypotheses based mainly on intuition or American history (since we know of no prior scholarly literature on this subject). We then introduce our data, a public opinion survey of approximately 4,000 U.S. adults conducted in 2011. The Genomics Knowledge and Politics Survey (GKAP) includes questions designed to reveal Americans' views about social constructionism. In the next section, we show that respondents' understanding of the relationships among race, genes, and traits or illnesses is coherent, sensible, and reasonably predictable. Respondents perceive more individual genetic than racial inheritance; presented with different outcomes, they vary in the importance attributed to inheritance or to the environment; and views are intelligibly related to individual factors such

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Whether the American public sees genes, race, environment, and choice as distinct or as closely linked is a fascinating question for future research.

as the respondents' levels of education and political worldview. Overall, Americans are more social constructionists than biological determinists, especially but only when asked to consider the idea of group inheritance. We conclude by reflecting on what GKAP has revealed, what it teaches us about the politics of social constructivism, and what remains to be done in this severely understudied arena.

What Does the Public Think About Genetics and Race?

We approach the question of what Americans think about the links among biology, race, choice, and the environment by formulating several hypotheses to be tested through GKAP. The first analysis is oriented around the juxtaposition of genetics and race, to determine which, if either, is thought to better predict personal characteristics. The first hypothesis articulates the social constructivist position, that "race" or ethnicity is a poor predictor of illnesses, traits, and behaviors. By extension, individual genetic inheritance may be a better predictor (setting aside for the moment the possibility of causation through the environment or personal choice). More formally:

> *H1A: respondents are less likely to say that racial or ethnic groups predict individual traits than to say that individual genetic inheritance is predictive. Put the opposite way, respondents are more likely to say that a person's attributes are associated with genes inherited from his or her ancestors than to say that a person's attributes are related to race or ethnicity.*

Several hundred years of American society, during which most elites insisted on the existence of genetically inherited racial or ethnic distinctions in individuals' health, traits, or behaviors, form the backdrop for the alternative hypothesis. It is the converse of H1A, and is

predicated on the possibility that racial or ethnic boundaries might be just as predictive in people's minds as individual genetic inheritance is (again setting aside for the moment attributions to the environment or individual choice). More formally:

> *H1B: Respondents are more likely or just as likely to say that racial or ethnic identity predicts individual traits, illnesses, or behaviors as to say that personal genetic inheritance does. Put differently, individuals roughly equate race with genetics, leading to comparable predictions or even stronger predictions about race than about individual genetic inheritance, in judging determinants of individual traits.*

We have no clear intuition about which of these two hypotheses should govern. Discourse among social scientists, along with pronouncements from elite organizations such as the American Anthropological Association (American Anthropological Association 1998), implies that Americans have been receiving a strong message over the past half century that race and ethnicity are social constructs, not genetically meaningful categories. If the general public has absorbed this message, we should see more evidence supporting H1A than H1B. If Americans' deep historical understanding and practice of racial divisions continues to predominate, however, we should see stronger evidence for H1B. We therefore examine the data from an agnostic perspective, since a key objective of this research is determine which narrative is more compelling to the American public.

Up to this point, we have set aside explanations for individuals' illnesses, traits, or behaviors that focus on the environment or individual choice; we now bring them in. After all, the social constructivist claim is that there can be no racial or ethnic inheritance of individual characteristics because race and ethnicity have no biological component. Social constructionists can agree that individual genetic inheritance plays a role in some illnesses, but in general they

are reluctant to attribute individual characteristics to genes. For the same reasons that we are agnostic between H1A and H1B, we have no clear prediction about whether respondents are social constructionists with regard to racial inheritance, individual genetic inheritance, both, or neither. That is, if they have absorbed elites' messages over the past half century, respondents prefer environmental or choice-based explanations, especially when offered a racial alternative; if they have absorbed elites' messages for the previous several centuries of American history, respondents prefer racial, and perhaps individual genetic explanations rather than environmental or choice-based ones. Thus, as with H1, we offer alternative hypotheses:

> *H2A: Respondents are more likely to attribute individual differences in traits or behaviors, and in some illnesses, to the environment or a person's choice than to make attributions to either inherited racial identity or individual genetic inheritance.*

Alternatively,

> *H2B: Respondents are more likely to attribute individual differences in illnesses, traits, or behaviors to either inherited racial identity or individual genetic inheritance than to the environment or a person's choice.*

The next step in the analysis makes distinctions within the American public. Belief in the importance of individual genetic inheritance versus racial or ethnic inheritance might differ by group, with some groups being more amenable to the idea that racial identity has a meaningful biological component. We therefore consider the role of group affiliation, in particular respondents' self-identified race or ethnicity. Given the historical power of the "one drop of blood" rule and segregative laws based on it, whites may be more likely to assume that individuals have strong racial inheritances. That view could easily blur into a racial explanation for differences in individuals' illnesses, traits, or behaviors. Conversely, given their historical

resistance to the one-drop rule and corresponding insistence that racial differences are only skin deep, blacks may be more likely to attribute individual differences to personal genetic inheritance rather than to racially inflected biology. The history of Asian Americans and Latinos has been less sharply defined by nineteenth century racial science and twentieth century segregation, so a prediction here is less clear. On balance, we anticipate that they think more like blacks than like non-Hispanic whites, and therefore resist racial attributions for individual variations in illness, traits, or behaviors. Finally, we expect that self-identified multiracials are especially resistant to race-based explanations for individual variations, and correspondingly more likely to accept explanations based on individual genetic inheritance. The choice to identify as multiracial, after all, is in itself a statement that group boundaries are not real but rather are chosen differently by people in different circumstances.

These considerations imply a third hypothesis:

H3: The choice of racial versus individual genetic explanations for variations in individuals' illnesses, traits, or behaviors varies by the race or ethnicity of the respondent. Non-Hispanic whites are more likely to see racial differences as predictive than are Latinos, Asian Americans, and (especially) blacks and multiracials. Conversely, the other four groups, especially blacks and multiracials, are more likely than non-Hispanic whites to reach for individual genetic explanations for variation across individuals.

Finally, based on robust academic literatures about the underpinnings of public opinion, we consider two additional differences among respondents. The first addresses what is known as scientific literacy. Operationalizations vary, but Jon Miller has established the premise that an acceptable level of public scientific literacy is the sophistication needed to understand science

articles in major newspapers such as the *New York Times*, *Le Monde*, or the *Guardian* (Miller 1983; 1987; 1998; 2004; 2010). Miller has deconstructed its components (1998), but surveys generally implement the concept of scientific literacy through a battery of questions about processes (e.g., the scientific method or probability theory) and specific areas of knowledge (e.g., definitions of DNA or a molecule).

Previous surveys show several things. Most Americans are scientifically illiterate by these definitions. "[T]he percentage of US adults who understand the basic idea of an experiment has increased from approximately 22 percent in 1993 to 35 percent in 1999" (Miller (2004); proportions were even lower for the understanding of "basic scientific processes." Specific topics fare even worse. For example, roughly 12 percent of American adults could classify or explain a molecule in 1997 and again in 1999. With regard to genomics and DNA, in 1990, just under a quarter of Americans could explain DNA in a way that "included its role in heredity;" that proportion increased only slightly by 1999, to 29 percent (Miller 2004), despite the dramatic increase in media attention to genetics on the eve of the human genome project.

However, the surveys also showed that education is strongly related to scientific literacy, as are taking more college-level science courses and visiting science museums or reading science magazines (e.g., Miller 2004). Applying this line of research to the issues in this chapter enables us to predict that as individuals gain more schooling, they are increasingly likely to be exposed to the evidence that humans of different races and ethnicities are more alike than different. That may be especially true for people who pay attention to and absorb the tenets of scientific research.

Thus we expect GKAP respondents' education in general and scientific literacy in particular to be associated with social constructivism with regard to the impact of group

identities on individuals' characteristics other than racially-inflected genetic diseases.[4] More formally:

H4: Respondents with more schooling or greater scientific literacy are less likely to think that race or ethnicity predicts a person's traits and behaviors than are those with little schooling or low levels of scientific literacy. Conversely, conditional on making genetic attributions, the well-educated and scientifically knowledgeable are more likely to attribute people's diseases, traits, and behaviors to individual genetic heritage.

An equally robust literature points to the strong association between partisanship or political ideology and beliefs about facts. [For summaries and further evidence, see (Hochschild and Einstein forthcoming 2014); (Suhay and Jayaratne 2012).] Given the political valences of the public discourse on social or genetic causes for success and failure, we expect political liberals or Democrats to be more amenable than conservatives or Republicans to the idea that race or ethnicity is a social construction that cannot determine individuals' traits, behaviors, or illnesses. Thus leads to the final hypothesis:

H5: Political liberals or Democrats are less likely to think that race or ethnicity predicts human traits than are political conservatives or Republicans. Political liberals or Democrats will be relatively more inclined to attribute people's characteristics to

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[4] This careful sentence is intended to convey that we take no position on the prior question of whether racial or ethnic categories themselves have a biological component. After all, highly educated and sophisticated scientists or social scientists disagree on that point. H4 makes a narrower, albeit important, claim: laypeople with more education and/or scientific literacy will have been more exposed to and persuaded by the social constructivist view of how racial categories affect individual characteristics than will those with less schooling or knowledge of science.

individual genetic heritage if they make genetic attributions – but overall, they will make fewer genetic attributions than will conservatives or Republicans.

Again in light of common political discourse in the United States and elsewhere, we offer one exception to H5, with regard to explanations for homosexuality:

H5.5: The second half of H5 is reversed on the issue of homosexuality. Political liberals or Democrats will make more genetic attributions than will conservatives or Republicans, but only to individual genetic inheritance and not to racial or ethnic genetic inheritance.

We now turn to exploring the evidence for and analyses of these five (sets of) hypotheses.

Genomics Knowledge, Attitudes, and Politics Survey (GKAP)

Our data source is a new public opinion survey of 4,291 U.S. adults, fielded online through Knowledge Networks in May 2011. The Genomics Knowledge, Attitudes, and Policies survey (GKAP) was stratified by race or ethnicity, which enables us to analyze differences among an array of racial and ethnic groups, and differences among respondents within each group. The survey included 1,143 non-Hispanic whites, 1,031 non-Hispanic African Americans, 1,096 Hispanics, 337 non-Hispanic Asian Americans, 635 non-Hispanic self-defined multiracials, and 49 non-Hispanic native Hawaiian or Pacific Islanders. Latinos could take the survey in Spanish (n = 578) or in English (n = 518). GKAP included over 100 questions about genetics and genomics, and we received Knowledge Network's demographic information on these respondents as well as self-reports on use of technology, religiosity, many aspects of personal and family health status, and several forms of political activism. The survey investigated knowledge about genetics, levels of support for various uses of genetics or genomics, views on

government regulation and funding, beliefs about links between genetics and morality or religion, levels of trust in various actors involved with genetics or genomics, perceptions of the role of genomics in racial differences, and other questions. (The questionnaire is available from the authors upon request.)

Most relevantly for this chapter, GKAP included two batteries of questions about the relative importance of, first, genetic inheritance as compared with environment or lifestyle in determining various diseases, behaviors, or traits, and second, racial or ethnic inheritance as compared with environment or life style in determining the same diseases, behaviors, or traits. Question wordings were as follows:

> "Some things about a person are caused all or mostly by their genes, which they inherit from their parents. Others may be due to their environment or the way they live. As far as you know, how much does each of the following have to do with a person's genes compared with the person's environment or lifestyle?" Answer categories were: "All or almost all to do with genes," "Mixture of genes and environment or lifestyle," and "Almost or almost all to do with environment or lifestyle."

And

> "Some things about a person may be genetically connected to their race or ethnicity. Other things may be due to their environment or the way they live. As far as you know, how much does each of the following have to do with a person's race or ethnicity compared with the person's environment or lifestyle?" Answer categories were: "All or almost all to do with race or ethnicity," "Mixture of race/ethnicity and environment or lifestyle," and "Almost or almost all to do with environment or lifestyle."

The questions were asked in randomized order. Both questions were asked about eight individual characteristics, which were themselves asked in randomized order. The characteristics included three illnesses ("having sickle cell anemia," "having cystic fibrosis," and "having the flu"), three traits ("having a particular eye color," "having heart disease," and "level of intelligence"), and two items that might be thought of as either behaviors or traits ("being gay or lesbian," and "being aggressive or violent."). We chose these characteristics because of both their obvious public salience and the fact that they range along a rough continuum from clearly genetic (eye color) to clearly situational (the flu).

Juxtaposing the answers to the two questions allows us to compare preferences for racial attribution, individual ancestral attribution, or environment and choice for characteristics that themselves vary in etiology (H1A or H1B, and H2A or H2B). That is the core question for understanding the American public's view of social constructionism.[5] The rest of the analyses refine and sharpen the contours of the core results. Thus the fact that GKAP's sample is stratified by race permits us to compare preferences by group (H3). And GKAP's size permits us to compare preferences by the scientifically knowledgeable and less knowledgeable (H4), and by political partisanship (H5). In all of these analyses, we can compare views on homosexuality with other views (H5.5). Unless otherwise noted, data in all analyses are weighted to be

[5] No item directly asks respondents for their view of social constructionism versus acceptance of the view that the category of race has, or particular racial identities have, a biological component. We expected that to be too abstract an issue to be meaningful to most non-experts. The array of questions in GKAP is intended to approach the conceptual question in concrete ways.

representative of the United States population as a whole, or, when appropriate, of each racial and ethnic group separately.

Evidence from GKAP

Perceptions of Individual, and of Racial or Ethnic, Genetic Inheritance: We turn first to the topic of how and how much Americans explain various diseases, behaviors, or traits through individual genetic inheritance, racial or ethnic genetic inheritance, or environment or lifestyle. Consider initially the comparison between individual and group genetic inheritance, that is, hypotheses 1A and 1B, as shown in columns 1 and 3 of table 1. Responses are disaggregated for the eight characteristics we queried:

Table 1: Importance of genetic inheritance, racial or ethnic genetic inheritance, or environment and lifestyle, among all respondents, GKAP 2011

(In order from most to least "having to do with genes," with all results weighted to reflect the U.S. population)

	1.All or most to do with genes	*2.All or most to do with environment or lifestyle*		*3.All or most to do with race or ethnicity*	*4.All or most to do with environment or lifestyle*
eye color	87%	3%		78%	4%
sickle cell anemia	73	6		64	8
cystic fibrosis	60	7		43	14
gay or lesbian	22	40		11	54
heart disease	23	7		17	16
intelligence	22	12		13	31
aggressive or violent	9	28		6	46

the flu	3	73		2	76

See text for question wording. The middle category – "mixture of genes [race/ethnicity] and environment or lifestyle" – is excluded for ease of interpretation.

Note: American Indians and Pacific Islanders are included in this analysis, but not in any group specific sample in later tables. In addition, individuals who refused to answer the question (around 1-2% for each question) are included for purposes of calculating the fraction who gave the answers reported in the tables. (That is, they are included in the denominator.)

Table 1 reveals several things. First, column 1 supports the observation that Americans overall have coherent and sensible views about the impact of genetics as compared with the environment or individual choices on various characteristics. Collectively they create three categories: phenotype and diseases widely known as heritable (eye color, sickle cell anemia, cystic fibrosis); traits that are plausibly understood to have multiple causes (heart disease, intelligence, violence) where the majority of responses are in the omitted middle answer category; and a disease widely recognized as environmentally contagious (flu). (We reserve discussion of homosexuality, the only item not mentioned thus far, until we come to H5.5.) In addition, the order of descent in columns 1 and 3 shows that GKAP respondents collectively rank the heritability of traits and illnesses in almost exactly the same order when they are considering inheritance through race and ethnicity as when they are considering individual genetic inheritance.

Comparing columns 1 and 3 of table 1 allows us to adjudicate empirically between hypotheses 1A (respondents are more likely to choose individual than group-based genetic inheritance) and 1B (respondents are more likely or just as likely to choose group-based genetic inheritance as individual genetic inheritance). H1A clearly dominates; for all items in which genetic responses do not bottom out – that is, six or possibly seven of the eight rows in table 1 –

a higher proportion of respondents chose "all or most to do with genes" than "all or most to do with race or ethnicity." Even conditional on recognizing strong genetic penetrance for some characteristics, the American public is less inclined to make causal attributions to racial or ethnic groups than to a person's own ancestry. We therefore see clear and consistent evidence that Americans collectively place more predictive importance in individual genetic backgrounds, than in group-based racial characteristics. This is a substantively and normatively important result, and we return to it in our conclusion.

Comparing column 1 with column 2, and column 3 with column 4, in table 1 enables us to adjudicate empirically between hypotheses 2A (respondents are more likely to choose environmental or choice-based explanations) and 2B (respondents are more likely or just as likely to choose a genetic explanation than a social constructivist one). As we understand the science, three of the eight items have an indisputable genetic etiology (eye color, sickle cell, and cystic fibrosis), [6] one is uncontroversially environmental (flu), and the other four are the subject of dispute over the degree, if any, of heritability.

From that starting point, GKAP respondents are split between social constructionism and individual genetic inheritance, and inclined toward social constructionism when asked to consider racial or ethnic inheritance. More precisely, for the three inherited diseases, the relative

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[6] The carrier rate for cystic fibrosis before testing is: Ashkenazi Jewish, 1/24; non-Hispanic white, 1/25; Hispanic white, 1/58; African American, 1/61; and Asian American, 1/94 (Committee on Genetics 2011).

"Sickle cell anemia . . . is particularly common among people whose ancestors come from sub-Saharan Africa; Spanish-speaking regions (South America, Cuba, Central America); Saudi Arabia; India; and Mediterranean countries such as Turkey, Greece, and Italy. . . . The disease occurs in about 1 in every 500 African-American births and 1 in every 1000 to 1400 Hispanic-American births" (Human Genome Project Information n.d.)

proportions claiming social causes is greater when the alternative is racial or ethnic inheritance (column 3 minus 4) than when the alternative is individual inheritance (column 1 minus 2). In fact, respondents are arguably too much inclined to social constructivism for these three characteristics.

For the four traits or behaviors with mixed or interactive causes, the relative proportions claiming social causation is greater (in some cases, much greater) when the alternative is racial or ethnic inheritance than when it is individual inheritance. Concretely Americans are disproportionately environmentalists with regard to two traits often perceived as undesirable – homosexuality and a tendency toward violence or aggression. Conversely, they are relatively more likely to see genetic penetrance for intelligence and for heart disease -- but only when considering individual genetic inheritance. Thus their views are interactions among genes versus environment, racial or individual inheritance, and the characteristic itself.

Reassuringly, huge majorities attribute the flu to social rather than genetic causes. In short, hypothesis 2A has slightly greater support than hypothesis 2B: Americans are more social constructionists when contemplating race-based biology than they are social constructionists when contemplating individual biology.

GKAP does not include the evidence needed to explain why Americans are social constructivists with regard to some traits but not others. It similarly does not provide evidence on why respondents are less likely to perceive racial or ethnic genetic inheritance than individual genetic inheritance. That may reflect a genuine, if partial, commitment to the norm underlying social constructivism; many respondents may see race as an inappropriate lens through which to understand individual differences even in diseases that are disproportionate by group. The slight dominance of H2A over H2B may, alternatively, reflect a general wariness about explicit

agreement with anything that links race and genetics. The fact that respondents see less racial than individual inheritance even for eye color or group-inflected illnesses suggests a social desirability bias instead of (or, as well as?) an ideological rejection of race as a genetically meaningful concept.

Variation among Groups on the Importance of Racial or Individual Genetic Inheritance: Comparing responses for each group separately may give some purchase on the question of why Americans make fewer attributions to racial inheritance than to individual genetic inheritance or societal causes, especially with regard to some traits. In accord with hypothesis 3, GKAP should reveal meaningful differences across people of different racial or ethnic groups, with whites attributing more importance to race-based genetics (compared to individual genetic inheritance) than do blacks, multiracials, and possibly Latinos and Asian Americans. Table 2 provides the essential data. We present here only the responses for "All or most to do with genes/ race or ethnicity" for ease of interpretation.[7]

[7] Parallel tables for all of those presented in this chapter focusing on "mixture of genes and social causes" or "all or most to do with environment or lifestyle" are available from the authors.

Table 2: Importance of genetic inheritance, and of racial or ethnic genetic inheritance, by race or ethnicity. GKAP 2011

(in same order as table 1)

	Whites		*Blacks*		*Multiracials*		*Asians*		*Hispanics*	
	All or most to do with genes	*All or most to do with race or ethnicity*	*Genes*	*Race or ethnicity*	*Genes*	*Race or ethnicity*	*Genes*	*Race or ethnicity*	*Genes*	*Rac ethn*
1. eye color	91%	78%	79%	71%	89%	76%	85%	79%	81%	73
2. sickle cell anemia	81	73	77	65	81	71	65	52	48	3
3.cystic fibrosis	69	48	54	38	65	41	53	35	46	3
4. gay/lesbian	26	12	12	6	19	7	19	10	23	1
5.heart disease	20	12	30	22	17	16	15	10	29	2
6. intelligence	19	10	20	13	15	6	19	14	30	2
7. aggressive or violent	6	4	11	6	6	6	7	5	17	1
8. the flu	2	2	5	3	1	1	2	1	5	4

Table 2 reveals several patterns. We focus first on the findings directly related to hypothesis 3, positing that whites are more likely to use race-based genetic inheritance as an explanation for a person's characteristics than the other four groups are. For that analysis, consider the shaded columns only, which show results for agreement that the characteristics "have all or most to do with race or ethnicity." The hypothesis is confirmed, if only by a few percentage points in many cases, for the three clearly genetic traits (eye color, sickle cell, and cystic fibrosis). The hypothesis is disconfirmed, however, for the four characteristics (homosexuality, heart disease, intelligence, and aggressiveness) in which the role of inheritance is much less clear. For three of those four characteristics -- the exception is homosexuality -- whites are *less* likely than most or all of the other groups to explain the trait or behavior through racial or ethnic inheritance. Hispanics are the most likely to use racial or ethnic inheritance to explain all four traits. Again reassuringly, almost no one attributes the flu to either sort of genetic inheritance.

Looked at from the other direction – which group is *least* likely to make racial or ethnic causal attributions – no strong result emerges. Hispanics, blacks, and Asians are all less likely than whites to attribute some or all of the three clearly genetic traits or illnesses to race or ethnicity. For the four ambiguous traits, no group predominates in the "least likely" sweepstakes. In short, H3 is largely disconfirmed. Whites do not stand out from the other four groups in asserting a racially inflected, rather than societally based, explanation for traits and behaviors that can be variously understood [For generally similar results, see (Singer et al. 2007): 346; (Shostak et al. 2009): 84-85; (Singer et al. 2010): 470-72; for partially contradictory results, see (Jayaratne 2006); (Jayaratne 2009)]. If any group does stand out in that regard, it is Latinos.

Table 2 enables two additional sets of comparisons. The first is the obverse of the comparison just made about hypothesis 3: which group is most and least likely to attribute these eight characteristics to individual genetic inheritance? To answer that question, we look only at the unshaded columns, which show results for agreement that the characteristics "have all or most to do with genes." Almost the identical pattern obtains as in the paragraphs above: whites are more likely than most or all of the other groups to attribute the three genetic traits (eye color, sickle cell, cystic fibrosis) to genetic inheritance, but are not more likely than the other groups to attribute the four ambiguous traits (homosexuality, heart disease, intelligence, and aggressiveness) to genes. No group stands out as the one least likely to make causal claims about individual genetic inheritance. Again, GKAP respondents do not differ by group in their inclination to reach for social constructionist rather than genetic arguments to explain important but causally ambiguous traits or behaviors.

Finally, we can compare individual genetic claims to group-based genetic claims within each set of respondents. That is, we can compare the shaded to the unshaded column for whites, the shaded to the unshaded column for blacks, and so on. In every case – forty out of forty possibilities – more members of a racial or ethnic group in GKAP attribute a characteristic to individual genetic inheritance than to racial or ethnic inheritance. Nineteenth century racial science may not be dead, but it does not predominate over individual etiology in the minds of the American population. Averaging across the eight items on which they were queried, whites show the greatest difference between genetic attributions and racial attributions (9 percentage points), and Hispanics show the least (6.6 percentage points). That too seems to violate the assumptions behind hypothesis 3, about the persistence of something resembling one-drop-of-blood beliefs among European Americans. We do not find it in the GKAP results.

However much social constructionism is or is not persuasive to the American public, its persuasiveness varies little by whether the group has benefited by or been harmed by the history of racial science and eugenics. The question of links between biology and race simply does not have the intense ideological valence in the population as a whole that it has among people who accuse each other of racism or killing people. Whether that indicates more common sense or dangerous ignorance we leave for a later day.

Education and Social Constructivism: H4 predicts that the more knowledgeable GKAP respondents are less likely than the less knowledgeable to attribute individual characteristics to racial or ethnic inheritance. We operationalize this in two ways, by examining level of education and level of scientific literacy about genetics. For ease of interpretation, we again look at only the responses for "All or most to do with genes/race or ethnicity." The evidence for education is in table 3:

Table 3: Importance of individual, and of racial or ethnic, genetic inheritance, by education level. GKAP 2011

(in same order as table 1)

	Less than high school		*High school or equivalent*		*More than high school (some college through post-graduate education)*	
	All or most to do with genes	*All or most to do with race or ethnicity*	*Genes*	*Race or ethnicity*	*Genes*	*Race or ethnicity*
1. eye color	76%	66%	86%	75%	91%	81%
2. sickle cell	55	44	71	63	82	73

anemia						
3.cystic fibrosis	45	36	62	42	68	48
4. gay/lesbian	16	10	23	12	25	11
5.heart disease	28	22	30	20	16	10
6. intelligence	30	20	23	15	17	9
7. aggressive or violent	17	11	10	6	5	4
8. the flu	5	3	3	3	2	2
N	512		1083		2647	

The results show clearly that people with different levels of education respond to these questions differently, but the substantive meaning of the results is complex. Consider first the shaded columns in table 3. The less well educated are *less* likely than those with more schooling to attribute eye color, sickle cell anemia, and cystic fibrosis to inheritance through a racial or ethnic identity; probabilistically speaking, they are more likely to be thereby mistaken. Conversely, the less well educated are *more* likely than those with more schooling to attribute the ambiguous traits (heart disease, intelligence, and aggression)[8] to racial or ethnic inheritance. In support of the external validity of these items, we see no difference by schooling level with regard to the flu. In short, compared with the well-educated, in the realm of racial and ethnic inheritance the poorly educated tend to be more social constructivist where it is not warranted and less social constructivist where arguably it is.

Does the same pattern hold for individual genetic inheritance? The answer lies in the unshaded columns; with one small exception, the pattern is the same. The less well educated are least likely to make individual genetic attributions for the items for which they are most appropriate (eye color, sickle cell anemia, and cystic fibrosis), and usually more likely to make

[8] As always, we set aside homosexuality for a separate discussion.

individual genetic attributions for the items in which inheritance is more ambiguous (heart disease, intelligence, and aggression). (Differences with regard to the flu are trivial and homosexuality is treated later).

The final question that table 3 can answer lies in the dependent clause of H4: "conditional on making genetic attributions." That is, a robust commitment to social constructivism would imply few genetic attributions to either individual inheritance or, especially, racial or ethnic inheritance. Looking at all eight characteristics, we do indeed see fewer attributions to racial or ethnic genetic inheritance than to individual inheritance in all three educational categories for all items. But those with less than a high school education make fewer genetic attributions of either kind than do those with more; taken at face value, that could imply that the more educated are more socially constructivist.

However, when we exclude the three traits (eye color, sickle cell anemia, and cystic fibrosis) for which a genetic attribution is plausibly warranted (although even that is contentious), we see the opposite pattern. The best educated respondents make the fewest genetic attributions to the five items that are not clearly inherited, and the least educated respondents make the most. That holds even more strongly with regard to racial and ethnic inheritance than individual inheritance.

In short, H4 receives strong support, *if* one assumes that it does not violate social constructivism to attribute eye color, cystic fibrosis, and sickle cell anemia to individual or group-based genetics. If social constructivism denies genetic inheritance even for those three items, the pattern with regard to schooling is complex and even contradictory.

Scientific Literacy and Social Constructivism: The overall pattern of results is similar for scientific literacy as for education, as the research literature and H4 both would predict. GKAP measured scientific literacy with regard to genetics with three questions, ranging from relatively easy to difficult:

- Based on what you know, would you say that DNA can be found in every cell in the human body or only in specific organs and cells in the human body?
- Based on what you know, would you say that more than half, about half, or less than half of a white person's genes are identical to those of a black person?
- Based on what you know, would you say that more than half, about half, or less than half of a human being's genes are identical to those of a mouse?

Each set of possible answers included "Don't know enough to say," which, for ease of operationalization, we count as incorrect. (That is, those respondents did not provide the correct answer.) Overall, 72 percent gave the right answer to the first question (on DNA in cells), 44 percent to the second (black-white DNA overlap),[9] and 17 percent to the third (human-mouse DNA overlap). Table 4 provides the evidence analogous to that in tables 2 and 3:

Table 4: Importance of individual, and of racial or ethnic, genetic inheritance, by level of knowledge about genetics. GKAP 2011

(in same order as table 1)

[9] Interestingly, 50 percent of white but only 25 percent of black GKAP respondents answered the question correctly. This is partly a function of education but not completely, since only 44 percent of the very well-educated Asian American respondents gave the correct response. (Fifty-six percent of multiracials and 28 percent of Hispanics answered correctly.)

	0 Questions Correct		*1 Question Correct*		*2 or more Questions Correct*	
	All or most to do with genes	*All or most to do with race or ethnicity*	*Genes*	*Race or ethnicity*	*Genes*	*Race or ethnicity*
1. eye color	69%	48%	90%	81%	96%	85%
2. sickle cell anemia	53	43	73	67	89	79
3.cystic fibrosis	43	32	63	45	75	51
4. gay/lesbian	19	10	21	10	28	13
5.heart disease	30	20	27	17	14	9
6. intelligence	24	17	24	14	16	8
7. aggressive or violent	13	9	9	7	4	2
8. the flu	5	4	3	3	1	1

We discuss these results only briefly, as they closely mirror the results for levels of education. (This is entirely consistent with results, not shown, demonstrating that education is predictive of respondents' abilities to answer the scientific literacy questions correctly.) First, those with less knowledge make fewer attributions to both individual genetic and racial or ethnic

causation with regard to the inherited traits (eye color, sickle cell anemia, and cystic fibrosis) than do those with more knowledge. Second, those with less knowledge make more attributions of both types (racial and genetic) for traits whose inherited component is more ambiguous, such as heart disease, intelligence, and aggression. We set aside homosexuality for now, and the answers to the flu question continue to allay concerns that the respondents might be providing random guesses. We also note that, consistently with H1A, people across all levels of scientific knowledge make fewer racial than individual genetic attributions.

In short, the results for scientific literacy are entirely consistent with those found when analyzing education: those who have the most scientific familiarity with genetics are the most socially constructivist, except when it comes to those characteristics that science has confirmed (e.g., that are widely understood) to be heritable.

Partisanship and Social Constructivism: H5 posits that, except with regard to homosexuality, political liberals or Democrats will be less likely than others to attribute genetic meaning to race and ethnicity. As before, we examine this hypothesis by presenting only answers to "All or mostly all having to do with genes" or ". . . with race or ethnicity." We focus here on partisanship, although we find (in results not shown) substantively similar answers when comparing respondents who locate themselves on an ideological scale ranging from liberal through moderate to conservative. Note also that although the subsample sizes show that GKAP's overall sample is skewed toward Democrats, that is likely to be a result of the fact that we oversampled racial and ethnic minorities who disproportionately identify as Democrats. Thus, as we do in the other tables (unless otherwise noted), we use weights to make the results in table 5 representative of the United States population.

Table 5: Importance of individual, and of racial or ethnic, genetic inheritance, by partisan affiliation. GKAP 2011

(in same order as table 1)

	Strong or "leaning" Democratic		*Undecided, Independent, or Other*		*Strong or "leaning" Republican*	
	All or most to do with genes	*All or most to do with race or ethnicity*	*Genes*	*Race or ethnicity*	*Genes*	*Race or ethnicity*
1. eye color	86%	76%	73%	58%	90%	80%
2. sickle cell anemia	74	64	61	44	77	72
3.cystic fibrosis	63	44	53	28	65	47
4. gay/lesbian	29	13	19	6	17	10
5.heart disease	23	14	28	26	20	14
6. intelligence	21	13	27	8	20	12
7. aggressive or violent	9	6	16	10	6	5
8. the flu	3	2	3	3	1	2
N	2715		158		1364	

The results in table 5 do not confirm H5, at least in the basic outline. Democrats and Republicans hold roughly similar views, while the category of Independents, Undecided, and "Other" differ systematically from both sets of partisans. With regard to racial or ethnic genetic inheritance (shaded columns), Independents are less likely than the other two groups to see racial inheritance in six of the eight characteristics. That includes the three items that are generally assumed to be heritable (eye color, sickle cell anemia, and cystic fibrosis), for which the

Independents are arguably mistaken. But it also includes the more ambiguous category of intelligence.

With regard to individual genetic inheritance, Democrats and Republicans again resemble one another, while Independents differ. Setting aside homosexuality, Independents are again the least likely to make genetic attributions to the three genetically-linked traits, but they are most likely to make genetic attributions to the three ambiguous traits of heart disease, intelligence, and aggressiveness. Again, reassuringly we see no variation in the very low proportions attributing the flu to either type of inheritance.

We need further research to explain the anomaly of the Independents, and how or why partisanship relates to other possible associations (for example, education, gender, and race) with views about genetic determinism. But these results conform to the general finding in the academic literature that "pure" Independents and nonpartisans (the Undecided or Others) are less knowledgeable about current events and political and social facts (Keith et al. 1992). The surprising and intriguing result is the lack of difference between Republicans and Democrats in the degree to which they concur with the social constructivist view, either with regard to racial or ethnic inheritance or individual ancestral inheritance. If the GKAP survey represents Americans in general, the question of biological or social causation is not polarized in the public in the way that it is among knowledgeable experts.

This similarity is reinforced by the overall average likelihood of making genetic attributions. As we have found in every previous analysis, for all items in all groups, there are fewer attributions to racial or ethnic inheritance than to individual ancestral inheritance. But within that framework, Republicans and Democrats closely resemble one another in accepting both types of genetic causes, while Independents are less likely to accept either individual

genetic inheritance or, especially, racial or ethnic genetic inheritance. That is not what we expected, and it warrants further study.

The surprise deepens when we look only at the five items that are not generally understood as heritable. For those items, Independents are the most likely to make genetic attributions, both for individual ancestral inheritance and for group-based inheritance – but Democrats are more likely than Republicans to do so, again for both types of inheritance. Even setting aside the three items that are arguably not socially constructed, Republicans are closer to being social constructivists than are Democrats. In light of the normative valences with which this chapter started, that finding needs further exploration.

The Anomalous Case of Homosexuality: We have noted several times that responses to the item, "being gay or lesbian," differ from responses to the other three traits (heart disease, intelligence, and a tendency toward violence) for which genetic and environmental or choice-based explanations are more ambiguous. We turn finally to a direct consideration of this item.

Hypothesis H5.5 posits that views on homosexuality are an exception to our overall expectation about the link between partisanship (or ideology) and social constructivism, and that is indeed the case. As table 5 shows, Democrats are much more likely than Independents or Republicans to attribute being gay or lesbian to "genes," and slightly more likely to attribute being gay or lesbian to "race or ethnicity." Indeed, Democrats' relatively high agreement with "genes" for that item helps to explain the fact that overall they are less socially constructivist

than Republicans.[10] Looking back to the other tables shows that homosexuality is consistently anomalous in comparison with the other ambiguous traits. Thus:

- Table 1 shows that GKAP respondents as a whole are more likely to assert that homosexuality results from "environment or lifestyle" than they are for the other three ambiguous traits.
- Table 2 shows that whites are more likely to see being gay or lesbian as a result of individual ancestral inheritance than the other three ambiguous traits. Conversely, blacks are less likely to see being gay or lesbian as a result of individual ancestral inheritance than two of the other three ambiguous traits, and much less likely to see homosexuality as a result of racial or ethnic inheritance. (The pattern is more mixed or less stark for the other three groups).
- Table 3 shows that the least well educated are least likely to attribute homosexuality to individual inheritance – a pattern that differs from the pattern for the other three ambiguous traits.
- The same holds for levels of knowledge about genetics; those who answered none of the three questions correctly are less likely to attribute being gay or lesbian to individual inheritance – a pattern that differs from that for the other three ambiguous traits.

[10] It does not fully explain that surprising result, however, since Democrats are also just as likely or slightly more likely than Republicans to explain heart disease, intelligence, and aggression through genetic causes.

- Finally, we have already noted that Democrats are much more likely than Independents or republicans to see homosexuality as an individually inherited trait, and slightly more likely to attribute it to racial or ethnic inheritance.

Clearly, the norms around and understanding of sexual preference differ from the norms around and understanding of other complex social behaviors. We are not, of course, the first scholars to note this important phenomenon [see (Sheldon 2007) and citations therein; (Suhay and Jayaratne 2012)] – although we have not seen it demonstrated so clearly or consistently in any other research. Although it is remains something of an intriguing footnote to the overarching debates about whether group categories are wholly constructed by societies or have an irreducible biological component, it does complicate the political, normative, and empirical treatment of that subject.

Conclusion

More research is needed; it always is. Some of what the GKAP survey reveals is reassuringly commonsensical. Americans are vanishingly unlikely to attribute the flu to genes or to group identity, and a majority recognizes that eye color and two inherited diseases are in fact inherited. In every possible comparison, regardless of the overall level of agreement about the importance of genetic inheritance, Americans see individual ancestry as genetically more important than is group inheritance. This is a key finding. Similarly, Americans are generally reticent to attribute traits that have a mixed or uncertain etiology to individual or group-based genetic inheritance; they tend toward societal explanations or explanations that mix genes and environment. This too is a key finding, and reinforces the view that Americans are more social constructivists than genetic or group determinists.

We refrain from speculating on the underlying causes of these two patterns. Perhaps they indicate that recent elite discourse has come to influence public thinking in a way that would surprise scientists and public leaders in the early twentieth century. Perhaps, that is, the idea that race is a meaningful biological phenomenon has been superseded by the idea of individual genetic inheritance, or by the idea that societally important characteristics have little to no genetic inheritance at all. We, reluctantly, leave further speculation on this important historical change until more evidence has accumulated.

Our analysis also points to some variation within this overall pattern. Most importantly, we confirm that higher levels of education and more knowledge about the field of genetics usually is linked to stronger support for the social constructivist position. Again, this may occur because more knowledgeable people are more receptive to messages from recent elite discourse; or, it could be that more knowledgeable people have absorbed the message from their schooling that race is a social construction.

However, two absences of variation are more surprising and arguably more intriguing. First, no racial or ethnic group is consistently outside the mainstream as defined by the other groups. We note in particular that, at least in their survey responses, whites are not the genetic determinists that their ancestors too often were. Although their ancestors insisted on the need for racial purity, whites in 2011 are even more likely to see inter-racial genetic overlap than are members of subordinated groups, some of whose ancestors were the product of involuntary racial mixture. Second, Democrats and Republicans (or liberals and conservatives) largely agree with one another about the level of genetic inheritance for various characteristics, and they are both less socially constructivist than are nonpartisans.

Finally, homosexuality is in a class by itself, revealing opinions that differ from and even contradict opinions about other ambiguous traits or behaviors.

These findings need closer investigation. Nevertheless, the overall message from the GKAP survey should reassure both those who see too much social constructivism in the public arena with regard to race and biology (a.k.a. inappropriate color blindness?) and those who see too much biological essentialism. Americans are not polarized by race or ethnicity, or by ideology and partisanship. They make sensible (if not always accurate) distinctions among characteristics. They are cautious about group-level genetic inheritance but do not eschew it. Experts who accuse one another of killing people or of racism might take a lesson from the relatively ignorant mass public, and consider more closely the murky middle of the debate over genes and groups. Despite the fact that the United States has no useable history in the arena of relating race to biology, the burgeoning field of genomic science suggests that we need to develop a vocabulary, set of concepts, and mutual tolerance in order to learn a decent way of talking about race and biology in the same sentence.

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[11] INCOMPLETE; some here are to be deleted, and others need to be added. See paper for conference for additional research-based notes

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