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DEBATES AND DEVELOPMENTS

The multiple dimensions of race

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ABSTRACT

Increasing numbers of people in the United States and beyond experience 'race' not as a single, consistent identity but as a number of conflicting dimensions. This article distinguishes the multiple dimensions of the concept of race, including racial identity, self-classification, observed race, reflected race, phenotype, and racial ancestry. With the word 'race' used as a proxy for each of these dimensions, much of our scholarship and public discourse is actually comparing across several distinct, albeit correlated, variables. Yet which dimension of race is used can significantly influence findings of racial inequality. I synthesize scholarship on the multiple dimensions of race, and situate in this framework distinctive literatures on colourism and genetic ancestry inference. I also map the relationship between the multidimensionality of race and processes of racial fluidity and racial boundary change.

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This article synthesizes a growing body of scholarship that distinguishes and analyses the multiple dimensions of the concept of race as experienced by individuals and as measured in research. Increasing numbers of people in the United States and beyond experience 'race' not as a single, consistent identity but as a number of conflicting dimensions. These may include, for instance, how an individual self-identifies her race, how she is perceived by others, how she believes she is perceived by others, what she checks among the limited options on the census or other surveys, her skin colour and other aspects of her racial appearance, and her racial ancestry. These dimensions influence one another, but are not necessarily the same. For example, Salvador, a restaurant worker in New York, identifies his race as Puerto Rican. Phenotypically, he is dark-skinned with indigenous features, leading some Americans to view him as Black.[1] He believes that Americans view him as Hispanic, based on his accent and name. Yet on the census,

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Salvador checks White for his race because no listed option fits his identity and in Puerto Rico his mixed racial ancestry allowed him to consider himself closer to White than to Black (Roth 2010). The word 'race' tends to be used as a proxy for each of these dimensions, with the result that much of our scholarship, as well as public discourse, is actually comparing across several distinct, albeit correlated, variables.

An important contribution of this scholarship is to emphasize that no single dimension is a person's 'true' or 'correct' race. For instance, observers' classifications may not match the individuals' self-identification, yet each of these dimensions measures something different about the way that individuals experience race in their daily lives. When it comes to housing or employment discrimination, Salvador's perception and treatment as Black is the meaningful reality, regardless of the fact that those observers are not correctly guessing the way he views himself. We can understand race as a cognitive structure that divides people into hierarchically ordered categories on the basis of certain physical or biological characteristics that are believed to be inherent (Roth 2012). An individual's race is shaped by both her own identification and the attributions and reactions of others (Cooley 1902; Jenkins 2008). By deconstructing race into its diverse dimensions, this scholarship illustrates precisely how race is socially constructed, by highlighting the micro-level processes and interactions that build, maintain, and occasionally shift a cognitive structure of race.

Much of the literature that explicitly addresses the multiple dimensions of race focusses on the United States, where demographic changes such as immigration and interracial marriage have led to increasing numbers of people experiencing conflicting dimensions of race. This is particularly true for groups such as Latinos and the multiracial population (Harris and Sim 2000; Rockquemore and Brunsma 2002; Hitlin, Brown, and Elder 2007; Golash-Boza and Darity 2008; Roth 2010). Native Americans are another group where dimensions of race are frequently inconsistent (Campbell and Troyer 2007; Bratter and Gorman 2011). Some also find inconsistencies for Asians and Middle Easterners (Boehmer et al. 2002; Vargas and Stainback 2016), and even some White and Black Americans – two groups for whom racial classification is assumed to be fairly static (Kressin et al. 2003; Saperstein 2006; Noymer, Penner, and Saperstein 2011). Distinct dimensions of race have also been examined in Latin America, where there has long been awareness of discrepancies between colour, ancestry, and racial classification, for example (Telles and Lim 1998; Bailey, Loveman, and Muniz 2013; Telles 2014; Cabella and Porzecanski 2015; Bailey, Fialho, and Penner 2016). Yet theoretically, the same processes are relevant to Europe, Asia and other regions of the world, even if those countries focus less explicitly on the concept of race (Ahmed, Feliciano, and Emigh 2007; Song and Aspinall 2012; Nagaraj et al. 2015; Perrin, Dal, and Poulain 2015).

Which dimension of race researchers use can significantly influence findings of racial inequality (Saperstein and Penner 2010, 2012; Bratter and Gorman 2011; Noymer et al. 2011; Bailey, Loveman, and Muniz 2013; Telles 2014). Social surveys typically measure only one dimension of race, most frequently a circumscribed form of self-identification, leaving it to serve as a proxy for all of the others. Yet other dimensions of race may be theoretically more appropriate for studying specific social outcomes. At the same time, analyses of the ways that different dimensions of race influence the same outcomes can push scholars to rethink theoretical mechanisms that are taken largely for granted.

I begin by discussing the multiple dimensions of race and which ones may be more theoretically appropriate for examining which social outcomes. Next, I review literature that identifies inconsistencies between different dimensions and factors associated with those inconsistencies. This includes both statistical studies that include different race measures and the growing literature on multiracial people, which has advanced our theoretical understanding of how individuals can experience different dimensions of race. I also discuss studies showing that different dimensions of race produce different inequality estimates. Here, in addition to scholarship that explicitly addresses multiple dimensions of race, I argue that what have been treated as distinctive literatures focussing on specific dimensions should be understood within this broader framework. For example, I situate the substantial literature on colourism, or phenotype inequalities and discrimination, within a broader understanding of phenotype as one of several dimensions of race that influences the others but also produces its own axes of stratification. I also discuss the literature on genetic admixture inference, and while I challenge the view that current techniques for measuring genetic ancestry capture a particular dimension of race, I argue that this scholarship is enhanced by the inclusion of other race dimensions. Finally, I map the relationship between this body of scholarship and related literatures of racial fluidity and racial boundary change, and identify additional avenues that would advance this scholarship further.

Mapping the multiple dimensions

Figure 1 presents a typology of race dimensions reported in the literature, with some terms used to describe them, and outcomes they may be more appropriate for studying. This typology is not meant to be exhaustive but to provide a roadmap to the different components of race that scholars have been studying. One challenge for this scholarship is the variety of terms used for the same dimensions. In some cases, the same terms are used by different scholars to reference distinct dimensions (e.g. 'racial identification'), prompting the need for greater theoretical clarity. All of these dimensions are fluid; they may vary over time and be influenced by a

Dimension of Race	Description	Typical Measurement	Also described as	Outcomes it may be appropriate for studying
RACIAL IDENTITY	Subjective self-identification, not limited by pre-set options.	Open-ended self-identification question	"Internal race" (Roth 2010); "Self-ID" (Scholler 2013); "racial identification" (Newby and Dowling 2007)	Political mobilization; assimilation; social networks; voting; residential decision-making; attitudes
RACIAL SELF-CLASSIFICATION	The race you check on an official form or survey with constrained options (e.g. the Census, college financial aid form, the GSS, etc.)	Closed-ended survey question	"Expressed race" (Roth 2010); "expressed internal race" (Harris and Sim 2002); "Census race" (Bailey 2008); "self-reported race" (Saperstein 2006); "racial identification" (Saperstein and Penner 2012)	Demographic change; vital statistics; disease and illness rates **Often used as a proxy for Racial Identity*
OBSERVED RACE	The race others believe you to be	Interviewer classification	"External racial identity" (Harris and Sim 2002); "racial classification" (Saperstein and Penner 2012); "racial identification" (Xie and Goyette 1997)	Discrimination; socioeconomic disparities; residential segregation; criminal justice indicators; health care/service provision
- Appearance-Based	Observed race based on readily observable characteristics	Interviewer classification with instructions to classify on first observation		- Racial profiling; discrimination in public settings
- Interaction-Based	Observed race based on characteristics revealed through interaction (e.g. language, accent, surname)	Interviewer classification with instructions to classify after interaction or survey		- Workplace discrimination; housing discrimination; language/accent-based discrimination
REFLECTED RACE	The race you believe others assume you to be	"What race do most people think you are?"	"Perceived" race (Vargas 2015)	Self-identification processes, perceived discrimination ** Often used as a proxy for Observed Race*
PHENOTYPE	Racial appearance	Usually interviewer classification		Discrimination; socioeconomic disparities; residential segregation; criminal justice indicators; health care and service provision
- Color	Skin color	Usually interviewer classification on a likert scale or color palette		
- Other features	Hair texture or color, nose shape, lip shape, eye color	Usually interviewer classification on a series of categorical variables		
RACIAL ANCESTRY	The compiled racial groups of your ancestors			
- Known	What you believe your racial ancestry to be based primarily on family history	Self-report, often open-ended		Assimilation; racial boundary formation; social closure; disease and illness rates
- Genetic	Deep ancestry indicated by genetic testing	Analysis of ancestry informative markers by researchers or direct-to-consumer companies	"Genetic ancestry" (Royal et al. 2010); "Genome-wide ancestry" (Perez et al. 2013); "Ancestry inference" (Bolnick 2008)	Self-identification processes

Note: This figure builds on an earlier typology in Roth (2010) and benefitted from the discussions of the Measuring the Diverging Components of Race Workshop at Texas A&M University in June 2014.

Figure 1. Race dimensions typology.

variety of contextual factors. However, fluidity within one dimension needs to be distinguished conceptually from differences across dimensions. To aid scholars conducting research in this area, the Multiple Components of Race Data Library (Bratter, Campbell, and Roth 2014) profiles social science surveys that include measures of multiple dimensions of race.

Racial Identity refers to a person's subjective self-identification. Importantly, it is not limited by a set of pre-determined options and does not represent a person's efforts to fit themselves into any given set of boxes. It is typically

measured with an open-ended self-identification question, and while it has more frequently been the focus of qualitative research, it could be captured through an open-ended question in survey research. This dimension might be most suited for studying outcomes that depend on an individual's internal self-identification process, such as political mobilization or voting patterns, residential decision-making, social network formation, or attitudes.

Racial Self-classification refers to the race that is checked on an official form or survey, such as a census or federal financial aid forms. It is typically measured with a closed-ended self-identification question. Both racial self-classification and racial identity are forms of self-identification, so it is a valid question whether these are actually theoretically distinct dimensions of the lived experience of race. On one hand, closed-ended questions are merely trying to measure racial identity and necessarily fail to capture all of its complexity due to their need to simplify response options for data analysis. However, the experience of having to fit oneself into boxes that do not represent how one identifies racially has become an important part of how many people experience the complexity of race. Several studies and artistic works highlight precisely this experience for groups such as Latinos and multiracial populations (Rodríguez 2000; Rockquemore and Brunsma 2002; Roth 2010; Scholler 2013; Dowling 2014). Race questions on national censuses are a particular case of racial self-classification, leading Bailey (2008) to refer to the answer people give specifically as their 'Census race'. Such questions, reflecting federal standards for data collection, represent a particular *racial schema*, a set of categories and way of thinking about race that reflects the nation's official classification system (Roth 2012). For example, in filling out the US Census, many people view themselves as providing the response that best fits the way they believe they are supposed to fit into America's official classifications, regardless of whether it matches their racial identity (Rodríguez 2000; Roth 2010; Dowling 2014). Other forms and surveys may have different variants of response options, but are similar in that individuals who see themselves falling between the boxes provided are forced to make a less-than-ideal choice.

Racial self-classification, as a proxy for racial identity, is frequently used to study a wide range of outcome measures, and when these two dimensions correspond (e.g. in the case of someone whose self-concept fits neatly within a society's official classification schema) this use is appropriate. When it is an inadequate proxy of racial identity, racial self-classification can provide some sense of how these groups see themselves fitting into official classifications (Rodríguez 2000). The distinction between racial self-classification and racial identity highlights that even in terms of self-identification, people may think about or express that identification differently in different contexts, and the nature of the question and options provided are aspects of that context.

Observed Race is the race that others believe you to be. In social research, it is typically measured by the interviewer's classification of the individual. In a person's lived experience, it is assessed repeatedly and often silently in numerous, daily interactions and encounters. For individuals whose race is unambiguous, it may be assessed instantly and subconsciously; observers may not even be aware that they are silently cataloguing a person's race together with other pieces of information about them. For those whose race is more ambiguous, the process may take longer (Freeman et al. 2010) and be more conscious. A large literature in psychology examines how observers perceive the race of others (e.g. Willadsen-Jensen and Ito 2006; Pauker and Ambady 2009; see Roth 2015). These assessments influence how people are treated and form the basis of racial discrimination, including non-deliberate actions that nonetheless lead to socio-economic inequities.

An important question for understanding how to interpret observed race is who is doing the observing. Characteristics of the observer influence how they perceive another individual's race (Harris 2002; Feliciano 2016; cf Herman 2010). An observer's knowledge of an individual with regard to some of the other dimensions of race may also influence their assessments. In one study, individuals who were previously surveyed about their ancestry but died before a follow-up study were identified by both a proxy – next of kin or nonrelatives who knew the individual – and by funeral directors. Only 20 Per cent of those who self-classified as Native American were classified as such by proxies, but none of them were classified as such by funeral directors (Hahn, Truman, and Barker 1996). Although even the proxies' assessments had low consistency with the individuals' self-classification, some likely had greater knowledge than the funeral directors of the individuals' racial identity or ancestry.

Similarly, the context of the observation matters for how a person's race is observed. Freeman et al. (2011) find, in a series of images morphing photographs of Black and White individuals, low-status attire is associated with the person being perceived as Black and high-status attire is associated with being perceived as White. Furthermore, the influence of the attire grew as the race of the individual became more ambiguous, suggesting that people rely on non-physical features more when a person's race is not clear.

We can also think of two subtypes of the Observed Race dimension. *Appearance-Based Observed Race* is based solely on readily observable characteristics. This includes not only a person's phenotype but also visible status markers, clothing, hairstyle, and the context of the observation. *Interaction-Based Observed Race* is additionally shaped by information revealed through interaction, including a person's accent or language ability, name, knowledge of their family members, or comments about their background, status, or racial identity (Roth 2010). Observers may initially make an assessment of appearance-based observed race only to alter that assessment after

interacting with them. Many Latinos describe being perceived as White or as Black until they open their mouths to speak, at which point their accent or use of Spanish leads an observer to reclassify them as Latino (Roth 2012). A person's name can also be used as a racial cue, with research showing that the same Asian-European multiracial faces are seen as looking significantly more European when associated with European names than with Asian names (Hilliar and Kemp 2008). Observers in different social roles rely on different sorts of information in their assessment of a person's race. Those most likely to engage in racial profiling or provide services, such as police officers, security guards, waiters, or salespeople, tend to rely on appearance-based observed race from their initial observations. But those with greater access to the resources associated with social mobility, such as employers, teachers, landlords, or lending agents, typically have greater interaction (Roth 2010). As a result, each type of observed race may be more suited to studying specific social outcomes.

The distinction between these subtypes remains greatly understudied. Studies of the classification of photographs or morphed images rely only on appearance, unlike most real interactions. A significant challenge for scholarship is that many surveys, as well as some qualitative studies, do not provide enough information to reveal whether the observed race measure reflects interviewers' assessments based on appearance or interactions. When and how the dimension is measured within a study can determine which one is captured. Observed race may be appearance-based when interviewers record a classification on their first observation of a respondent, but is interaction-based when recorded at the end of an interview. When the latter occurs in interviews that ask for racial self-identification, the interviewer's interaction-based assessment is likely to also be influenced by the individual's response.

A person can have many observed races – as many as there are observers and contexts in which they are observed. Although we typically capture this dimension of race once, from one interviewer, if we capture it at all, it can also be thought of as something specific to each moment and each act of observing.

Reflected Race refers to an individual's belief of how others classify them. It draws on the concept of reflected appraisals and the idea of the 'looking-glass self' (Cooley 1902), which focusses on how an individual's racial identity is influenced by the perceptions of others. However, within the emerging literature, scholars consider reflected race a distinctive dimension of people's lived experience of race, one that may or may not influence their racial identity. In this way, it is useful for understanding the process of self-identification as well as other outcomes such as perceived discrimination.

However, most often reflected race – measured by questions such as 'What race do most people think you are?' – is used as a proxy for observed race in

self-administered or telephone surveys where interviewers cannot observe the person. The effectiveness of this proxy has never been studied. As noted above, one's observed race may differ based on the observers' characteristics. To the extent that the observed individual is aware of this, specifying the reference group doing the classifying may result in different responses. A mixed-race person with Black and White parents may believe that Whites usually view her as Black, but Blacks usually view her as mixed-race. The CDC's Behavioral Risk Factor Surveillance System Measures of Racism Module asks respondents 'How do other people in this country typically classify you?', which may be intended to capture how the mainstream society classifies the person, but how respondents interpret it could vary based on the extent of interactions they have with the mainstream society. Ideally, these questions would specify the reference group, whether it is mainstream society, the individual's own racial group, or specific minority groups (e.g. blacks or Latinos).

Phenotype refers to aspects of a person's physical appearance that are socially understood as relevant to racial classification. This includes skin colour as well as other features such as hair texture or colour, nose shape, lip shape, and eye colour. This is a dimension of race that varies, sometimes considerably, within racial categories. It affects most other dimensions of race but is not synonymous with any of them.

Much of the research on phenotype focusses on skin colour, usually measured by interviewer classification with either a categorical question asking the interviewer to rate the person's skin colour from light to dark or a colour palette that interviewers memorize and apply to the respondent. Although more common in the past, few studies today use a spectrophotometer, an instrument that measures light reflectance off the skin,[2] and measures of self-perceived skin colour are fairly rare (Monk 2015). Thus the bulk of scholarship on skin colour reflects someone else's perception of an individual's colour. This may be appropriate for studies of colour-based discrimination based on other people's perceptions. However, Monk (2015) shows that, compared to interviewer-rated skin colour, self-reported skin colour is actually a better predictor of internalized measures such as perceived discrimination, which predict key health outcomes among African-Americans. Future typologies of race dimensions may find it useful to distinguish self-reported and observed dimensions of phenotype, both skin colour and other features, as data become available to explore these distinctions in greater depth.

Observed skin colour, much like observed race, is influenced by the person doing the perceiving. Hill (2002) found that Black and White interviewers saw more colour variation within their own race than in the other, such that White interviewers rated Black subjects' colour as darker than did Black interviewers, and Black interviewers rated White subjects as lighter. Contextual cues also

matter, and indeed the same kinds of social and interactional cues that distinguish interaction-based from appearance-based observed race – name, accent, language ability – may also influence an interviewer's rating of a person's skin colour. An experimental study found that the inclusion of racially-coded names influenced how observers rated an image's skin colour. Specifically, people rated the same face as darker when it was associated with a distinctively Hispanic name rather than a non-Hispanic name (Garcia and Abascal 2016).

Phenotype is more complex than skin colour alone, yet few surveys include measures of other features, and those that do typically only ask interviewers to record the respondent's hair colour and eye colour. Studies have found that nose, lips, and hair texture influence individuals' classifications, although skin colour is the primary characteristic used to classify a person's race (Feliciano 2016). Few studies consider how these other phenotypic features influence perceptions of skin colour, observed race, or socio-economic outcomes (cf Gravlee 2005). One study found that some Latinos rated their own skin colour darker than a White American observer rated their colour because they had African or Indigenous facial features; they viewed their non-European nose, lips or hair texture as darkening their overall colour, while the American observer focussed only on skin tone (Roth 2012).

Racial Ancestry is a dimension of race that influences other dimensions, such as racial identity and observed race. This is particularly true in the United States, where racial ancestry was used as the basis for determining who was Black for much of the nation's history (Davis 1991), as well as what fraction of Indigenous ancestry was needed to be considered Native American (Snipp 1989). In assessing what another person is (or making a judgment about appearance-based observed race), observers often rely on phenotype, but do so because such physical differences are thought to reveal an ancestral lineage (Smedley and Smedley 2012). In fact, because racial classification depends not just on phenotype but also on ancestry in North America, many view race as 'a supra-individual, social-relational phenomenon, not as a subjective individual property' (Brubaker 2016, 22), where someone cannot take on a race from which they have no ancestry. The widespread public rejection of the Black identity claimed by Rachel Dolezal, the NAACP chapter president who was revealed to be of European descent, is a case in point. In other societies, racial ancestry is less important and simply living the life of a group member is sufficient for inclusion (Wimmer 2008).

Although we can think of racial ancestry as the compiled racial groups of one's ancestors, most people are unaware of all of the racial ancestry they have. Knowledge of family trees may only go back a few generations, and in some cases, racial ancestries were buried when relatives passed as members of different races to pursue greater opportunities or avoid social exclusion. In practice, what most people think of as their racial ancestry is

their *Known Ancestry* – what a person believes her racial ancestry to be based on family history. Survey questions on ancestry, such as the US Census's open-ended self-report question, attempt to capture known ancestry, although people's responses may not be comprehensive, as some forget parts of their ancestry or simplify what they report (Waters 1990; Perez and Hirschman 2009).

The ancestry question was placed on the US Census and other surveys to study immigrant integration and ethnic assimilation. But Gullickson (2016) argues that these write-in ancestry responses indicate an essentialized identity that is often related to but distinct from racial self-identification. Analyzing ancestry and self-classification of race or Hispanic origin together can indicate how people's self-classifications draw upon some components of their racial ancestry and not others. For example, identifying multiracial individuals by ancestry and examining who also identifies as multiracial on survey race questions can provide new estimates of the multiracial population and illuminate who chooses a multiracial identity (Gullickson and Morning 2011). Examining the characteristics of people who report a Latino ancestry but do not identify as Latino or Hispanic on the census Hispanicity question can also reveal what factors are associated with the loss of a Latino identity (Alba and Islam 2009; Duncan and Trejo 2011; Emeka and Vallejo 2011). In these ways, racial ancestry is appropriate for studying social status and social closure, as well as assimilation and racial boundary crossing.

Even known ancestry is fluid as what people know about their racial ancestry can change over time. Through genealogical research, people may learn of ancestors pruned from family trees or who passed across racial lines (Williams 1996; Broyard 2008). Those who were adopted and later connect with their biological families may also learn new information about their racial ancestry. While this dimension of race is typically less fluid than others, some people do make discoveries that can influence other dimensions, particularly racial identity.

One way of discovering new information about racial ancestry is through genetic ancestry testing. Nearly three million tests have been sold by approximately forty direct-to-consumer companies in a little over a decade (Roth and Lyon, forthcoming). These tests purport to tell people about their geographic ancestral origins by analyzing genetic variation that occurred during worldwide human migrations. We can think of this information as a *Genetic Ancestry* dimension, which may include racial ancestries that were previously unknown to an individual from her family history or genealogical research. Critics point out several limitations of these tests, including that analyses are restricted by the other individuals within a company's database and that the probabilistic nature of the findings is not properly qualified (Bolnick et al. 2007; Royal et al. 2010; Duster 2011). In some cases, test-takers can confirm new ancestry information by connecting with other test-takers whose DNA suggests relatedness. While many test-takers understand the tests' limitations, others misinterpret

what the tests can tell them about ancestry (Roth and Lyon, forthcoming). Whether or not these interpretations are supported by the evidence, the information from test-takers' genetic ancestry can inform what they report as their known ancestry when they accept the results.

Increasingly, genetic measures of racial ancestry are used in population-level research and health studies (e.g. Bauchet et al. 2007; Atzmon et al. 2010; Marcus et al. 2010; Perez et al. 2013). There are several problems with how genetic ancestry is measured and interpreted by both genetic ancestry test-takers and population geneticists, as I discuss further below. Yet as new technologies attempt to provide information about a person's deep ancestry beyond what is known in a family's collective memory, genetic ancestry may increasingly influence both individuals' lives and popular discourse about what race is.

Below I review the major themes in recent scholarship on the multiple dimensions of race. I focus on work that delineates the inconsistencies across dimensions of race and the factors associated with them, the relationship between different dimensions, and how using different dimensions of race influences estimates of inequalities and what this implies for analytical approaches.

Major themes in the literature

Inconsistencies across dimensions

One theme in this scholarship is exploring the inconsistencies across dimensions of race and its associated factors, particularly the inconsistencies between racial self-classification and observed race. For example, several US studies in the health fields examined inconsistencies between individuals' self-reports and the observations of others in the form of medical records, interviewer classifications, or death certificates (Hahn et al. 1996; Kressin et al. 2003; West et al. 2005).[3] These studies found the highest rates of consistency among self-reported Whites (91–98 Per cent) and self-reported Blacks (90–99 Per cent), and typically moderate-to-high rates among Asians (76–95 Per cent) and Hispanics (64–83 Per cent), but low rates of consistency for Native Americans (0–23 Per cent). In a comparison of racial self-classification in the 2000 US Census and observed race in the 2000 General Social Survey, Smith (2001) similarly found 97–98 Per cent agreement for Blacks and Whites but only 58 Per cent agreement for other races. Saperstein (2006) also found that inconsistencies between self-classification and observed race, while small overall, were rapidly growing – with a 55 Per cent increase between 1996 and 2000.

However, most of these studies include only cases where observers marked a race for the individual. When the observer was allowed to mark 'unsure' or

'race unknown', many did so, suggesting even lower levels of consistency. For instance, Kressin et al. (2003), who reported 98 Per cent consistency for Whites and 92 Per cent for African-Americans between observed race and self-classification, found those levels dropped to 62 and 61 Per cent, respectively when they included observers' reports of 'race unknown' (see also Boehmer et al. 2002).

In these studies, it is difficult to know whether the observer – typically an interviewer or health administrator – is recording observed race based only on appearance or on interactions as well. In an important new study, Porter, Liebler, and Noon (2016) shed light on the process of interaction-based observed race by examining the racial classifications made by proxies, people outside the household who know the target individual. Drawing on a unique dataset of individually-linked records from the full 2000 and 2010 US censuses, they leverage 3.7 million cases with both a proxy report, usually from a neighbour, and a report for the same individual by someone within the household. They find high consistency between the household reports and proxy reports for the nation's largest groups: 98 Per cent of Whites, 94 Per cent of Blacks, 88 Per cent of Asians, and 86 Per cent of Hispanics. However, proxy reports matched household reports for only 62 Per cent of Native Americans, 62 Per cent of Pacific Islanders, and 8–36 Per cent of multiracial people, depending on the mix of races reported. Unfortunately the data cannot reveal who makes the household report – or whether this study reflects consistency between interaction-based observed race and racial self-classification (if the household report comes from the individual herself) or the fluidity in interaction-based observed race that occurs when there are different observers, even ones who know the individual.

This scholarship has also examined the factors associated with inconsistencies in self-classification and observed race. It understandably finds greater consistency under conditions that would improve the observers' knowledge of the individual. We would expect observed race that is based on interaction to match the way a person self-identifies more often than that based only on appearance, and these studies suggest that greater interaction leads to greater consistency (Kressin et al. 2003; Porter, Liebler, and Noon 2016). Observers who have less knowledge of an individual often rely on social cues to determine what that person's race might be. Many of these are associated with stereotypes or assumptions based on social status. For instance, proxies may rely on positive or negative stereotypes about groups' financial standing in reporting an individual's race. Homeownership is associated with higher odds of consistent classification for Asians, but lower odds for Native Americans, while the odds of consistent classification were higher for many minorities in areas with more people using public assistance. (Porter, Liebler, and Noon 2016). Racial stereotypes about health and group behaviour can also influence observers' classifications and their inconsistency with proxy

reports by relatives; on death certificates, medical examiners were more likely to classify someone as Native American who had died of cirrhosis, and to classify someone as Black whose cause of death was homicide, with the race reported by the person's next of kin held constant (Noymer et al. 2011).

Observers also rely on contextual cues and racial classification norms when guessing the race of others. Porter et al. (2016) found that proxy classifications were more likely to match household reports if the person was living in an area where many others report the same race, suggesting that observers rely on the racial composition of the area to guide their assessments. However, for people identified by their household as Black-White, proxy reports were more likely to be inconsistent if the area had a high number of Blacks. In general, Black-White multiracial people were more often observed as Black than as other races, reflecting social norms of hypodescent. Proxies also tended to report children as multiple-race and adults as single race, which may reflect societal ideas that younger people are more likely to view themselves as multiracial and/or a greater tendency to see young people with their parents and to draw upon this information about racial ancestry in reporting race.

The consequences of inconsistencies

While much of the research on inconsistencies across dimensions of race points toward the implications of using different measures to study inequality (see below), some studies examine the impact of the inconsistency itself on the individuals who experience it, showing that being perceived differently from how one classifies oneself can have negative psychological and health consequences. Campbell and Troyer (2007) examine indicators of psychological distress among those who classify themselves as Native American but are perceived as another race by an observer. Relative to those with consistent classifications, those classified as a different race have an increased likelihood of considering or attempting suicide and of fatalistically believing that they will die before the age of 35. The authors argue that this mismatch in observed race and self-classification increases stress and leads to negative mental health outcomes by invalidating one's self-image and identity, threatening social status, and de-legitimizing claims for membership in one's community.[4]

Other studies consider the impact of inconsistencies between a person's racial self-classification and reflected race, arguing that a person's *perception* of being routinely viewed as a different race is more important for emotional or physical responses than a single instance of being observed differently by an outsider, of which she may not even be aware. Applying a status perspective, Stepanikova (2010) shows that people who believe they are classified as a lower status race than the one they report for themselves have significantly

higher odds of reporting physical and emotional symptoms as a result of how they were treated based on their race. Yet those who believe they are classified as a higher status race do not experience symptoms that are significantly different from people who believe their race is validated by others.

Vargas (2014) finds that individuals who self-classify as White but do not believe that others view them this way are more likely to express similar or amplified notions of colour-blindness in order to legitimate their membership in the White group from which they feel marginalized. Meanwhile, people who claim a race that they believe is contested by others generally experience lower levels of racial group closeness and racial identity salience, which may lead to a thinning of racial identity when self-classification is inconsistent with reflected race (Vargas and Stainback 2016). In Canada, people whose self-classification did not match their reflected race were significantly more likely to report suffering from high blood pressure and hypertension, and poorer self-rated mental health and overall health than those not experiencing a mismatch (Veenstra 2011). Inconsistency between racial self-classification and both observed and reflected race is associated with a number of negative physical and emotional outcomes (but see Song and Aspinall 2012).

The relationship between dimensions

Another theme in the literature is how one dimension of race influences another. Some work considers how phenotype, particularly skin colour, influences racial self-classification, for example. Latinos with darker-skin are more likely to classify their race as Black or as Hispanic, and less likely to self-classify as White, compared to those with lighter skin (Golash-Boza and Darity 2008). Similarly, qualitative research shows that phenotype influences the racial identity of multiracial individuals (Rockquemore and Brunsma 2002; Song and Aspinall 2012). The influence of skin colour on self-classification varies between nations, however. In Latin America, skin colour has a strong effect on who self-classifies as Black in Panama but a weak effect in the Dominican Republic, with Colombia and Brazil in between (Telles and Paschel 2014).

The concept of reflected appraisals implicitly examines the relationship between different dimensions of race – how reflected race influences racial identity. Although the term 'reflected race' derives from this theory, it is not the same as a reflected appraisal, as not everyone conforms their racial identity to the way they believe others view them (Vargas 2015; Vargas and Stainback 2016). Nonetheless, Khanna (2004, 2010) shows precisely how Black-White and Asian-White multiracial people's identities are influenced by how they believe they are classified, a belief which is itself closely tied to their phenotype.

Feliciano (2016) analyses how individuals' phenotype influences their observed race, as well as inconsistencies between observed and self-classified

race. Using photos that are uploaded to match.com and are associated with would-be daters' own classifications, she considers how those photos are racially classified by a number of different observers. She finds that observers tend to place individuals into monoracial groups, using skin tone as their primary guide. Notably, while light skin is associated with a White designation, and dark skin with a Black designation, medium skin is associated with a Latino designation, suggesting the extent to which observers have come to see Latinos as a racial group that is both phenotypically and categorically in-between Black and White.

In ongoing work, I am investigating how genetic ancestry influences racial identity and self-classification by examining people's responses to genetic ancestry tests (see also Nelson 2016). Many people who take these tests say that they influence their racial or ethnic identity (Roth and Lyon, forthcoming). But test results indicating new ancestries do not automatically transform existing identities if the individual is not receptive to the idea of that particular transformation, such as by viewing those new ancestries positively, believing that they fit their personality or appearance, or seeing them as offering closure to long-held identity questions. Those who are less receptive tend to reject the results and do not incorporate them into their sense of self. Despite popular beliefs that people tend to privilege scientific or genetic information as more unbiased and factual, this work finds that genetic ancestry information has only a moderate impact on racial identity, well below the impact of other dimensions such as observed race, reflected race, or phenotype.

Different dimensions, different outcomes

Among the important findings from this literature is that using measures of different dimensions of race influences findings on inequality. We have seen this with respect to racial inequalities in health, criminal justice, and socio-economic outcomes. However, the data are not always consistent with regard to which measure reveals the greatest racial disparities in outcomes.

In the health fields, some find that using observed race rather than self-classification can depress estimates of health problems among Native Americans. Many people who self-classify as Native American are classified differently by health professionals – most often as White. Using observed race from administrative records rather than self-identification tends to lower estimates of cancer incidence and injury among Native Americans (Frost, Taylor, and Fries 1992; Sugarman et al. 1993). However, using self-classification may also obscure important aspects of how race contributes to health inequalities, particularly if only one race response is allowed. Many multiracial individuals with Native American and White ancestry choose White when

asked to select a single race, despite health profiles that are more disadvantaged than Whites and more similar to Native Americans overall (Bratter and Gorman 2011).

In studies of health care provision, we might expect observed race to more closely mirror experiences of discrimination in service provision. Yet what little evidence exists is mixed. Observed race reveals greater inequalities in women's health screening than does self-classification; being seen as White is associated with lower rates of pap smear screenings than self-identifying as White (Saperstein 2012). A study of dental outpatients examined the odds of having a root canal treatment rather than tooth extraction using self-classified and observed race, and found that African-Americans were less likely and Asians more likely than Whites to obtain root canal therapy regardless of the race dimension used. But when using self-classification, Hispanics were significantly less likely than Whites to obtain a root canal rather than tooth extraction, while their odds of obtaining a root canal were not significantly different from Whites when using observed race (Boehmer et al. 2002).

Focussing on criminal justice outcomes and potential discrimination that can occur at various levels, observed race appears to be more influential than self-classification. One study found that the odds of young people being arrested are significantly higher if they are perceived as Black by others, even if they do not self-classify as Black (Penner and Saperstein 2015).

With regard to socio-economic outcomes, Saperstein (2006) found that even though levels of inconsistency between observed race and self-classification were small in the population overall, they were significant enough to affect estimates of family income; she found that self-classification revealed greater race gaps in family income than observed race. Yet in another study, observed race revealed greater inequalities in women's family income than did racial self-classification. Being seen as White by others was associated with higher family income than self-identifying as White (Saperstein 2012). This pointed toward the same mechanisms as an earlier study in Brazil that found significantly higher rates of racial income inequality based on observed race than on self-classification. While the gap between Browns (*pardos*) and Blacks varied little based on the race measure, there were significant differences in the income gaps between Whites and Browns. Using observed race, Whites earned 26 Per cent more than Browns, but only 17 Per cent more than Browns using self-classification (Telles and Lim 1998).

In a cross-national study comparing Brazil, Colombia, Mexico, and Peru, Telles (2014) found evidence of stratification by skin colour, particularly in education and occupational status, and argued that self-identification is less reliable for assessing ethnoracial inequality than classification by others and, especially, external evaluation of skin colour. Yet extending this

examination to 19 countries across Latin America and the United States, Bailey, Fialho, and Penner (2016) found considerable variation throughout the region in how skin colour and racial self-classification mapped onto social inequality in household incomes and how each one was mediated by social class. They argue that neither dimension is unilaterally better, but must be examined at the country level.

Thus, while the dimension of race that is used affects many estimates of inequality, it is not always clear which one will best explain the data. One way to approach the dilemma of which measure to use is to follow the theoretical expectations for the particular outcome being studied and the mechanisms expected to influence it. Thus a study focussing particularly on discrimination in the housing market might select observed race, while one focussing on residential decision-making might select racial identity (or its common proxy, self-classification). However, researchers often want to be able to tease apart both of these mechanisms in explaining racial differences in outcomes (suburban residence, for example). In this case, quantitative researchers should include both dimensions in their models. Indeed, Saperstein, Kizer, and Penner (2016) detail different analytical strategies for doing so, ranging from testing specific hypotheses about mechanisms to exploratory analyses. Those that want to explore which dimensions matter most often face challenges in explaining the patterns they find; indeed, an important avenue for future research is to complement the more exploratory studies with theory building and advanced work testing emerging hypotheses.

Other literatures that capture multidimensionality

While a growing scholarship explicitly addresses the multiple dimensions of race, other fairly self-contained literatures can now be situated within a larger framework of multidimensionality, for example research on colourism or phenotype inequalities and discrimination. Skin colour produces social stratification along numerous social outcomes that is distinct from stratification on the basis of racial categorization. Indeed, scholars have found phenotype inequalities within US racial groups where lighter or more European phenotypes are associated with better outcomes in income and wealth (Frank, Akresh, and Lu 2010; Kreisman and Rangel 2014), educational attainment (Branigan et al. 2013; Monk 2014), residential segregation (South, Crowder, and Chavez 2005), health and healthcare (Codina and Montalvo 1994; Gravlee, Dressler, and Bernard 2005; Baker et al. 2010), school suspension (Hannon, DeFina, and Bruch 2013), arrest rates (White 2015), and prison sentence length and time served (Viglione, Hannon, and DeFina 2011). Colour inequalities also persist outside of the United States, with much of the research focussing on Latin America (Telles 2004, 2014; Bailey, Loveman, and Muniz 2013; Bailey, Fialho, and Penner 2016).

This literature fits within a multidimensional framework because an awareness of racial categories is implicit. Scholars typically restrict their analyses to one racial group, usually self-identified; in doing so, they reveal the heterogeneity within racial classifications. The overriding point of the colourism literature is the variation of experience *within* categories as well as between them. This is effectively the same point as showing that, even among people who self-identify the same way, perception by others affects their experience of race and vice versa. All of this scholarship works toward the same goal of illustrating that the experience of race is much more complex than a single, monolithic label. The colourism literature simply does so, most often, while holding other dimensions of race constant.

Studies that examine whether colour or racial categorization matter more for understanding unequal opportunities and outcomes typically find complex interactions between them (Telles 2004, 2014; Ronquillo et al. 2007; Bailey, Fialho, and Penner 2016). Thus while some argue that one should be used in lieu of the other (Banton 2012), the question is not whether colour or racial classification (by oneself or others) tells us more about inequality, but how they both reveal the way that inequalities unfold along many simultaneous dimensions that are all related to how people experience racialized difference.

Another body of literature that captures the multidimensionality of race – albeit sometimes unbeknownst to the researchers – is genetic admixture studies in population genetics and health research. This research relies on the analysis of 'ancestry informative markers' (AIMS), genetic variants whose frequency differs between continental groups. AIMS are identified from 'unadmixed' populations – samples collected from contemporary West Africans, Europeans, or Native Americans, for instance, who are geographically isolated and report homogeneous ancestry. Researchers use computer estimation to identify genetic variants that differ across populations being analysed.

Rather than determining racial ancestry by purely genetic means, this type of analysis relies on existing social understandings of what these populations are to identify the genetic markers that differ most between them. Without an a priori sense of who is West African, European, Native American, and so on, and including comparison samples from groups which are so designated, the analysis software would not be able to divide samples into discrete categories because most human traits are clinal, existing along a gradient of continuous change (Graves 2013). In a study using the three populations mentioned above, researchers have to tell the computer to look for AIMS that will divide the sample into three populations, but they would get different results if they asked it to be divided into four, eight, or twenty populations. In other words, it is because these studies set out to look for discrete, categorical differences that map onto existing social ideas about what the

populations should be that they find them, all the while suggesting that such differences are natural and free of social influence.

Genetic measures of ancestry, then, are not objectively natural but rather are affected by other dimensions of race. We should not be surprised that they overlap with other dimensions such as racial self-classification (Guo et al. 2014) because both reflect the same underlying social categorizations. But what do these measures actually represent and are they analytically useful? When researchers attempt to measure 'genetic ancestry', what they are actually capturing is a probability that the individual and someone in a particular, contemporary racial group share a common ancestor going back many more generations than most family trees extend. But because of how populations change, it is not clear that the common ancestor resembles our contemporary notions of what a 'European' or a 'Native American' is (Duster 2011). These measures are capturing an aspect of biological descent, but not one that informs our understanding of racial ancestry in an analytically meaningful way.

And yet here is another situation where the researchers' attempts to account for the multidimensionality of race enhances our understanding of the mechanisms driving racial inequalities. Several studies that include both measures have found that racial self-classification explains health inequalities better than genetic ancestry. In their study of southeastern Puerto Ricans, Gravlee, Non, and Mulligan (2009) include both measures of observed race and genetic ancestry (ancestry informative markers indicating African ancestry) and discover that observed race (in interaction with socio-economic status), but not genetic ancestry is associated with blood pressure. Perez et al. (2013) include measures of racial self-classification and genetic ancestry (genome-wide European ancestry) to find that self-classification as African-American, but not European genetic ancestry, is associated with lower rates of atrial fibrillation. Similarly, in a study of European-Americans and African-Americans, genetic ancestry does not predict cardiovascular disease better than racial self-classification (Halder et al. 2012). These findings support the arguments of evolutionary biologists and others that the vast majority of racial health disparities are explained by environmental rather than genetic causes (Graves 2013). Thus, it is particularly important for health researchers using these biosocial measures of genetic ancestry to include other dimensions of race such as self-classification or observed race, to avoid misattributions of racial health inequalities to genetic causes.[5]

Situating and advancing the multidimensionality of race

In this final section, I map the relationship between the multidimensionality of race and other processes that contribute to the complexity of how people experience race – namely, racial fluidity and racial boundary change. These

are also lively areas of study, and it enhances scholarship in general to have greater theoretical clarity in which processes are being explored and how they relate to and differ from the others. I also suggest where further research can help us better understand these relationships and the multidimensionality of race on its own.

Racial fluidity refers to fluctuation in one dimension of race as opposed to inconsistency across different dimensions. It is useful to further distinguish between *temporal fluidity*, changes over time within the same context, and *contextual fluidity*, changes across contexts within a fairly limited period of time. Temporal fluidity is of particular interest to psychologists who study racial identity development, particularly during adolescence and young adulthood. But we also see it among adults in longitudinal studies, assuming that the question formats and contexts do not change much from one survey to another (Doyle and Kao 2007; Saperstein and Penner 2012; Liebler et al. 2014). Contextual fluidity includes the different social settings in which a question is asked, such as asking an adolescent to racially self-classify at home and at school (Harris and Sim 2002). It is also what is captured by changes to the questions themselves (Loveman, Muniz, and Bailey 2012) and by observers' characteristics. When we talk about observed race, the specific observer being referenced is part of the context.

As discussed above, each dimension of race is fluid, and this can lead to a lack of clarity in the broader literature between fluidity within one dimension and inconsistency between different dimensions. This distinction is shown in the top-left of Figure 2. Fluidity and multidimensionality are sometimes jointly referred to as 'inconsistency', which serves to highlight that race is not static, but does not help us understand the particular nature of its dynamism.

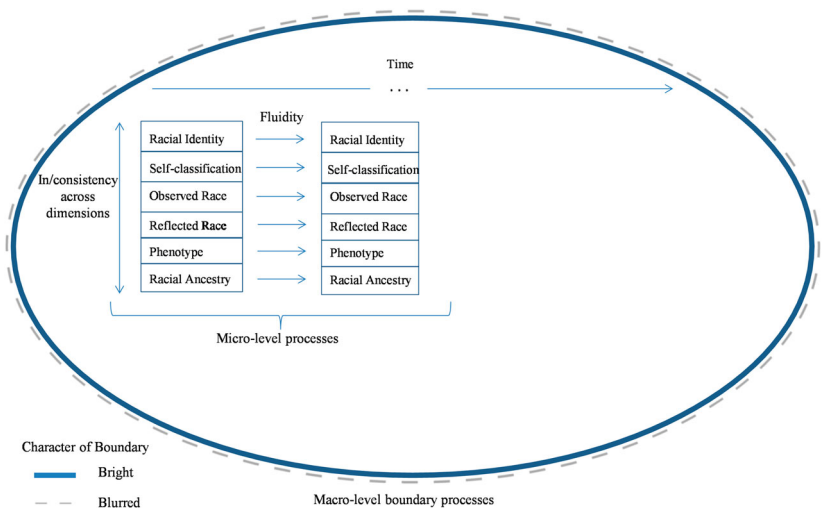

Figure 2. Integrated model of racial multidimensionality, fluidity, and boundary process.

Research on the multiple dimensions of race and on racial fluidity both point to micro-level social processes. Racial boundary change occurs at both the micro- and macro-levels, and the former two processes alone do not determine macro-level boundary change (Wimmer 2008), although they may contribute to it. The micro-level processes we observe when we measure racial fluidity or an inconsistency between racial identity and observed race, for instance, generally occur on a relatively short time frame compared to that of macro-level boundary processes (see Figure 2). These micro-level processes speak to the character of the boundary, particularly whether it is bright or blurred (Alba 2005). Large inconsistencies between race dimensions or substantial fluidity in one dimension both point to a lack of agreement over who falls where, which suggest a blurred boundary. But without looking at whether these inconsistencies or fluidity occur repeatedly over long periods of time, this does not necessarily reveal processes of boundary change. A boundary may be blurred and stably so; this does not mean that it is *blurring*, which suggests change in the nature of the boundary over that longer time frame.

When thinking about how racial boundaries change over time, the issue of the multidimensionality of race is quite central. Macro-level boundary change is arguably most related to observed race – how people are classified by others, and particularly by the most privileged groups. Large numbers of Latinos may classify themselves as White on the census, but it is only when the dominant White group comes to view them this way that we think of the White racial boundary as having expanded. Unfortunately, we do not have good public opinion data over time on how immigrant or ethnic groups are perceived racially. Researchers can consider these shifts historically by examining the public discourse of dominant groups, but the particular nature of how people were racially classified is subject to debate (Fox and Guglielmo 2012).

To advance scholarship on the multiple dimensions of race, and perhaps in the long term on racial boundary change, more work is needed on how dominant groups perceive the race of others – both particular individuals shown in a variety of social contexts and entire ethnic or immigrant groups. Experimental studies that can vary aspects of the context in which individuals are shown (e.g. Freeman et al. 2011) are a promising route to understanding more about how racial attribution is made. Focussing on both individuals and groups would help to distinguish between different boundary processes, such as the repositioning of certain types of individuals through boundary crossing compared to a boundary expanding to incorporate new groups (Wimmer 2008).

There are a number of other promising avenues for future work on the multiple dimensions of race. There is still considerable work to be done in establishing which dimensions of race matter most in explaining different types of

outcomes. Some studies point in different directions, and there is not yet enough research to allow a meta-analysis across samples. At present, we can say which dimensions we expect theoretically to be most appropriate, as I have attempted to do in Figure 1. But we still need empirical work to test whether those hypotheses are supported, and to develop and test additional theories when they are not.

Few studies test the validity of using one dimension of race as a proxy for another. Often proxies are used because of the difficulty of measuring particular dimensions with particular research designs (i.e. racial identity in survey research, observed race in telephone or web-based modes of survey research). Future research should determine how estimates of racial inequalities are affected by using perceived race as a proxy for observed race, or racial classification as a proxy for racial identity.

Of course, future research in these areas depends on having more data sets that measure multiple dimensions of race, which at present are few in number (Bratter et al. 2014). Those who design and implement surveys often need to be convinced of the value of adding questions that capture these multiple dimensions (Saperstein 2013). This is particularly true outside of the United States and Latin America, the regions that have been the focus of most of this research. Although the theoretical distinctions between different dimensions of race are relevant in many parts of the world, more empirical research is needed in Europe, Asia, Australia, and the Middle East, to understand how they affect people's lived experience. In the United States, the number of people who experience race as a number of conflicting dimensions will likely grow, making it more important to understand how the multidimensionality of race affects research estimates, statistics, and the lived experience of race. Yet in all societies, understanding the diverse dimensions of race shows how racial inequalities are constructed in multiple ways – from within and without, by aspects of our experiences, our appearance, our interactions, and our family history, and by no single one of these on its own.

Notes

1. A grammatical note: Throughout this article, I have deliberately capitalized the racial categories "Black" and "White." Common grammatical usage does not capitalize these terms, even though other racial categories such as ''Asian'' and "Native American" are capitalized, as are ethnicities, nationalities, religions, and other social constructions. I believe this grammatical exception reflects a conception of race, and particularly of Whiteness and Blackness, as natural and generic, much like age and sex (also not capitalized). Yet it is clear that the categories 'Black' and 'White' are just as socially constructed as other racial terms. I believe it is appropriate for these labels to take their rightful place in our language with other proper nouns.
2. Although sometimes presented providing an objective measure of skin color, spectrophotometer readings are influenced by background lighting and the part of the

body that is measured, including how tanned that body part is at the moment of the reading (Garcia and Abascal, 2016).

3. Some of these studies attempted to study the 'validity' of race data in vital statistics or medical records without recognizing that the observed classifications represented a different dimension of race than the self-classification data used to verify it (e.g., Baumeister et al. 2000).
4. Campbell and Troyer (2007) focus on Native Americans precisely because of the typically high levels of inconsistency between their self-classification and observed race. Native Americans generally reveal higher levels of racial ambiguity compared to other US groups.
5. Or alternatively, genetic contributions to health can be analysed through a panel of gene sequences (single-nucleotide polymorphisms) that are not associated with efforts to genetically measure continental or racial ancestry.

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