

Isolation by Distance and the Problem of the Twenty-First Century

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ABSTRACT

Isolation-by-distance models are part of the institutional creed of antiracialism used to critique claims of biological race concepts (BRCs). Proponents of antiracialism appeal to isolation-by-distance models to describe patterns of human genetic differences among and between groups as a function of distance. Isolation by distance has been referred to as the pattern that human genetic variation fits, distributing the differences we see as race throughout geographic space as a series of Gaussian gradients. Contemporary scientific critiques of BRCs fuse social constructionist race concepts with a description of the distribution of proportions of human genetic variation in geographic space as a function of distance. These two points are often followed by statements noting that there is only one human race. How these two concepts connect to each other, and whether or not they connect at all, is unclear in both academic and nonacademic spaces. Consequently, scientists and the public lack an understanding of human population structure and its relationships to varying systems of human interactions. This article reviews isolation-by-distance models in population genetics and the use of these models in the modern problem of human difference. The article presents a historical and conceptual review of isolation-by-distance models and contemporary scientific critiques of BRCs, followed by examples of the use of isolation-by-distance models in studies of human genetic variation. To address the shortcomings in the scientific critique of race, the author proposes combining Du Boisian demography with Darwinian evolutionary biology. From a Du Boisian demographic perspective, race is a product of racism, or race/ism, and is a heredity and inheritance system based on rules of *partus sequitur ventrem* and hypodescent. Race marks individuals and groups them to reproduce unequal relationships into which Europeans co-opted them. This synthesis propounds a new racial formation theory to understand the more general consequences of racism on genes and health outcomes.

The greatest difficulty we face is first of all to excavate our actual history.

—James Baldwin

Contrary to what you may have heard or learned, the past is not done and it is not over, it's still in process, which is another way of saying that when it's critiqued, analyzed, it yields new information about itself.

—Toni Morrison

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[Du Bois] augments his critique of biological definitions of race with a materialist explanation for the existence of race. Central to this explanation is his analysis of white labor and its collusion with capital.

—Joel Olson

The essential nature of the Darwinian revolution was neither the introduction of evolutionism as a world view (since historically that is not the case) nor the emphasis on natural selection as the main motive force in evolution (since empirically that may not be the case), but rather the replacement of a metaphysical view of variation among organisms by a materialistic view.

—Richard Lewontin

The problem of the 21st century is the same as the 20th century: the color line. The correlations between an index of phenotypes and power still have a major impact on the health, well-being, and life outcomes of individuals in the contemporary American settler state. Over 50 years after the release and then revision of the UNESCO statement on race, questions regarding the correlations between inequality and race are still being asked by geneticists and sociologists alike (Byrd and Best 2016). Since institutions like UNESCO, the American Association of Physical Anthropology, and the American Association of Anthropology have all made statements against the use of race as the cause of inequality, claims that there is some genetic unit behind sociological trends have all but disappeared. Proponents of biological race concepts (BRCs) have moved away from denying social constructionism and have instead used racial identity as a stand-in for biological race in studies of human genetics (Byrd and Best 2016). While variation is the stuff of evolution, the matter of anthropological classifications of racial difference is not evolutionary at all. In attempts to reject claims of the existence of biological race, scholars have looked to human genetic population structure and patterns of variation to refute the idea that race is biological. Part of this denial of discontinuous patterns of human genetic variation that would justify the use of BRCs is an appeal to isolation-by-distance models.

In this article, I demonstrate that claims separating race and racism from genetics in an uncritical way hold underlying assumptions that erases the very history we seek to understand and treats human politics as ahistorical. I review examples of the uses of isolation-by-distance models in critiques of biological race and then demonstrate that

no ahistorical and apolitical account of race and racism at any level (genetic included) is sufficient or even useful. I focus on appeals to isolation by distance because the problem illustrates the difficulty we have linking evolution to people. I then draw on the work of W. E. B. Du Bois that allows for a critical historiography of race that takes seriously the ways in which politics structures human ecology and thus human biology. One of the main reasons I look to Du Bois's work for the methodological framework is that his analysis is grounded in an analysis of Western colonialism. In other words, Du Bois understood the color line as a colonial invention. Thus, I discuss the context of transatlantic slave trade, a process that depopulated one continent for the purpose of colonizing another. The making of blackness entails the displacement and dispossession of Indigenous peoples for the purpose of doing the same thing on another continent. Also, Du Bois's work should be seen through the lens of his developed thought throughout his career. As a Pan-Africanist, Du Bois was very much concerned with decolonization, and his work is central to decolonial theory. I take a Du Boisian stance that understands race as a distinction reproduced in service to generating racialized and racist relations and doctrines. In a Du Boisian view, racialization is the social reproduction of racialized distinctions motivated by enactments of political control. A Du Boisian theory of the race concept models race as the social problem of racism, a hereditary system serving the reproduction of whiteness and empire. Racialized distinctions are symptomatic of racism; thus, racism is the etiological foundation of the social construction of race (Du Bois 1898, [1935] 1998; Olson 2005; Roberts 2011; Wolfe 2016).

Discussions about the relationships among race, racism, biology, and genetics are rife with

reactive, though well-intended, arguments against BRCs. Despite the popularity of social constructionist race concepts (SCRCs), human genetics remains actively racialized by experts and the public. The scientific critique and SCRCs have yet to unpack what race is, what biology is, what makes them distinct from one another, and how they interact. The scientific critique of BRCs rests on the argument that race and racism have nothing to do with biology, or at least genetics (Gravlee 2009). While the mainline critique makes sense on its surface, beneath it lies a theoretical gap that weakens our understanding of the processes behind the biological consequences of race and racism, if race is truly not biological. Though there is work discussing how race becomes biology (Gravlee 2009), contemporary genetics and biology does not address how we see racial patterns in biological and genetic data if race is not genetic. If race and racism have biological consequences, are there genetic consequences? If race is not biological or genetic, why do we see, at least superficially, what appears to be racial patterns in human genetic and phenotypic variation?

SCRCs understand race as a social phenomenon that symbolizes social conflict in reference to human bodies (Cornell and Hartman 2007; Omi and Winant 2015). Most important, SCRCs hold that, while race is ocular and corporeal, race is not biology. Race is then defined in negation, as what it is not rather than what it is. The problem that SCRC proponents appear to have with BRCs is the use of biology and genetics as the origin of and justification for racial stratification. As Yudell and colleagues (2016:564) noted in a *Science* essay titled "Taking race out of human genetics," "Several meetings and journal articles have called attention to a host of issues, which include a proposed shift to 'focus' on racism (i.e., social relations) rather than race (i.e., supposed innate biologic predisposition) in the interpretation of racial/ethnic 'effects.'" For Yudell et al., researchers should be concerned with racism, not race. I would caution that suggesting taking race out of human genetics research implies that race and racism are distinct entities, bearing similarities with a Boasian understanding of race that sees racism as cultural conflict between racial groups (Visweswaran 1998; Roseman 2014; Yudell et al. 2016). This is an example of antiracism in its focus on racism while opposing racial categories.

Both defining race as what it is not and separating race from racism leaves us with an understanding of social constructionism that lacks historical grounding.

On the other hand, BRCs hold that there are differences between humans as a result of separate evolutionary histories producing subspecies referred to as races. These concepts are commonly used to justify social and political inequality and differences in culture, mental ability, and temperament in racist discourses. Some scholars hold that they can believe that racial differences exist and are worth further study while not believing those differences justify racism. Sociologist Catherine Bliss (2012:15) refers to this perspective as antiracist racialism, or the idea that while distinct races exist, those racial groups are not ranked. The critique of BRCs maintains that the extent to which racialized distinctions are biological is entirely a matter of the environment acting on individuals throughout their life course (Gravlee 2009).

One of the popular arguments against BRCs treats race and genetics as separate issues entirely. This scientific critique of biological race often achieves the separation of genetics from race by pointing to isolation by distance to explain smooth clines of variation through geographic space claimed to characterize human variation worldwide. *Isolation by distance* refers to a series of models that propose that the spatial distribution of genetic variation within local areas and over geographic distance is structured by a trade-off between two evolutionary forces: random genetic drift and gene flow (Wright 1943; Malécot 1948; Kimura and Weiss 1964; Barbujani 1987; Slatkin 1993; Ishida 2009; Meirmans 2012). Random genetic drift is a process involving changes in allele frequency because of the random sampling of gametes from generation to generation in a finite population with no tendency for the allele frequencies to increase or decrease. Random genetic drift tends to decrease the amount of genetic variation in a population and causes random genetic differences to build up between populations. On the other hand, gene flow is the movement of individuals between groups that results in the exchange of gametes, which homogenizes populations. The trade-off is between the local differentiating effects of random genetic drift and local homogenizing effects of gene flow at the species level. The process will produce a

pattern where genetic similarity decays with distance. At some distance, genetic differentiation is random. Sewall Wright's (1943) theory of isolation by distance describes the process of local interactions among individuals, including the migration of individuals in and out of the population and the effects of random genetic drift. Wright's (1943) model describes a process where the movement of organisms is modeled across a boundless landscape as a Gaussian distribution where they are more likely to mate with an individual that is closest to them rather than individuals that are far away. The dynamics of the interactions among individuals with respect to random genetic drift and gene flow in a local area can result in differentiated subpopulations where more distant populations may become differentiated as a function of distance.

Isolation-by-distance models are used to explain the purported continuous worldwide distribution of genetic and phenotypic variation, without sharp geographic discontinuities. If differences are continuously distributed, then there are no distinctly bounded genetic entities that would qualify as biological races. Thus, race does not correspond to global patterns of human genetic variation. A set of populations undergoing isolation by distance will reach an equilibrium where the differentiating effects of drift and homogenizing effects of gene flow will (along with a "systemic pressure") cancel each other, resulting in a stable equilibrium of differentiation among groups and variation within groups that does not change through time. If populations have been undergoing isolation by distance for some time, variation within and among a group of populations is at equilibrium. Nothing changes; thus, no record of past events can be found from inspection of genomic variation. Major past events like the massive depopulation of Western Africa due to the transoceanic slave trade and the genocide and displacement of the Indigenous peoples of Turtle Island are assumed to have left no record of their occurrence. The distribution of within- and among-group differences in the present is equivalent to any time in the past and at any point in the future for as long as isolation by distance has or will hold. Isolation-by-distance models obscure the dynamics of history through time. In effect, they imply that human genetic variation has not changed at all and is practically the same as it ever was.

Despite the use of isolation-by-distance models to combat typological race thinking in favor of populational thinking, the connections between biology and race remain unclear and contested (Visweswaran 1998; Gannett 2001). As a result, the consequences of the processes of racism on evolutionary demographic parameters go undiscussed, while discussions about patterns reign supreme (Templeton 2013, 2016; Fuentes 2014; Raff 2014; Baharain et al. 2016). The literature talks about these processes in anodyne ways, with respect to mating, and do not critique race and racism (Baharain et al. 2016; Gross 2018). As a result, this work has not had an effect on how people talk about race, especially since many are still talking about race as if they are talking about ancient evolved groups. The notion that racism can have multigenerational biological effects at all levels of organization, epigenetic and genetic included, is missing from the social science critique of race. Consequently, mainstream SCRCs focus on the changing meanings of the marks of race. In contrast, contemporary biological sciences claim that phenotypic and genetic differences are a function of geographic distance and/or cultural isolation. Most responses to arguments for BRCs muster results from studies of human variation to debunk claims of the existence of ancient evolved human races. These hypothetical ancient races, however, have nothing to do with the ways in which racism has shaped humans in the modern world and thus little to do with the way meaning is attached to biology in the here and now.

How Well Do Critiques of BRCs Using Isolation by Distance Fare?

When referring to the recently shared population-level ancestry of humans, social and natural scientists alike typically cast it in terms of a scenario positing that much of human genetic variation in the genetic now is recently derived from populations in Africa tens or hundreds of thousands of years ago and arrived in the remainder of the world through a series of population-level migratory events (Ramachandran et al. 2005; DeGiorgio et al. 2009; Weiss and Long 2009; Roseman 2014; Hunley et al. 2016). Typifying these responses is an appeal to recent shared population-level ancestry for the bulk of human variation, coupled with a claim that isolation by distance is the prevailing process governing variation (Templeton 2013, 2016;

Fuentes 2014; Raff 2014; Baharain et al. 2016). This contradiction lies in references to what human genetic variation was like 500–600 years ago as a description of what human variation is like now, along with appeals to nonequilibrium and equilibrium processes at the same time. Appeals to isolation by distance are made in professional conversations when combating claims of biological races. The simultaneous appeal to isolation by distance and an out-of-Africa event as the primary causes of human genetic variation shows that we have an underlying conceptual problem when critiquing claims of biological race as they are presented to us by actual racists.

The scientific critique of race makes statements about ancient population movements while ignoring the many population movements that have come to shape the last few centuries. I draw the following paired statements from responses to public science writer Nicholas Wade's book *A Troublesome Inheritance* (2014). I selected responses from scholars across a range of biologically oriented disciplines to substantiate this and other points.

Critiques of BRCs tend to reference human genetic variation in the past and the high amount of genetic variation found in populations in Africa as evidence to validate their counterargument (Fuentes 2014; Raff 2014; Yoder 2014). Geneticist Jeremy Yoder (2014) appealed to isolation by distance in his critique of Wade when explaining the relationship between geographic and genetic distances. Yoder's appeal to an equilibrium dynamic follows his discussion of a series of eventful nonequilibrium dynamics. After noting the recent African origin of humans and the large amount of genetic diversity the continent contains, Yoder stated,

This is because of isolation-by-distance, a fundamental process of population genetics. Populations separated by sufficient geographic distance will be genetically different even if they are connected by migrants and interbreeding. Before the advent of planes, trains, and automobiles, a genetic variant that first appeared in France could, eventually, make its way to China because there were human populations all the way between those two points—but because that could take many generations, we'd expect that variant to be more common in France than China.

For Yoder, gene flow is the process connecting groups to one another and thus the reason for smooth clinally distributed allele frequency differences across space in the human species. He deploys a claim about a process (isolation by distance) in the context of a pattern (most variation being in Africa). Yoder thus appeals to isolation by distance while referencing a series of eventful nonequilibrium dynamics: "As the ancestral home of modern humans, Africa contains more genetic diversity than any other continent."

This pair of claims—*isolation by distance and recent African influence on worldwide variation*—is a contradiction echoed in anthropologist Agustin Fuentes's (2014) critique of Wade's book. This statement of a pattern of isolation by distance was accompanied by a statement about the historical importance of events involving the African origin of the human species: "We know that most variation is due to gene flow and genetic drift, so the farther apart two populations are, the more likely they are to have more differences (isolation by distance)" (217). This is followed by Fuentes pointing out the incompleteness of Wade's accounts of evolutionary events: "His argument is that our species emerged in Africa about 200,000 years ago (which is true) and that between 120,000 and 50,000 years a few small groups left Africa, some heading to Europe and some to East Asia (accurate but woefully incomplete)" (217). In one instance we have a statement about the predominance of isolation by distance, and in the other, agreement with historical contingencies and an eventful model.

Eventful accounts of human demographic history across the globe featuring historically contingent events, such as the recent African origin and subsequent worldwide dispersal of humans, are ways of looking at evolution that are entirely different from equilibrium models of evolution such as isolation by distance. A process of isolation by distance does not produce a unique characteristic pattern after a range expansion until after geographically restricted gene flow and random genetic drift have been operating on the population for a considerable amount of time (Malécot 1948; Kimura and Weiss 1964; Slatkin 1993). Most important, isolation by distance would erase all evidence of any range expansion, so one would not know that the event ever happened in the

first place, and if the event did happen, it does not matter. Other eventful histories can produce relationships between genetic variation and space that appear to fit the data much better than an isolation-by-distance model (Hunley et al. 2016; Meirmans 2012; Ramachandran et al. 2005).

Ignoring History

Appeals to isolation by distance when describing human variation successfully allows the embrace of the nonexistence of biological races but does so while simultaneously eliding the last ~600 years of history. The use of isolation-by-distance models in studies of human population structure omits the evidence of human histories given that an equilibrium would erase any signature of population-level events. This omission has left a chasm between both sides of the scientific critique of biological race. The omission occurs in two ways: through the assumption of the genetic now (Roseman 2014), where statements about human variation are made as if approximately 600 years ago were now (t_0); and by omitting politics from isolation-by-distance models. Both of these omissions obscure what human genetic variation is like today and the effect that such dynamics as the rise of Euro-Western colonialism have had on human genetic variation.

When scholars from the social sciences and humanities do cite population genetics, they tend to emphasize gradients in space and the unity of humans through gene flow. This creates two problems: equilibrium, as discussed above, and the genetic now, “conceived of as being sometime in the mid-15th century before Transoceanic European conquest and colonialism” (Roseman 2014:236). The genetic now functions as what Kim TallBear (2013) called a pinpoint in time and space of biogeographic originality. This belief in biogeographic originality is antithetical to the fundamental principle of evolution: change over time (TallBear 2013; Roseman 2014).

Population genetics data are structured in a way to ignore the last few hundred years. For instance, geneticist Luigi Luca Cavalli-Sforza (2005:334) frankly discussed the biased distribution of genomic data from particular populations in the Human Genome Diversity Project (HGDP):

All five continents are represented in the collection, and all samples are from populations of anthropological interest—that is, those that were in place before the great diasporas started in the fifteenth and sixteenth centuries, when navigation of the oceans became possible. This choice was important, because these diasporas caused significant population admixtures, especially in the Americas but also in other continents. Only genetic knowledge of the original populations that contributed to these admixtures can disentangle the various genetic complexities that resulted, and the HGDP fulfills these criteria.

One of the greatest tricks of race and racism is how it hides in time. The baseline for the questions we ask about human variation comprises what human variation may have been a few hundred years ago combined with a mishmash of different techniques ranging from the historical and linguistic to the archaeological and genetic. This use of the genetic now is an admission that the spatial distribution of human genetic variation has been radically altered over the last several hundred years.

Models of human genetic variation thus ignore the last several hundred years, during which large changes in the spatial distribution of human variation have taken place because of changes to the spatial scales and spatial behavior of the politics of governing and/or exploiting peoples and of resistance to being governed/exploited. More recently published data sets spend much effort distinguishing admixed and nonadmixed populations. The entire enterprise is directed toward a reconstruction of what human variation was like *some time ago*. There are good reasons to think that they are reasonably successful and that the result serves as an important guide to understanding variation today. The entire exercise is directed toward finding a way to ignore the profoundly disruptive effects that conquest, genocidal, and settler-colonial processes have wrought on the world at many levels. More bluntly, writing race and racism out of human history is a central preoccupation of human genetics.

Ignoring Politics

Population genetics models are concerned with the dynamics of the relationships between organisms and groups of organisms. In this way, population genetics models are political in the most generic sense. But at equilibrium, there are no population-level events and thus no political dynamics. Instead, under isolation by distance we have an individualistic model in the extreme. Ultimately, isolation by distance relates a model of the lives of organisms at the individual level—their births, movements across the landscape, interactions, reproduction, and deaths—to the state of genetic variation. Under isolation by distance, individuals roam the landscape without belonging to any groups, with little to no interaction. Even the politics of choosing a mate occurs randomly, as if sociopolitical phenomena have no bearing on reproduction.

By way of example, consider the life course of individual organisms on Wright's landscape. From the location of their birth they wander in a random direction before randomly encountering a mate and giving birth to one or more offspring in their new location before dying. Their movements are limited only by the speed at which they traverse the landscape. Nothing other than basic geography influences the movement of individuals. There are no walls, guarded borders, or militaristic state police to pen them in or out. No sociopolitical forces bear any implications on their reproductive choices or outcomes. In effect, under isolation by distance, organisms live out their lives alienated from the very politics that shapes our everyday lives. Thus, the model implied by isolation by distance lacks any human social, cultural, and economic effect, the very elements crucial to the sociological component of the scientific critique of race and racism.

Instead of the logic of continuous space, with individuals distributed uniformly, consider some of the ways in which humans act that skew genetic variation away from basic geography. In *Wretched of the Earth*, Frantz Fanon (2004) discusses the compartmentalization of cities into two sectors: that of the colonizers and that of the colonized. Such physical divisions reflected social divisions, but ones distinctly different from previous divisions of ancient cities based on large developments built for gods (Nightengale 2012). Quarters were built and

developed just for European foreigners, with walls built around them, separating them from the native quarters supervised by trusted natives who assisted colonists in maintaining order (Nightengale 2012; Fanon 2004). Whether through zoological compartmentalization between the colonizer's sector and the native quarters or through the sundown ordinances that barred Africans and Indigenous peoples from particular regions at night, the social divisions on the land and of the land impacted whose gametes were likely to meet.

Moreover, other events, practices, schemas, and the resources to enact them play a role in regulating reproduction beyond dispersal and distance. The hereditary nature of slavery (*partus sequitur ventrem*) and its linkage to Indigenous dispossession reveal a colonial breeding program that has structured the human population for hundreds of years (Wolfe 2016). Chattel status operated through the juridical rule of *partus sequitur ventrum*, meaning “the child follows the status of the mother” (Sublette and Sublette 2016:3). Human beings were traded with no recognition of family, not allowed to marry, raped, beaten, murdered, wiped out, and commercially bred like cattle (Du Bois [1935] 1998). Antimiscegenation laws, sundown towns, \$100 fines for trying to move to a white block while black in Baltimore in 1910, walls separating a black neighborhood from a white one to raise the property values of the white neighborhood, redlining, and militant policing—all are multiple levels of regulation of the reproduction of human beings, as well as committing violences against them. Thus, while dispersal distance plays a role, higher-level processes that are the consequence of events motivated by colonial capitalism also have ensured that those gametes would never meet, no matter how physically close.

Isolation-by-distance models do not help us understand human genetic variation today, even if it was informative ~600 years ago, because racism structures much among- and within-group genetic variation. Isolation-by-distance models and antiracist approaches write racism out of our understanding of humans today. Refuting BRCs with statements about the proportion of alleles within and between groups is an exercise in formal logic, “with no point of contact with the contingent world” (Lewontin 1974:11). Both critics and proponents of BRCs omit the contingent,

relational histories of coordinated and uncoordinated human action over time. Thus, once again, the entire exercise is directed toward finding a way to ignore the profoundly disruptive effects that conquest, genocidal, and settler-colonial processes have wrought on the world at many levels. Power, inequality, identity, economy, law, and any kind of complex demography are excluded. The organism is alienated from politics as if genetic drift does not describe the likely consequences of human interactions and such events as genocide, murder, and mass species extinction. The changing of relations among groups of organisms (however defined) is a consequence of a scaling up of distributions of resources, ideas, and cultures. As a result, the probability of interactions increases or decreases given the conditions generated by contingent events, given past states. These ever-changing relations point to the primacy of transportation and technology in explaining historical, contemporary, possible and probable future relations and conditions. The phenotypic and genetic variation we see in contemporary populations is not a function of geographic distance but, rather, a culmination of events, conditions, and actions given all previous states.

Du Bois, Politics, and Biology

Rather than geographic distance alone, politics also divides human organisms. Even geographic space is shaped by political dynamics. Sociopolitical dynamics, therefore, shape genetic variation. Isolation-by-distance models do us no good with respect to understanding the evolutionary implications of coordinated and uncoordinated human sociopolitical dynamics. Contemporary definitions of race rest on timeless models that start with the biogeographical pinpoint of Euro-Western modernity. As a result, we cannot adequately theorize race and racism with a critique that omits the very events and group interactions that came to define what we know of as the social constructions of race and racism.

Work that defines race as ocular, corporeal, and phenomic (Omi and Winant 2015) must move beyond treating biology as no more than mere analogy, if we are to come to understand human biology without reproducing racialized distinctions

and doctrines. An analogy, as noted by Du Bois (2000:40), “implies knowledge but does not supply it—[it] suggests but does not furnish lines of investigation.” The scientific critiques of race and racism that dominate contemporary discourse are concerned with ensuring that race is not biological but somehow corporeal. For instance, if we take a look at contemporary social constructionist definitions of race, we see that scholars define race in negation, as not biology (Omi and Winant 2015). If we are to have a full understanding of the scope of the effects of this hegemonic inheritance system, theories of race and racism require the insight of evolutionary biology. Evolutionary biology merged with Du Boisian studies of race and racism can demonstrate an understanding of human biology beyond racialized distinctions. This remains one of the great intellectual challenges that Du Bois spoke of in his 1904 essay “Sociology Hesitant”: “Some such reconciliation of the two great wings of Science must come. It is inconceivable that the present dualism in classified knowledge can continue much longer. Mutual understanding must come under a working hypothesis which will give scope to Historian as well as Biologist” (Du Bois 2000:43–44). The banishing of biology from the study of race and racism left a theory of bodies as an index of phenotypes with changing racial identities. There’s no evolutionary biology in these discussions; all we are told is race isn’t biology, never how or what the relationship is or how it is mediated. Biology, genetics, nature, and evolution have been signified as dangerous fields that misuse race in racist ways. As Omi and Winant (2015) point out in *Racial Formation in the United States*, the body had been all but removed from the study of race and racism. For example, in their first chapter, Omi and Winant attribute social Darwinism to Charles Darwin. According to popular beliefs among the public and social scientists, Darwin’s greatest contributions are “survival of the fittest” (which is actually the work of sociologist Herbert Spencer) and his work on basic models of natural selection. Many scholars repeat this misjudgment with evolution theory, assuming a stadial developmental process of progress generated by competition with respect to overall resources. They mistakenly credit Darwin with creating a perspective that not only existed before him but also was

exactly what his work methodically critiqued and replaced.

Developing a working hypothesis that gives scope to sociologists, historians, and biologists alike requires that we combine the sociohistorical approach of Du Bois with Darwinian evolutionary biology, introducing Du Bois's analysis of social problems to an evolutionary framework within which human biologists can better understand human variation (Lewontin and Levins 2007). A Du Boisian study of social problems analyzes social problems from within their peculiar social and environmental contexts (Du Bois 1898). Such a sociohistorical approach provides biologists with a theoretical framework from which to engage in a contextually accurate telling of the story of human variation without making one feedback/interaction more fundamental than another, because these phenomena have their context in relation to one another.

A Du Boisian theory of the race concept argues that the salience of race depends on the analytical power of racism. In this view, racialization is the social reproduction of racialized distinctions or, more aptly put, race in action. Racialized groups are produced when people enact political control onto others in the forms of economic exploitation, dispossession, displacement, genocide, and chattel slavery. Here, individuals' racial identity is a culmination of the interactions between them racializing themselves (self- or internalized racialization) and being racialized by others (externalized racialization). For example, the Native American race formed over several generations during which various groups with no notion of homogeneous kinship were united by the experience of and struggles against Euro-Western settler colonialism. As TallBear (2013) noted, without settlers, there are no Indians or Natives. The "Native American" race was created in opposition to European settlers. Similarly, blackness formed over intergenerational scales of time during which various groups became an undifferentiated mass through the shared history of displacement and chattel slavery (Du Bois 1898, [1935] 1998; TallBear 2013).

Race, as a social problem, finds its explanatory power in racism. The utility of race is its stabilization of colonial and imperial power amassed through historical and ongoing displacement and dispossession in an expanding global fashion. As

Dorothy Roberts (2011:4) points out, the first step of dividing humans into categories is a political practice. Liberal niceties and intentions are no match for state-sanctioned racialization of genetics and biology, or the continued use of biological concepts of race in the natural, social, and applied sciences. Race continues to have a grand utility because it serves social, political, and economic interests of dominant groups and historical and contemporary actors (individuals and institutions). Race is a product of racism, always (Du Bois 1898, [1935] 1998; Roberts 2011; Wolfe 2016).

Race, then, is racism, which I refer to as *race/ism*, is a political process of marking individuals and groups for the regulation of reproduction and inheritance of sociopolitical status. Race, as a set of classificatory regimes and practices, is not limited to its doctrines that maintain group-specific modes of colonial domination (Du Bois 1898, [1935] 1998; Roberts 2011; Wolfe 2016). How we collectively use race academically, publicly, and privately fails to communicate this meaning. Highlighting the relationship between race and racism requires a racial formation theory that does not legitimate the Euro-Western colonial narrative of "we made this land" (Fanon 2004). Mainstream racial formation theory lacks a dynamic and contingent historical analysis. A settler-colonial consciousness troubles the categorizations of problematic beings. The inequities that we see are reproduced, and race is a colonial doctrine formed to justify and normalize those exploitative relations.

Race/ism is the hegemonic managing of bodies. How humans treat one another is a dynamic ecological system and should be analyzed as such. Such an approach entails tracing genealogies of power, relationships, and social practices on the micro- and macrolevels of human interactions. To produce knowledge about a human population is to tell a story, encompassing family, relations, social structures, and ultimately origin stories. How, then, do we bring the context of human history into how we model human genetic variation? This question guides us to the importance of the context and contingency of human history, which reveals that we are studying the more general consequences of racism on human variation. Coordinated and uncoordinated human actions and relations (internally, interpersonally, institutionally, and systemically) shape the very conditions in which we live, develop,

interact, and eventually die. There were and are multiple strategies for regulating inheritance and the reproduction of human beings. Humans were traded with no recognition of family, not allowed to marry, sexually assaulted, beaten, murdered, and commercially bred (Du Bois [1935] 1998; Robinson [1983] 2000; Wolfe 2016; Sublette and Sublette 2016), with such strategies as antimiscegenation laws, sundown towns, redlining, food apartheid, prison pipelines, and state-sanctioned violence. The consequences of the social reproduction of such practices are reflected in the differential distribution of resources, morbidity, and mortality. If we are sorting people who are born into groups, then variation today is a product of racism rather than a basis for race. Thus, human variation is a product of coordinated and uncoordinated collective human actions, not a teleological phenomenon determining someone's destiny. Without an understanding of racism, population genetics has an incomplete understanding of genetic variation.

How, then, do we incorporate a science of human actions into human evolutionary biology? This is where the sociological imagination and study of social problems enter. How do we go about bridging the study of social problems with the study of human variation? Doing such work means that we need an account of how bodies get to where they are, how genes change and get to different places. Allowing our analysis to be informed by human actions enables us to incorporate the historical dynamics of race/ism, providing context for migration and movement. A sociological imagination bridges individual biography with the general forces of history, allowing a dynamic understanding of individual troubles and social problems, thus allowing an understanding of the relationships between the individual self and society (Wright Mills 1959).

Appealing to biogeographical pinpoints of originality treats bodies as static entities trapped in space and time to reproduce racial formalisms. A dynamic account of bodies can be achieved by incorporating a theory of change over time at multiple levels of aggregation (genes, whole organisms, individuals, groups, populations, etc.). Such a theory would then be able to attack what Du Bois (2000:43) called "the great central problem of scientific investigation today—the relation of the science of man and physical science." We can begin

with a materialist, nonteleological, historical theory of the social constructions of race and racism; such a theory can account for the dynamic events central to the formation of the biogeographical pinpoints of originality. The method that gives us access to developing such a theory is what I call *eventful temporality*, a historical method designed to analyze the dynamic, contingent, and chanceful relationships among conditions, actors, events, and human practice. Eventful temporality can be best understood by Du Bois's (1898:3) definition of social problems as "ever a relation between conditions and action, and as conditions and actions vary and change from group to group from time to time and from, place to place, so social problems change, develop and grow." Du Bois follows this definition with a materialist historical etiology of the racialized distinction of the Negro: "The Negro problem . . . is not one problem, but rather a plexus of social problems, some new, some old, some simple, some complex, and these problems have their one bond of unity in the act that they group themselves about those Africans who two centuries of slave trading brought into the land" (3). This crucial act that Du Bois spoke of is a dynamic series of events, happenings, and the collective actions of humans. Every human action involved in the depopulation of the African continent, to capture, enslave, and trade Africans across the seas, is a materialist concrete relation that contributed to producing the conditions of exploitation that came to be the marks of what we today know of as race.

What human evolutionary genetics needs is an account of the stories of how bodies came to be who they are and where they are and how that present came to be. A sociological understanding of lives and deaths in their respective time, space, and place can provide further context to Darwinian evolutionary thinking, which involves what Richard Levins and Richard Lewontin (1985:3) called the rejection of "platonic ideals . . . substitut[ing] for them *real forces among real existing objects*." The real forces that they speak of are forces like that of settler colonialism and imperialism and their consequences among real existing lives. Such forces during the last ~600 years include agricultural transitions, secondary populational migration events, mass births (e.g., slave breeding), mass deaths (e.g., genocide, chattel enslavement, and settlement), and mass extinction of nonhuman life. These forces

are how today came to be and are central to the historical science of evolutionary genetics.

Describing Human Genetic Variation at t_0

Human genetic variation in contemporary populations fits elaborate models of common ancestry, gene flow, and admixture among groups better than it fits both the ancient races model and the isolation-by-distance model (Weiss and Long 2009; Roseman 2014). In “The Apportionment of Human Diversity Revisited” Keith Hunley and colleagues (2016) compared the goodness of fit and lack of fit of two models, the equal and independent divergence model (a simple tree model) and the rooted tree (RT) model, by measuring their likelihood ratio statistics relative to their degrees of freedom. Compared to the human genetic data, the RT model had a better fit. Most important, the RT model revealed that African populations are not monophyletic, that regional populations outside of Africa are nested inside one another, and that most of them are not descended from a common evolutionary ancestor or ancestral group that is not shared with any other group (Hunley et al. 2016:567). These results are consistent with other findings that also note a complex hierarchical structure consistent with a model of “nested regional bottlenecks and serial population fissions within regions,” not an isolation-by-distance model (Hunley et al. 2009:43).

The shortcoming of statements about the apportionment of human genetic diversity is that they assume that biological races actually exist. In this case, F_{ST} values are used to describe human genetic variation between three ancient races. It is important to note that populations are made and are context dependent, along with the statistics used to describe them (Gannett 2001). Meaningful statistics are derived from meaningful comparisons between meaningful units. Using racial designation to apportion variation implies that one thinks biological races exist in the first place and that, ultimately, we are just arguing about the importance of the statistical differences between these races that we say do not exist (Roseman 2014). Without assuming a model of biological races, there is no evolutionary interpretation for the F_{ST} statistic (Long and Kittles 2009; Roseman 2014).

Many studies on human genetic data argue that such findings provide more than enough proof to reject the use of BRCs to describe humans (Lewontin 1974; Ramachandran et al. 2005; Hunley et al. 2009, 2016). While these models do a better job describing human genetic variation than simple race or isolation-by-distance models, the role of human interactions on individual, group, regional, and global scales is still out of grasp. The explanatory power required is found in the context of the contingent dynamics of the social reproduction of racialized distinctions, thus racism. Understanding why racialized distinctions are correlated with genes requires that we begin to analyze them as the units of a hegemonic hereditary system. This would then draw our attention to the major demographic events of the last six centuries or so when we speak of contemporary human genetic variation. How did the advent and reproduction of racialized distinctions and discourses effect colonized peoples? What roles do racialized practices play in shaping population structure?

Conclusion

What happens if we discuss human biology without projecting racialized doctrines as destiny? Racialized distinctions are not destiny unless they are made to be so through the command of resources and structures of human action. Current models fail to incorporate connected sociological analyses of coordinated and uncoordinated human actions, resulting in an incomplete understanding of human genetic variation beyond the colonial calculus we inscribe upon it. Coloniality’s framing of philosophies of human biology requires that we revise our understanding of human biology and investigate the ways social inequalities have had an impact on human variation. That means that our understandings of human biology must match how humans have lived.

When we look for the causes of human genetic variation, we are tracing not racial groups but racism itself. The variation we see between racialized groups is the result of human demographic events and the official institutional and interpersonal management of the breeding of colonized subjects. We are looking at the effects a political, zoological typology has had that fashioned the world after

a particular kind of human body defined by its hierarchical ordering in reference to other human bodies. We need to understand how a system of hegemonic heredity practices can affect patterns of human variation. All individuals get their genes from their parents, and parentage is mediated by racialization, since racism governs reproduction. Thus, genetic differences between racialized groups can occur even though racialized distinctions are socially constructed. There are material consequences for human social divisions, and we need an antiracist conception of human biology to help us understand the underlying processes involved.

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