

CHAPTER 3

“Them That Has, Gets:” Self-Reinforcing Feedback Loops¹

Daria Roithmayr

This draft chapter is part of a larger book project entitled “Locked In: A Market Lock-In Model of Racial Inequality.” The book develops a theoretical model to explain why racial disparities have persisted as long as they have, even after the enactment of civil rights laws that prohibit intentional discrimination. The lock-in model draws on recent theoretical work from antitrust and complex systems theory that explains how market monopolies reproduce themselves over time, even after the monopolist has stopped engaging in intentional, anti-competitive activity.

Applied to race, the lock-in model proposes that, just as Microsoft’s monopoly has persisted long after the end of its illegal conduct, so too can white “racial monopoly” persist even in the absence of intentional discrimination. In outlining the model, the book advances three central and related arguments. First, during the era of slavery and Jim Crow, whites formed racial cartels (like white neighborhood homeowners’ associations and whites-only trade unions) to anti-competitively exclude blacks and Latinos from many areas of economic, political and social life. Owing to this anti-competitive conduct, whites generated a significant monopoly surplus in housing, education, employment and political markets.

Second, this monopoly surplus now structurally reproduces itself over time by way of institutional “feedback loops” that translate early advantage into self-reinforcing advantage. Race-neutral processes in the family, in social networks, and in neighborhoods and workplaces reproduce white advantage even absent intentional discrimination. For example, the practice of relying on local property taxes for public school financing reproduces the advantage of segregated wealth. Third, racial disparities may now have become locked in place. Non-linear processes often reach a tipping point where “switching costs” make it impossible to reverse institutional dynamics. Racial disparities may now have reached that point of lock-in.

This chapter, Chapter 3, focuses on institutional feedback loops, their dynamics, and the role they play in the lock-in model.

In 2004, sociologists Robert Sampson and Jeffrey Morenoff published a remarkable study on the persistence of poverty in Chicago neighborhoods from 1970 to 1990.² The authors made several important findings. First, those neighborhoods that were poor in 1970 were almost all poor twenty years later in 1990.³ Even as poverty rates dramatically increased in those neighborhoods throughout the period, the neighborhoods' rankings stayed the same—that is, the poorest neighborhoods in 1970 were also the poorest in 1990, only significantly more so. Likewise, poverty rates increased most in those neighborhoods that were already poor, and less so in neighborhoods that did not suffer already from high poverty rates. Over time, neighborhood rankings remained remarkably stable despite significant turnover of families and individuals.⁴

Second, and not surprisingly, race was closely correlated both to increasing poverty and to a neighborhood's position in the rankings. In 1970 and in 1990, poverty was highest in the neighborhoods that formed the core of the city's historic black belt: Grand Boulevard, Oakland, Woodlawn and Englewood to the south, and Garfield Park and North Lawndale along the city's western corridor. The data also suggested a tipping phenomenon: neighborhoods that initially were at least 40 percent black remained black and poor or became blacker and poorer.⁵ Although the presence of Latino residents was not initially linked to poverty in 1970, over time, the number of Latinos in a neighborhood increasingly predicted higher poverty rates.⁶

Third, certain key institutional structures in a neighborhood were linked to poverty. The number of homeowners and physical proximity to a poor black neighborhood were significantly correlated to a neighborhood's poverty rate. Neighborhoods that had the fewest homeowners and were located closest to the black belt experienced the most dramatic increases in poverty rates. These structural features were linked, in turn, to the race of the neighborhoods' residents.⁷

Sampson and Morenoff's findings raise several key questions about the nature of racial inequality. Why does racial poverty persist over time, even after the passage of anti-discrimination laws? Why are racial inequalities in housing, education, employment and wealth linked to residential location and space? Most importantly, how do our institutional rules—those taken-for-granted rules that govern the workings of the neighborhood, the school house and the workplace—contribute to continuing racial poverty?

This chapter argues that institutional “positive feedback loops” play a central role in perpetuating race and poverty.⁸ In a negative feedback loop, change in one direction triggers change in an opposite direction, which usually produces some sort of equilibrium. For example, in response to a drop in body temperature, humans shiver, in order to heat the body back up to its normal temperature. In economic markets, price increases trigger a drop in demand, which in turn produces a drop in price.

In a positive feedback loop, however, a change in one direction leads to more change in that same direction. A snowball gathers more snow. The population explodes. A bank account accumulates wealth exponentially. Positive feedback loops amplify earlier conditions because change in one direction feeds back to produce more change in the same direction. Each increase leads in turn to further increase, and each decrease produces a further decrease. In this way, small disparities can become self-reinforcing and produce large and very persistent disparities later on.

This chapter argues that persistent racial disparities can be traced to positive feedback loops. Chapter 2 described the anti-competitive activities of racial cartels (homeowners’ associations, real estate boards, political parties) that excluded blacks and Latinos from key labor, housing and education markets. Chapter 2 also described the monopoly surplus—higher wages, better jobs, better schools, wealthier neighbors—that whites acquired by way of their cartel conduct. This chapter suggests that this historical monopoly surplus is reproduced over time by institutional feedback loops that make whites richer and certain minority groups poorer, even in the absence of intentional discrimination.

In particular, many of the taken-for-granted, race-neutral arrangements that structure our contemporary social institutions create positive feedback loops that reproduce racial inequality. Most of these loops operate via the social context in which individuals develop—families, social networks, neighborhoods and workplaces. For example, in social circles, people refer their friends and relatives for job openings. For whites who are more likely to be in high-wage, high-status jobs, network referrals pass along such jobs and wages. In contrast, for poor and working class blacks and Latinos, these network referrals link people to lower-wage jobs or unemployment. Likewise, relying on the wealth of surrounding communities to finance local public education produces self-reinforcing wealth for whites and material disadvantage for blacks and Latinos.

The rest of this chapter explores these institutional feedback loops in greater detail. The next section looks at the structure of the institutional feedback loop, and the underlying theory of self-reinforcement and path dependence. The section following outlines four general categories of feedback loops that reproduce racial inequality –family transfers of wealth, social network effects, neighborhood effects and control over the rules of the game.

Institutional Feedback Loops: Some Basic Theory

The concept of the institutional feedback loop draws from work in complex systems theory, antitrust, economics, and sociology. Complex systems theory is an interdisciplinary field that studies the dynamics and structure of complex systems. Complex systems are made up of individual agents that interact with each other to produce unpredictable and interesting patterns. These patterns cannot be understood simply by looking at the behavior of individual agents. Instead, the patterns are “emergent”—they emerge from the interaction of individuals. The whole is indeed far more than the sum of its parts.

The world is full of complex systems. Ant colonies, stock markets, families, star systems, neighborhoods, and sand piles are all complex systems that display emergent patterns. For example, individual ants follow very simple rules of behavior, like “follow the pheromone trail in front of you.” In contrast, the ant colony as a whole is capable of complex behavior—the colony can relocate after a flood to higher ground. But the ant colony’s emergent behavior cannot be predicted from the behavior of the individual ant, just as the stock market’s complex dynamic patterns cannot be reduced to the behavior of buyer or seller. Something distinct happens at the level of the complex system, and complex systems theorists look for rules common to all complex systems to help explain what that something is.⁹

Many complex systems exhibit very similar emergent patterns. For example, complex systems often experience “phase transitions,” in which change is sudden, non-linear and unpredictable. The stock market crashes and bubbles, even as it moves slowly in other periods. Water boils and then escapes into steamy vapor. An ant colony suddenly goes into breeding mode. The racial composition of neighborhoods can change quite rapidly once the numbers reach a certain threshold or “tipping point.”¹⁰

This non-linear change is often produced by a dynamic process known as a positive institutional feedback loop. In an institutional feedback loop, an initial change to the system produces more change to the system and moves it in the same direction. When the system's "output" feeds back to become part of the system's "input," change accelerates over time. In a compound interest bank account, for example, the account grows dynamically because output (the interest) feeds back into input (the account's capital) during the next period. Assuming no withdrawals, the account grows exponentially larger, even in the absence of further deposits.¹¹ Likewise, when the population grows, each new generation feeds back to become the parents of the next generation.

In positive feedback loops, early historical change, even small changes, can end up making a big difference. Economist Brian Arthur uses the mathematical example of the Polya urn process to illustrate the path-dependent way in which feedback loops reinforce the effect of earlier events.¹² At the outset, the urn contains only two balls, one red and one white. For each round of play, an experimenter randomly draws a ball and then returns it to the urn, together with another ball of the same color as the ball drawn. Draws and returns proceed until the urn is filled. The key mechanism—adding another ball of the same color as that drawn—is a positive feedback loop, because it reinforces the effect of each previous draw, particularly those early in the process.

In the world of economics, positive feedback loops can take the form of increasing returns. Neo-classical economists have always assumed that the economy is governed by negative feedback loops, or the law of diminishing returns, where the effect of change is dampened as the system moves toward equilibrium. For example, an increase in oil prices triggers conservation, exploration of alternative fuels and a decrease in demand, which in turn produces a drop in price..

As early as the 1950s, however, economists like Gunnar Myrdal and Nicholas Kaldor described positive feedback loop mechanisms—in Myrdal's words, "circular and cumulative causation"—that appeared to depart from these conventional principles. These scholars, and now a new generation of economists, have pointed out that certain markets are sometimes characterized by increasing returns, in which market success is cumulative and self-reinforcing.¹³

In the context of monopolies, increasing returns can amplify the advantage of a market monopolist, even after the bad actor has stopped

engaging in illegal conduct. Some commentators have argued, for example, that a positive feedback loop reproduced Microsoft's advantage in the operating systems market even after Microsoft had ceased its anti-competitive behavior.¹⁴ Trying to sustain its market share in operating systems market, Microsoft had engaged in anti-competitive conduct (e.g., bundling, illegal tying contracts and exclusive contracts), which gave them an unfair competitive advantage or "monopoly surplus" in market share.

Microsoft's unfair surplus in market share persisted over time because an institutional feedback loop connected software authors to consumers. Because software authors wanted to write software for the most popular operating systems, more software authors wrote programs for Windows as the system became more popular. In turn, because consumers wanted to buy the operating system that had access to the widest range of software, any increase in available software triggered a corresponding increase in consumers. Each increase in software authors triggered an increase in consumers, which in turn, triggered a corresponding increase in software authors, thereby producing more change. Microsoft's advantage became self-reinforcing over time, even in the absence of further innovation, and long after Microsoft had stopped its illegal behavior.¹⁵

Like the operating systems market, systems with institutional feedback loops display several characteristic qualities. *First*, they can be "path dependent." That is, they can be very sensitive to historical events, particularly those that happen early in the formation of the system.¹⁶ For example, if early draws in the Polya urn happen by chance (or by manipulation) to be mostly of one color, then the urn may ultimately "tip" to that color over time.

In an oft-cited example of this idea, economists trace the dominance of the standard Sholes QWERTY typewriter keyboard to two minor historical events. Initially, a number of typing schools decided to use the Sholes keyboard to develop a typing course. Subsequently, a typist using the keyboard scored a decisive victory in a typing contest in 1888. These relatively minor events gave the Sholes keyboard a competitive lead in the market, early on in the formation of the industry.¹⁷

That early competitive lead quickly became a self-reinforcing advantage because relationships between employers and new typists were mutually reinforcing. Like the software authors in the Windows example, new typists were eager to train on the most popular keyboard. In turn, employers wanted to buy the keyboard that would give them access to more

trained typists. Each increase in Sholes typists triggered an increase in employers who bought the keyboard, thereby persuading even more typists to train on the keyboard, and so on and so forth.

Importantly, this process also created barriers to entry for competitor keyboards. Given limited resources, employers adopted only one kind of keyboard, and typists were likely to train on only one keyboard as well. Thus, the increase in employers who adopted QWERTY keyboards worked not only to the advantage of Sholes and Sholes employers and typists, but also to the disadvantage of competitor keyboards, typists and employers. In this way, both advantage and relative disadvantage became self-reinforcing over time. Eventually, the Sholes keyboard monopolized the market.¹⁸

Second, once the system has charted a particular direction, systems with positive feedback loops may become inflexible thereafter. In the Polya urn example, once the urn has begun to tip towards one color, later draws of the balls may have very little effect on the ultimate distribution of balls in the urn. The same idea is illustrated in the VCR market. In the competition between the Betamax and VHS video recorders in the 1970s and 80s, small market fluctuations favored the VHS format manufactured by JVC, even though both Sony and JVC began with roughly the same market share. After VHS had gained a sizable lead, the VHS advantage accelerated because video outlets began to exclusively carry VHS tapes, which made that format even more popular. Ultimately, the market became inflexible when Beta could no longer catch up to VHS.¹⁹ At this threshold or “tipping point,” we say that VHS had become “locked in.”

Third, markets with feedback loops are potentially inefficient. Because a product’s success is sometimes linked to accidental (or intentional) advantage, the market can potentially lock in an inferior technology. Some commentators argue that Betamax is technically superior to VHS, and that the feedback process has locked in the relatively less efficient format.²⁰ Importantly, self-reinforcing dynamics do not necessarily produce an inefficient or sub-optimal outcome. In fact, self-reinforcing effects might actually accelerate the advantage of the more innovative alternative, given the right circumstances.

Feedback Loops That Reproduce Racial Inequality

So what does the monopoly dynamics of typewriter keyboards and computer operating systems have to do with contemporary race relations?

This chapter suggests that both technological markets and contemporary race relations are governed by the same self-reinforcing institutional feedback loop. Just as institutional feedback loops have sustained Sholes' and Microsoft's monopoly on the markets, so too have institutional feedback loops reproduced whites' early racial monopoly on resources and opportunities. And, like the locked-in monopoly that characterizes some high-tech markets, racial disparities appear to be path-dependent on history, very firmly entrenched and potentially inefficient.

This recursive relationship between racial inequality and earlier history draws heavily from earlier work done by economist Glenn Loury on the persistence of racial inequality.²¹ Loury has argued that much of racial inequality persisted because family and community background affects a person's ability to acquire labor market skills. Importantly, Loury has suggested that institutional processes like public education and job-referral networks, as well as other forms of social capital, have operated to reproduce the effects of past discrimination by affecting the ability to invest in human capital.²² Although this chapter focuses far less on individual investments and far more on the structural connections, the analysis here builds on Loury's arguments about self-reinforcing inequality.

The story of persistent racial monopoly has its beginnings in slavery and later eras of racial exclusion. As Chapter 2 describes, whites formed a variety of racial cartels during slavery and afterwards to anti-competitively exclude certain communities of color. Real estate boards, neighborhood homeowners' associations, political parties and industrial labor unions engaged in collective action to exclude blacks and Mexicans from key labor, housing, land, education and political markets.²³ These cartels engaged in a wide range of anti-competitive behavior—from simple economic pressure on one end of the spectrum to violence, murder and property destruction at the other end.²⁴ By way of this anti-competitive conduct, whites came to enjoy a “monopoly surplus” in opportunities and resources, to include wage premiums from a white monopoly on the best jobs, superior housing at lower prices from a monopoly on housing, land at great prices, and well-financed schools at lower tax rates from a monopoly on education, among others.

More specifically, this chapter suggests that whites now have parlayed that early monopoly surplus into self-reinforcing advantage. Different types of institutional feedback loop operate to reproduce inequality through social processes that range from the intimacy of family assistance to

the more impersonal politics of the workplace. These four feedback loops include (i) family transfers of assets, in which early wealth generates future wealth—particularly financial assistance with education and buying a home; (ii) social networks, in which people distribute information and social capital; (iii) neighborhood networks, in which space and geography distribute resources; (iv) “increasing returns to institutional power,” in which early occupants control the rules of the game for future distribution. The following discussion considers each loop in turn.

Rich Dad, Poor Dad: Family Transfers of Assets to Generate Future Wealth

Although the racial gap in income has closed very slightly in recent history, the gap in wealth between races remains huge—seven times greater than the gap in income. According to recent studies, the net worth of a typical black family falls between 10 to 20 percent of the net worth of a white family.²⁵ As of 1999, the typical black family had a net worth of \$8,000, compared to \$81,000 for a white family.²⁶ Similar figures for 2002 put the average net worth of a Latino family at \$7,932.²⁷ Moreover, the wealth gap for both groups seems to grow much larger during economic downturns.²⁸

How much of this racial wealth gap can be traced to the white monopoly surplus from earlier periods of exclusion? In general, a significant portion of a person’s wealth can be traced to family wealth that is passed from generation to generation. Laurence Kotlikoff and Lawrence Summers have estimated that eliminating inter-generational transfers of wealth would reduce U.S. wealth by as much as 50 percent.²⁹ Certainly for those who are wealthiest, intergenerational transfers—both bequests and assistance while parents are still living—constitute the vast majority of wealth for the next generation. Predictably, these transfers contribute quite a bit to the modern racial wealth gap, particularly because the very wealthy make very big transfers, and the very poor make very small transfers, if they make any transfers at all.³⁰

Recent research by sociologist Dalton Conley has confirmed that family transfers play a big role in reproducing the racial gap. Conley’s study looked at data from several generations to determine how much of the racial wealth gap could be explained by differences in parental net worth. After controlling for a number of other potential explanations, Conley found that

racial differences in parental wealth accumulated over time, and these differences were the single most important factor in explaining the contemporary racial wealth gap.³¹

Economist James Curtis has traced the source of the black-white wealth gap even further back to the accumulation of historical wealth during slavery. Curtis's research compared historical racial differences in wealth before the end of the Civil War to modern racial differences in wealth. Curtis's study made two important findings. First, wealth differences among blacks in the years between 1860 to 1870 could all be explained by legal status--whether the person in question was free or enslaved. Second, modern wealth differences between blacks and whites could be traced to the compounding growth rate of wealth passed from generation to generation. Like Conley, Curtis concluded that initial historical differences in wealth during the era just after slavery are responsible for much of the modern racial gap in wealth.³²

Beyond bequests, two types of inter-generational transfers appear to play a special role in reproducing racial inequality: first, parental help to make a down payment to buy a house, which generates more wealth via home equity, and second, parental help with college tuition, which boosts a child's future earnings and wealth as well. For most people other than the very wealthy, home ownership constitutes the most significant part of family wealth, mostly because home equity appreciates over time. By some estimates, home equity makes up more than a third of a household's non-pension wealth.³³

Racial gaps in home ownership are significant. Although home equity wealth gets more evenly distributed than, say, stocks or trusts, huge racial gaps exist in rates of home ownership. The 2000 Census reports that 71 percent of whites owned homes, but only 46 percent of black and Latino households were homeowners.³⁴ Other research reports a similar race gap in home equity.

What explains these racial differences? Economists Kerwin Charles and Erik Hurst have traced a big part of the gap to racial differences in getting help with a down payment. The authors note that 27 percent of whites get parental help in making a down payment to purchase a house, compared to only 7 percent of blacks.³⁵ According to their research, a full 25 percent of the racial gap in home ownership can be explained by the

racial differences in parental help.³⁶ The amount of help varies between races as well.³⁷

This racial gap in assistance helps to produce the gap in home ownership. Not surprisingly, families who cannot get down payment help are less likely to apply for mortgages, even when they have sufficient income to make the monthly payments.³⁸ Alternatively, they buy homes later than those who get assistance, thus losing valuable time to enjoy equity appreciation. Other research suggests that racial differences in inheritance (which often is connected to the family home) also contributes to wealth inequality.³⁹

The racial gap in down payment assistance is further aggravated by the fact that wealthier homeowners own bigger houses on more desirable property, and thus accumulate even more wealth.⁴⁰ Making the gap even larger, white homeowners were uniquely able to take advantage of the dramatic rise in home values during key historical periods, including the 1970s.⁴¹ Thus, differences in getting help with buying a house likely has made a big difference in the wealth of racial groups over time.

Beyond helping with down payments, families also help their children pay for college tuition, which also serves to generate future wealth. As anyone who has priced college tuition knows, in college financing, a family's wealth matters far more than its income. Indeed, in an era when college costs have skyrocketed, families frequently take out home equity loans or draw on other financial assets to pay for college.⁴²

Here again, however, social science evidence documents a big racial gap in family ability to help with college tuition. Dalton Conley's research has looked at the link between parental wealth and college attendance. In particular, Conley examined racial differences in parental wealth and post-secondary education; completing a baccalaureate degree; and completing a graduate degree. In dissecting racial differences, Conley found that family wealth was strongly linked to whether a person pursued a post-secondary education and completed an initial undergraduate degree, although less so for the graduate degree. According to his study, doubling of parental assets raised the probability of a child going to college by 8.3 percent, and the likelihood of graduating by 5.6 percent. Conley found that after controlling for parental wealth and other class characteristics, blacks were actually more likely than whites to continue on to college.⁴³

Of course, family members provide a very important source of social capital to enable people to accumulate wealth. Beyond paying for college or

the down payment on a house, family members often choose residential location and help children to find their first job. As the next several sections will discuss, job help from network connections and neighborhood advantages and disadvantages represent other types of positive feedback loops.

“It’s Who You Know:” Social Networks and Social Capital

A second type of feedback loop, the self-reinforcing process of network effects, reproduces white advantage by way of connections to others in social networks. “Network effects” are the benefits and disadvantages that flow from network connections, primarily social connections. In economic network markets, the value of a product can flow from the number of users connected in a network. For example, the value of a telephone is largely derived from the number of other people whom one can dial up. Similarly, but perhaps less intuitively, the value of a VCR comes in part from the number of “network suppliers” of videotape—your favorite rental store, the library, and your network of family and friends.

Some economists have argued that network effects facilitate a natural monopoly for networked products, because the first firm to market such a product can often tip the market in their favor before competitors really have an opportunity to attract users.⁴⁴ Others have noted that, for the illegal monopoly, network effects can reproduce inequality, even when the monopolist has stopped acting illegally. The Department of Justice’s case against Microsoft was based on the network effects argument described earlier, in which a jump in the number of software authors triggered an increase in operating systems consumers, and vice-versa.⁴⁵

In social networks, as in telephones, the value of a professional connection often derives from the resources that the connection can make available. Network connections can hook a person up to several different kinds of resources. First, “who you know” is most often important because of what they have (and can make available for the asking). Network connections can make available embedded network resources—money, high wage or high status jobs, or other forms of material resources controlled by people in the network.⁴⁶

Second, network connections are also important because of “what they know”—network connections can disseminate information. For example, network ties can pass along information about job openings, or

pass on tips about the important social symbols and rules that govern a particular cultural setting (“cultural capital”). A network contact can advise a new worker about the power brokers on the plant floor, or about the custom of making decisions behind closed doors. Indeed, recent research suggests that gossip among members of a network can pass along valuable information about organizational norms.⁴⁷

Third, network connections can influence people by shaping their preferences or decisions, sometimes more coercively than others. For example, employers can be talked into hiring someone by the person’s network referees, who go to bat for the candidate. Likewise, employees can be pressured by their connections into conforming to company policy.⁴⁸ Finally, network connections can provide a person with a sense of well-being and esteem, prompting some researchers to argue that social networks form for this very reason.⁴⁹

Social and institutional networks distribute group capital not only across space but also across time. Networks can function to pass along wealth, opportunities, information and influence to successive generations. For example, informal referral networks play a key role in distributing jobs, particularly high-wage and professional jobs. Sociologists like Mark Granovetter have demonstrated that employers fill well over half of all jobs via personal referrals, although the number is slightly lower for black job candidates than for white.⁵⁰

Not surprisingly, race rears its head in the distribution of jobs via network connections. Comparative studies show significant racial differences in the types of jobs that people get through their job referral networks. According to work by sociologists Diedre Royster and Mercer Sullivan, white men entering the workforce get lots of help from older men in their social networks—shop teachers, fathers, neighbors and friends of the family frequently help on the job search, particularly if the candidate is looking for entry level work or an apprenticeship in high-wage trades jobs that are unionized. Blacks and Latinos, by comparison, have far fewer older men in their social networks who are able or willing to serve as a network referral for steady, high-wage or high-status employment. Indeed, when compared to whites and Latinos, blacks have the fewest network connections to industrial and trade occupations.⁵¹ The same is true for high status jobs. Thus, the type of jobs embedded in networks—both in terms of wages and status—differ significantly by race.

Research reveals a number of other important racial differences in social networks. First, blacks and whites have referral networks that differ in density--the number of connections that each person in the network possesses. Density is very important in making a network effective. Referral networks will cease to “hang together” if the number of connections to people with jobs drops below a critical density. Above this threshold, referral networks have enough links between people to function properly. Below the critical number, the network literally disintegrates and falls apart. Fragmented networks cause huge problems for racial groups. Without effective networks, whole communities can become so isolated from high-wage jobs that members are perpetually unemployed.⁵² Work by economists Kenneth Arrow and Ron Borzekowski indicates that, because of networks’ critical threshold, even very small differences in the number of ties can induce isolation and substantial income inequality across racial lines.⁵³

Second, racial differences in network structure affect the strength of the network connection. Most scholars agree that the strength of network ties affects the network’s function, and that race is related to the strength of network connections.⁵⁴ Sociologists Mark Granovetter and Ronald Burt, argue that the strength of a network depends heavily on the weak ties that a person has across a network. Weak ties--ties to people known only casually or through friends of friends--will pass along information that differs from what the candidate and her close circle already have.⁵⁵ Because weak ties are usually people who are not connected to each other, a network of weak ties may provide a bridge across the disconnected segments of a network, called “structural holes.”⁵⁶ Bridging the structural holes gives a candidate a much wider search range for job prospects in the universe of possibilities.

Empirical research on racial differences seems to indicate that blacks and Latinos may be less successful on the job market because their networks are smaller and their ties stronger. People of color tend to know more of the same people, and to be connected to them more strongly. Without a large network of weak ties, these groups cannot search as productively across structural holes as can whites.⁵⁷ Other research suggests that people of color are less likely to make use of their network ties to find job opportunities.

Why is it that social networks do not become integrated? Even in the absence of overt racism or intentional discrimination, networks remain segregated because like tends to attract like. People tend to create social networks with others who resemble them, and race is one axis along which

resemblance is structured. Social psychologists call this tendency racial “homophily.”⁵⁸ In addition, social contacts take place in the context of social institutions—neighborhoods, schools, workplaces—that tend to be segregated for reasons already discussed. It is hard to say whether the architecture of social networks would look different if history had been different. Resources attached to those networks might well be much more equally distributed if they had not been so stratified early on.

“Won’t You Be My Neighbor?” Neighborhood, Space and Geography

Drawing on some of the same network-based ideas described above, a third type of feedback loop reproduces inequality through geography and space. Space is important not just because the physical organization of space or its intrinsic characteristics—nearness to a river or natural resources—but also because of the bundle of legal and social benefits that become linked to that space. In the last decade, experts have begun to study the feedback loops that connect geographic space to industry location and economic growth. Economists Paul Krugman and Brian Arthur have argued that a firm’s decision to migrate to a city is influenced not just by its physical characteristics, but also by the firm’s prospective neighbors—i.e., the earlier location choices of other firms.

The presence of “good” neighbors adds a great deal to the attractiveness of a location. For example, having other high-tech neighbors in Silicon Valley might also mean having a ready supply of skilled labor and transportation infrastructure. These neighborhood benefits are self-reinforcing. Each new good neighbor makes it more likely that the place will attract more good neighbors, at least until the area gets too crowded or competitive.⁵⁹ Thus, industrial location choices can be self-reinforcing.

Neighborhood effects work not just for industrial neighbors but for residential neighbors as well. Good neighbors attend to attract more good neighbors (and often they zone their neighborhoods to keep out “bad” neighbors). Poor neighborhoods attract poor neighbors, in turn. Neighborhood effects are not restricted just to the quality of neighbors, but include other kinds of public goods as well. Legal scholar Lee Fennell notes that choosing a residential location includes not just the particular set of (“good” or “bad”) neighbors, but also a particular basket of local public goods both from one’s own jurisdiction and from others nearby. (For

example, a certain residential location might offer so-so public schools but easy driving distance to workplaces nearby.) Fennell also notes that the basket of neighborhood amenities is not an ala carte menu: a resident has to take all of the amenities associated with a particular space, and cannot divide them up.

This residential basket of benefits (and liabilities in poorer neighborhoods) often affects the wealth of the entire community and of future generations, and not just that of an immediate family. Where someone lives plays a centrally important role on their future wealth, education and well-being. Research by Leonard Rubinowitz and James Rosenbaum on the Gautreaux Assisted Housing Program examined the effect of moving 7100 black residents to wealthier white suburban neighborhoods. The results of the study suggested that living in a “good neighborhood”—with wealthy predominantly white neighbors, well-maintained property, good security services and good schools—generates additional wealth for the individual family and future wealth for children, particularly in terms of attending college and getting good jobs. Living in a predominantly minority neighborhood with concentrated poverty often means the loss of opportunity and a cycle of disadvantage, both for the neighborhood and the individual residents.⁶⁰

Scholars have studied the effects of a wide variety of neighborhood effects: local public finance, income distribution in the neighborhood, and neighbors’ property improvements, to name a few.⁶¹ These studies confirm several important points. First, a family’s welfare is closely tied to that of the neighbors. Research finds, for example, that a child’s success in school depends heavily on what her classmates are like, and in particular their socio-economic status.⁶²

Second, neighborhood effects operate to sort neighborhoods over time via feedback loops. More specifically, differences in neighborhood amenities tend to sort neighborhoods by housing price, rental price, local property taxes and zoning barriers (which impose minimum price requirements).⁶³ Neighborhood effects like public expenditure also tend to sort neighborhoods by race. The following discussion focuses on public school financing, to explain how neighborhood differences can persistently stratify neighborhoods by race.

As any family looking to buy housing (or real estate broker) can testify, people pay very close attention to schools and school finance in

choosing where to live. Homeowners who are not parents pay attention because of the effect of schools on property values. Those who are parents pay attention because they know that going to the “right school” will help to determine their children’s future success.

Several scholars have studied the dynamic relationship between public school finance and persistent residential segregation.⁶⁴ According to research by economist Roland Benabou, the "neighborhood effects" of public school finance are so strong that even small differences in public school financing can sort neighborhoods by income and by race over time, even if the neighborhoods are initially mixed.⁶⁵

Benabou's economic model starts with two neighborhoods that have an equal proportion of rich and poor families. If education spending in Neighborhood A becomes slightly higher than Neighborhood B, the land in A becomes more valuable, and so the price of housing in A rises. The wealthier families in B now are more likely to move to A to take advantage of the good schooling and appreciating property values. The mix of neighbors left behind in B, in turn, is now relatively poorer, and education spending likely will decrease. Another round of defections ensues, with the relatively wealthier families departing, until land in A becomes too expensive for anyone in B to purchase. Owing to this feedback loop, even minor differences in education spending can cause neighborhoods to stratify by income over time. Moreover, these forces can slow down or even reverse any income convergence between rich and poor.

So much for the theoretical model. What happens in real life, when neighborhoods do not begin equally mixed, but have been racially and economically segregated for a long time? In Benabou’s view, given the country’s lengthy history of racial segregation, white advantage might now be too great for blacks to overcome. In Benabou’s view, racial discrimination during Jim Crow and slavery created two kinds of monopoly surplus. First, whites enjoyed the benefit of buying into good neighborhoods at artificially lowered prices. Under the regulation of Jim Crow laws and informal social norms, blacks were not allowed to bid on land to which white families moved. This exclusion artificially decreased land prices for the benefit of whites, particularly in the suburbs, but also in urban white neighborhoods.⁶⁶

Second, now that non-whites are permitted to buy into any neighborhood without regard to race, those home buyers who move into white neighborhoods must pay full value to buy in, unlike white residents,

who were able to buy in at lower prices. Moreover, even those whites who are buying into a new neighborhood for the first time will enjoy an advantage over non-whites. Namely, whites who grew up in all-white neighborhoods with better-funded schools have benefitted from a racial monopoly surplus. White families have enjoyed the higher income and wealth that accompany attending better-funded schools and the higher property values that accompany neighborhoods with better-funded schools.⁶⁷ When whites buy into a new neighborhood in order to trade up, they can draw on that monopoly surplus to pay the bill; blacks and Latinos cannot.

Benabou notes that this public school finance feedback loop works in only one temporal direction, as is often true with feedback loops. Namely, once neighborhoods have become stratified by race and class, dismantling the feedback loop becomes far more difficult to do without producing bad results, like the racial displacement that comes with gentrification. As Benabou remarks,

[S]tratifcation is likely to be much harder to undo once it has occurred than it is to stop [it] in its tracks early on. Due to the cumulative nature of the process, the amount of transfers required to induce the first few rich families to come back is considerably larger than what it would have taken to make them stay in the first place.⁶⁸

“How You Play the Game:” Controlling the Rules of Distribution

Being the first to populate a profession or an industry or an institution of higher learning does not just mean a material head start in terms of wealth. It also means, more importantly, that the earliest occupants potentially can control the rules of distribution to determine who will participate in the future. Institutional incumbents can structure those rules in a way that ensures the group’s continued success in subsequent generations. Political theorists have called this “increasing returns to power”—a situation in which “victors at one stage impose institutional solutions that reflect and entrench their interests, thus biasing outcomes in the next round.”⁶⁹ Control over the future rules of distribution creates a very powerful self-reinforcing advantage in the lock-in model of inequality. More than using past winnings to build future winnings, winners get to change the rules of the game in their favor and thereby to ensure success.

This “rules of the game” feedback loop operates most obviously in institutional selection criteria, notably in the admissions criteria for higher education. Most universities and colleges have a particular category--legacy admissions--that favor the children of alumni. Legacy admissions reproduce privilege by transmitting the advantage of monopoly incumbency to the next generation. Legacy applicants are twice as likely to be admitted as non-legacy applicants. Lest anyone think this is because they are a self-selecting, well-credentialed group, sociologist Espenshade and his colleagues estimate that being the child of an alumnus is worth a bump in credentials--an extra 160 points on an SAT score.⁷⁰ Most college administrators will candidly admit when pressed that alumni children receive preferences in admissions in order to ensure continued financial giving by their alumni parents. Legacies look like what they are--the naked exercise of power to change the rules to favor the powerful.

But more importantly for purposes of this project, the “rules of the game” loop also works in a far less obvious, less intentional way. Monopolist incumbents can also exercise their power to reproduce their privilege by choosing, in all good faith, forms of “intrinsic merit” that appear group-neutral but in fact favor their group. What counts as merit-based admissions criteria for elite schools might well be an example of this more institutional advantage. Most college admissions boards select applicants on the basis of academic talents that are intrinsically desirable--good grades, high test scores. But even though these qualities are theoretically attainable by all, in practice they are disproportionately possessed by those groups who themselves generated the criteria--predominantly whites who grow up in middle-class or wealthy white neighborhoods and who attend well-funded public or private schools.⁷¹

Jerome Karabel traces the evolution of admissions criteria at Yale, Harvard and Princeton that favored the first-movers in those institutions--white, Anglo-Saxon men of wealth. At the beginning of the twentieth century, the “Big Three” maintained surprisingly low admissions standards in terms of academics. Anyone who could pass relatively easy subject examinations was admitted. At the same time, expensive tuition, plus the requirement that applicants pass examinations in both Greek and Latin, served to limit admission to the sons of the elite, because only elite private schools offered classes in Greek and Latin.⁷² Shortly after the turn of the century, all three institutions did away with the Greek and Latin requirement and opened their doors to more public school students.

At the same time, the Big Three witnessed a dramatic increase in the number of Jews from Eastern Europe who were able to pass these examinations and enroll. In an effort to ensure that enrolled students exemplified the ideal of the manly Christian gentleman, elite institutions abandoned strict academic criteria, and began to use subjective criteria to obtain a “favorable mix” of matriculants. These institutions created “offices of admissions,” which were charged with using discretion to admit “desirable” candidates.

The admissions process required applicants to fill out lengthy applications, including a listing of extracurricular activities and a personal statement. Admissions offices conducted college interviews in order to assess the “leadership” and “character” of the applicant. Physical fitness warranted special attention, because a superior physique reflected a “manly candidate.” Alumni parentage and geographic diversity also played an important role in selection (the latter to exclude public schools from Long Island, Boston, eastern New York and New Jersey.⁷³ Admissions offices relied most heavily on letters of recommendation from known sources, preferably from feeder schools that routinely passed graduates on to elite schools.

A window into Harvard’s admissions process in the 1950s and 60s shows just how much control over the rules of distribution could mean. Applicants were classified by several sorting systems. The first system, the “docket system,” sorted by geographical region, sometimes devoting an entire category to a particularly favored school, and competition occurred within docket. (This category operated to disfavor certain parts of New York City, which were heavily Jewish). The second system rated applicants on four dimensions—personal, academic, extracurricular and athletic. The third scheme divided applicants into twelve categories, assigning each candidate a “social type.” “A” for example signaled the All-American type—athletic strength, some extracurricular activities, but with academic credentials that were not particularly stellar. “B” was for “boondocker, from an unsophisticated, rural background. “L” stood for lineage, someone who was a Harvard or faculty son, or an applicant with ties to the local community.

Remarkably, these categories remained in place with only minor modifications through 1988, largely because school officials viewed them as legitimate indicia of intrinsic merit. As Karabel notes, the criteria reflected not just the desire to exclude, but more importantly for our purposes, the

WASP elite's deeply held beliefs and values about what constituted a well-educated man and a deserving applicant.⁷⁴ Preferences for leadership, athletic ability and personal character reflected their genuine, good faith desire for a gentleman, the potential "captain of industry" or political leader, and a strong distaste for the scholar or the "greasy grind," whose nose was always in a book.

Such group-produced definitions of merit serve to reproduce privilege over time, even in the absence of intentional discrimination. Although the personality categories have now disappeared from the admissions process, the central features of the original application process remain in place today: interviews, preferences for athletes (including preferences for candidates in sports that are not big money makers for the school), geographic diversity with an emphasis away from the Eastern seaboard, lengthy college applications and the recitation of extracurricular activities that demonstrate leadership and character. Notwithstanding the historical connection between these processes and institutional efforts to "deal with the Jewish question," admissions committees continue to use them as legitimate measurements of merit.

Not surprisingly, these same criteria, including a more modern emphasis on standardized tests and grades, function to admit disproportionately more whites than blacks or Latinos to elite colleges and universities. Of all high school students in 1999 with a GPA of B or better, and an SAT of 1200 or above, only 6 percent were black, Latino or Native American.⁷⁵ Such numbers do not even take into account the number of students who do not apply for post-secondary education, having been excluded in the preparatory process by badly-funded public schools or some other form of inadequate educational preparation that is related to race. Race-conscious affirmative action places a thumb on the scales to compensate for the fact that the rules of distribution disproportionately keep blacks and Latinos out of our institutions of higher learning.

The rules of the game do not function only at the point of selection. They also function more broadly, even before the point of selection, to attract particular applicants early on, and much later in the process to weed out applicants who do not resemble first-mover incumbents. Organizational theorist Benjamin Schneider has looked at why some organizations become more homogenous over time, often reproducing the culture and characteristics of their founders many generations after the firm's beginning. According to Schneider, who studied Silicon Valley start-ups, organizations

can become more homogenous because of three organizational processes: attraction, selection and attrition.⁷⁶

Initially, the group of people sufficiently attracted to an organization to potentially apply for a job already is more likely to share the experiences, traits and characteristics of the organization's founders. The process of selection then winnows this field even further, to create an even more homogenous group. Finally, attrition over time narrows diversity even further, as people who are a "bad fit" leave the organization, and people who remain behind are those who most resemble the firm's founders. This is the group that then undertakes the next round of selection. The processes of attraction, selection and attrition thereby produce an increasingly homogenous population of people in an organization who share key experiences, traits and characteristics.

Perhaps most importantly, monopolist incumbents actually reshape and redefine the institution for which the rules of distribution are designed. Path-dependence relies on the notion that in navigating institutional direction, incumbents can choose from many paths within a universe of possibilities. The choice of institutional path inevitably reflects the mental models and experiences of those who do the choosing.

For example, the very thing that we call "market competition"—the battle between firms in the marketplace—has fundamentally been shaped by the experiences, traits and characteristics of incumbent CEOs who were institutional founders. Sociologist William Roy has described the way in which CEOs with strong backgrounds in marketing heavily influenced conceptions of corporate control and corporate strategy in the early twentieth century.⁷⁷ After antitrust legislation eliminated mergers and trusts as primary competitive strategies, these "marketing CEOs" developed a marketing-oriented definition of corporate strategy that emphasized brand differentiation and niche marketing. Monopolist incumbents began to compete not by driving each other out of the market via exclusionary strategy but by developing and marketing the idea of "brands" that provided some sort of comparative advantage.

In defining the institution of marketplace competition, these incumbents drew on their experiences, traits and characteristics to reframe competition, away from exclusion and direct confrontation and more towards brand differentiation. Had the CEOs of that time had backgrounds

more in finance and less in marketing, however, they might well have pushed corporate competitive strategy in a much different direction during the critical turning point that firms faced after the passage of the Sherman Antitrust Act.⁷⁸ Namely, as Roy points out, firms might have formulated strategies in which they competed on the basis of their underlying financing and governance structure, rather than on the basis of brand differentiation.

Likewise, the very purpose and shape of higher education—its mission to train the “well-rounded” future leaders of tomorrow as opposed to scholars, for example—reflects the values, experiences and traits of the original incumbent monopolists—school administrators, alumni, donors and faculty. Had the doors to higher education been open from the beginning, the rules of the game might have disfavored the athlete-leader-of-tomorrow in favor of the “greasy grind” scholar or intellectual, or someone else entirely. Thus, what we think of as meritocratic competition—in higher education and in the marketplace—has inevitably been shaped by the experiences and traits of monopolist incumbents.

Differential Mobility

All four of these institutional feedback loops contribute to persistent racial inequality. In each loop, whites have parlayed their early monopoly advantage into continuing advantage. More generally, the notion of self-reinforcing advantage helps to explain why whites’ material well-being consistently ranks above the well-being for non-white groups, and blacks and Latinos in particular. Previous chapters have explained that these groups started out with dramatic initial differences in their levels of wealth. Using the compound interest bank account analogy, whites and non-whites began with very different initial deposits. Even if we assumed that the compound interest rate for both groups was the same, the feedback loops described above reproduce early advantage into continuing advantage because whites and non-whites began with very different levels of initial assets, owing to discrimination.

But some evidence indicates that the compound interest rates themselves might differ significantly between groups. Research on class mobility indicates that a mobility gap exists between blacks and whites. In a nationally representative study, economist Tom Hertz discovered big mobility differences between blacks and whites at all levels of parental income, and particularly large differences in the wealthiest brackets. For

example, Hertz found that whites at the top tend to stay at the top, far more so than blacks. Thirty percent of white children born to the top tenth of the country's wealthiest people remain in the top ten percent, compared to just 4 percent of black children.

At the other end of the spectrum, whites at the bottom don't stay long, compared to blacks. Only 17 percent of white children born to the poorest ten percent of the population stay in that bottom bracket, compared to 42 percent for black children. Hertz documents that ten times as many black children remain in the bottom decile as at the top. In contrast, twice as many white children remain at the top decile as remain at the bottom.⁷⁹ This research helps to explain why racial poverty persists even though average black and white incomes have converged slightly in past years. More broadly, the research indicates that differences in the feedback loops themselves, and not just the initial historical asset differences between groups, contribute to persistent inequality.

Emergence

Contemporary anti-discrimination law defines racism as the choice made by an individual person to intentionally exclude someone on the basis of an irrational stereotype. But the institutional feedback loop and the concept of "emergence" demonstrates how institutional processes can shape social patterns separate and apart from individual behavior. Racial inequality can "emerge" when people who are following race-neutral rules interact with each other.

The concept of emergence is drawn from complex systems theory, to explain how complex and unpredictable social patterns can emerge from individual agents who follow very simple rules. For example, in an ant colony, individual ants' behavior is governed by very simple rules like "follow the pheremone trail of the ant in front of you." The individual investor follows the simple rule "buy low, sell high." In comparison, the behavior of the ant colony and the stock market is far more complex. Contrary to earlier understandings, the colony's good sense to move after a natural disaster comes not from some direction to evacuate by the ant queen, but rather from the complex interaction of ants who are just following very simple rules of behavior.⁸⁰ The stock market also demonstrates complex behavior—bubbles, crashes and free-falls on occasion—that cannot be predicted from or reduced to individual choices.

Likewise, racial inequality can emerge from group behavior even when individuals are following race-neutral rules of behavior. Our discussion of feedback loops helps to explain how that happens. At the level of individuals, people are following simple, race-neutral rules--like "move to a new neighborhood if your neighbors are wealthier and it has a well-funded school " or "hire new employees through people you already know." At the level of the collective, however, given the country's history, they are interacting in ways that reinforce historical racial inequality. Given historical patterns and arrangements, the racial inequality can emerge from the interaction of actors without bias.

An Agent-Based Model

In a forthcoming project, Derek Robinson and I have developed an agent-based model to demonstrate the self-reinforcing nature of institutional feedback loops. Our model shows how neighborhood effects can work to reproduce residential segregation.⁸¹ In this model, black and white families (or "households") engage in two primary activities during each "generation" or iteration. First, households acquire wealth. In particular, they accumulate wealth from two sources. Initially, a portion of each household's wealth comes from their "inheritance" from the previous generation. In addition, the remainder comes from added social capital that they acquire from their neighbors.⁸² (This social capital is meant to reflect a wide range of neighborhood capital, including the value of public schools and of access to job referral networks). Second, households move to more attractive neighborhoods.

Families are allowed to move under two conditions: first, if a move will help a household "trade up"--i.e., if the new neighbors are on the average wealthier than the old neighbors,⁸³ and second, if the household is wealthy enough to buy into the new neighborhood.⁸⁴

As is detailed in the Appendix to this chapter, the simulation takes place in two periods of play. During the first period, the period of segregation, black households are not permitted to move into white neighborhoods. At the beginning of this period, white households are assigned more initial wealth than black families, to reflect the dramatic differences between black and white families after the end of slavery and Jim Crow.⁸⁵ During the second period, the period of legal integration, all households can move into any eligible vacancy, subject only to financial

constraints and not to racial restrictions. Importantly, for both periods of play, households have no preferences about the race of their neighbors.

Figure 1 below demonstrates the location of black and white households at the beginning of the first period of simulation. Black households (represented in blue) represent 20 percent of all households. Households are randomly located in each racial neighborhood. Each area contains an equal mix of rich and poor households along wealth curves, but the median wealth for white households is significantly larger than for black households.

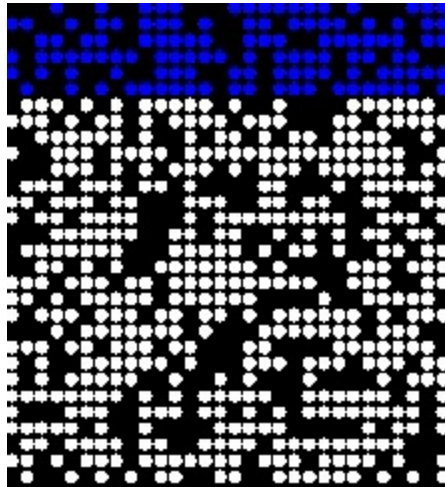


Figure 1: Initial Household Locations At the Beginning of Simulation

During the first period of play, households accumulate wealth and move around. Segregation of neighborhoods affects the rate of wealth accumulation for white and black households. Because white households have more initial wealth relative to blacks, white households will pass down more wealth to their children and grandchildren. As importantly, because blacks are not permitted to move into wealthier white neighborhoods, and because their neighbors are poorer, black households generate less social capital from their neighborhoods than do wealthier white households.

Figure 2 on the next page shows the household locations of blacks and whites at the end of the period of legal segregation. Some poorer white households have moved into black neighborhoods, but owing to the rules,

no black households have been permitted to move into white neighborhoods. Wealth differences between the races become more pronounced.



Figure 2: Household Locations After Initial Segregation Period

During the second period, that of legal integration, wealth accumulation and movement continue. Blacks are now permitted to move close to whites, subject to their ability to buy a house in the neighborhood.

Figure 3 on the next page shows the household locations after this subsequent period of legal integration.



Figure 3: Household Locations After Legal Integration Period

Figure 3 demonstrates that, although a few more white households have moved into black neighborhoods, and a few black households have moved to the outer edges of white neighborhood clusters, most if not all residents are still living in relatively segregated neighborhoods, despite the lifting of legal segregation rules. Multiple runs of this simulation demonstrate that in twenty-four out of twenty-five runs, households remain largely segregated by both race and wealth. Black households are not able to move into neighborhoods with white families in any significant number, because they are unable to afford the relatively more expensive housing prices.

Importantly, in one out of twenty-five runs, owing to random luck and the optimal distributions of wealth and the dynamics, black families are able to integrate well into the white neighborhood. The agent-based model provides a useful way to visualize the self-reinforcing nature of institutional feedback loops. More specifically, with regard to neighborhood effects, the model demonstrates how de jure segregation on the basis of race can become locked in place through an emergent evolutionary process, even in the absence of intentional discrimination.⁸⁶

Other Groups, Other Histories: Path-Dependence and Feedback Loops

When discussing the anti-competitive history of African-American, inevitably, the question of other racial groups arises. Why weren't Asians and Jews also affected by racial cartels and by self-reinforcing institutional feedback loops? How were they able to escape the ghettos? Chapter Two makes the important point that historical differences in the kind and degree of anti-competitive activity may explain the differences in contemporary well-being among groups. As that chapter makes clear, segregation for blacks and Latinos has always been significantly more severe than for other groups, and in particular for Jews and many Asian groups (Chinese, Japanese and Korean, but not Laotians, Hmong, Cambodians and Thai, for whom segregation is dramatic).

Beyond differences in anti-competitive exclusion, historical differences in the nature and duration of institutional feedback loops may also explain relative degrees of success. For example, although so-called "ethnic ghettos" existed for other racial groups besides blacks, they were never homogenous. Even in ghettos that were publicly identified with a particular group, the enclave usually contained a wide range of nationalities, and a wide range of wealth and capital. In addition, a significant number of members of those groups lived outside the ghetto, in contrast to blacks at the turn of the century, most of whom lived in a deeply segregated area.

Likewise, the duration of the self-reinforcing feedback loop has differed significantly among groups. For example, ethnic enclaves proved fleeting, in comparison with the black ghetto. Segregation fell significantly for European immigrants after 1910 for a number of reasons, much of which had to do with a formation of white ethnic identity in reaction to the increasing in-migration of blacks.⁸⁷ In contrast, segregation for blacks and Latinos persisted right up until Congress enacted fair housing laws, and persist even today. Finally, historical differences in initial levels of wealth for immigrants (for example, high levels of human capital and wealth for Jews, Japanese, Korean, and some waves of Chinese immigrants) may also explain those differences.⁸⁸ Because self-reinforcing processes reinforce the magnitude of even small events, these historical differences in initial wealth and in the nature and duration of feedback loops may well explain the significant differences among racial groups that currently exist.

The simulation illustrated above shows graphically how patterns of race and class inequality can be produced by the dynamics of a complex

system. The locked-in patterns visible in Figure 3 in particular show that racial inequality can persist even after white racial cartels have stopped all intentional discriminatory behavior.

As the product of complex systems, persistent monopolies in both race relations and the market share three very important characteristics. First, both are path dependent. Microsoft's early illegal conduct explained its later advantage in the operating systems market. Likewise, early historical events like segregation and slavery have played a central "evolutionary" role in explaining why blacks and Latinos continue to lag behind whites on almost every measure of economic well-being. Given how massive the events of slavery and Jim Crow were—more like a fire or flood than a small random event—one might argue whether the phenomenon is really one of path dependence. At the same time, path-dependence is a concept quite useful in explaining how history has forever changed the path of contemporary race relations.

Second, as the next chapter will discuss in more detail, just as Microsoft's monopoly in operating systems may have become locked in, racial inequality may now be locked in place. Most available evidence suggests that, forty years after the passage of civil rights legislation, racial disparities have diminished very little over time in key areas like housing, wealth, education and employment.⁸⁹ The concept of self-reinforcing feedback loops helps to explain the persistent racial gaps in material well-being.

Third, just as self-reinforcing market monopolies can be potentially inefficient, so too can persistent racial inequality create social arrangements that are potentially inefficient for all. Earlier, this chapter referred to evidence that diversity actually improves performance when work teams are asked to solve problems or to innovate. Political scientist Scott Page has done some work comparing the problem solving efficiency of two groups: one made up of those agents who performed best when asked to solve the problem in isolation, and the other a random group of problem solvers.⁹⁰ Contrary to intuition, Page's random group of agents performed consistently better in problem-solving than the group of the best agents. Page's work suggests that collective difference and not "individual merit" offers more in terms of creativity and innovation, particularly as the global economy moves to more innovative enterprises.

Reframing Inequality: From Individual to Institutional

The story of the institutional feedback loop does not answer many of the important questions about persistent racial disparity. Is racial inequality merely the story about who got there first? How far back should one go to look at early anti-competitive conduct? Weren't the key historical events those that came much earlier--perhaps as Jared Diamond suggests, the early ability of certain communities to domesticate certain plants and get a head-start on food production?⁹¹

Although the feedback loop does not help us to answer those questions, the concept of self-reinforcing institutional disparity gives us a new framework within which to frame these questions. The metaphor of self-reinforcing monopoly seems to better fit with our intuitions about racial inequality - that three hundred years of slavery and segregation do explain a lot of current race gaps, that the racial composition of one's neighborhood makes an economic difference in people's lives, that it "takes money to make money," and that is why "the rich get richer and the poor get poorer."

Perhaps more importantly, the feedback loop story helps us to understand how racial inequality can emerge from institutional processes that operate independently of individual actors. By reframing inequality as a structural and institutional phenomenon, and not just as an individual one, policymakers can better wrestle with the possibility of social change that actually eliminates persistent racial disparities. The following chapters explore ideas for eliminating self-reinforcing disparities in more detail.

1. "To him who hath shall be given and from him who hath not, shall be take away even what he hath." Matthew 25:29 (drawn from the parable of the three servants).
2. Robert J. Sampson and Jeffrey D. Morenoff, Durable Inequality: Spatial Dynamics, Social Processes and the Persistence of Poverty in Chicago Neighborhoods, in POVERTY TRAPS (Samuel Bowles, Steven Durlauf and Karla Hoff eds 2004).
3. The correlation coefficient for neighborhood poverty rankings and rates from 1970 to 1990 was .87. *Id.* at 4.
4. Poverty rates for the average neighborhood studied increased from 11 to 20 percent. *Id.* at 5.
5. *Id.* at 22.
6. *Id.* at 7-8 (black neighborhoods), 12 (Latino trends).
7. *Id.* at x.
8. Importantly, this chapter does not suggest that individual and intentional discrimination play a minimal role in persistent inequality. Indeed, evidence abounds that racial steering, redlining and other forms of intentional institutional discrimination remain a significant factor in explaining racial disparities. [cite] At the same time, this chapter suggests that even if intentional discrimination (both individual and institutional) were to disappear tomorrow, structural inequality would persist.
9. For a highly readable introduction to complex systems theory, including the narrative of the genre's evolution, see MITCHELL WALDROP, COMPLEXITY: THE EMERGING SCIENCE AT THE EDGE OF ORDER AND CHAOS (1992). For a more technical discussion of the principles of complex systems, see ROBERT AXELROD AND MICHAEL COHEN, HARNESSING COMPLEXITY (2000); for an introduction somewhere in the middle, see Brian Arthur, Why Do Things Become More Complex? SCIENTIFIC AMERICAN, May 1993, at 144.
10. In physical systems, such points are often referred to as phase transitions. For example, when water moves from frozen form to fluid, the phase transition takes place within the context of a small increase in temperature. Other complex systems display tipping points, critical thresholds and other phenomena in which small differences create large changes. A small outbreak of an infectious disease suddenly becomes an epidemic. The centuries-old practice of foot binding disappears over thirty years. For a very readable description of this feature of complex systems, see MALCOLM GLADWELL, THE TIPPING POINT: HOW LITTLE

THINGS CAN MAKE A BIG DIFFERENCE (2004). For a more scientific description of phase transitions, tipping points and critical threshold, see [cite].

11. See W. Brian Arthur, Increasing Returns and the New World of Business, 74 HARV. BUS. REV. 100, 102 (1996); Mark Lemley & David McGowan, Legal Implications of Network Economic Effects, 86 CAL. L. REV. 479, 500-507 (1998).

12. See W. BRIAN ARTHUR, INCREASING RETURNS AND PATH DEPENDENCE IN THE ECONOMY 6 (1994).

13. GUNNAR MYRDAL, ECONOMIC THEORY AND UNDERDEVELOPED REGIONS x (1957); NICHOLAS KALDOR, CASES OF THE SLOW RATE OF ECONOMIC GROWTH OF THE UNITED KINGDOM (1966); See also Nicholas Kaldor, The Case for Regional Policies, 17 SCOTTISH J. POL. ECON. 337 (1970).

14. For a vigorous defense of Microsoft's conduct, a challenge to the lock-in argument and an argument that Microsoft's dominance can be traced to a better product, see STANLEY J. LIEBOWITZ AND STEVEN E. MARGOLIS, WINNERS, LOSERS AND MICROSOFT: COMPETITION AND ANTITRUST IN HIGH TECHNOLOGY (1999).

15. ?.

16. Scott Page correctly points out that increasing returns do not necessarily lead to path-dependence, monopoly or to lock-in. In the event that two or more technologies can take advantage of increasing returns at roughly the same rate, then those technologies may remain competitive with one another, and small historical events will not necessarily affect market outcomes. Scott E. Page, *An Essay on the Existence and Causes of Path Dependence* 5 (unpublished on file with author).

17. See Paul A. David, *Understanding the Economics of QWERTY: The Necessity of History*, in ECONOMIC HISTORY AND MODERN ECONOMICS 30-49 (William N. Parker ed., 1986). See also Paul David, *Clio and the Economics of QWERTY*, 75 AM. ECON. REV. 332, 332-34 (1985); Paul David, *Why Are Institutions the "Carriers of History?" Notes on Path-Dependence and the Evolution of Conventions, Organizations and Institutions*, 5 STRUCTURAL CHANGES & ECON. DYNAMICS 205 (1994). For an argument against QWERTY as an example of path-dependence, see LIEBOWITZ AND MARGOLIS, WINNERS, LOSERS AND MICROSOFT, *supra* note 14 at x.

18. Scott Page has argued that the relative disadvantage or "negative externalities" created by the QWERTY feedback loop are what drive path dependence, and not positive externalities. See

Page, An Essay, *supra* note 16 at x. In my view, Page's argument confuses the issue. First, it is the positive feedback loop—positive in the sense not that it confers benefits but that it produces movement in the same direction—that creates both positive and negative externalities. Second, I would argue that in most real-world cases, both the negative externalities experienced by competitor keyboards and the positive externalities enjoyed by QWERTY are incident to the same institutional feedback loop. To be sure, in the theoretical world, feedback loops could create positive externalities or effects—effects that benefit one competitor—without creating negative effects on competitors. But practically speaking, in a world of limited resources, any feedback loop that confers positive benefits on a dominant market player is likely also to confer negative effects on competitors in the same market.

19. Michael A. Cusumano, Yiorgos Mylonadis, and Richard S. Rosenbloom. *Strategic Maneuvering and Mass-Market Dynamics: The Triumph of VHS over Beta*, 66 BUSINESS HISTORY REVIEW 51 (1992); See also W. Brian Arthur, *Positive Feedbacks in the Economy*, 262 SCI. AM. 92 (1990); Arthur, Increasing Returns *supra* note 14 at 2.

20. See *id.* at 112.

21. Glenn C. Loury, A Dynamic Theory of Racial Income Differences, in *Women, Minorities and Employment Discrimination* (P.A. Wallace and A. La Mond eds. 1977).

22. See *id.* In particular, Loury argues that because public schooling and job networks in segregated black communities are under-resourced, blacks will find it more costly to invest in human capital. In turn, so long as blacks find it more costly to acquire education and training, public schooling (which is financed from the wealth of the surrounding community) and community job networks will be under-resourced.

23. As noted earlier, and as more fully described in Chapter 2, other racial groups did not suffer the same degree of anti-competitive exclusion as did blacks and Latinos. In addition, other immigrant groups came with more human capital or actual capital than did either of these two groups.

24. See Chapter 2's discussion of the monopoly strategies deployed by racial cartels during Jim Crow and slavery.

25. These results hold true in studies that control for income and other factors. See THOMAS M. SHAPIRO, THE HIDDEN COST OF BEING AFRICAN AMERICAN: HOW WEALTH PERPETUATES INEQUALITY 47 (2004); MELVIN L. OLIVER AND THOMAS M. SHAPIRO, BLACK WEALTH/WHITE WEALTH: A NEW PERSPECTIVE ON RACIAL

INEQUALITY 7 (1997) (reporting 15 percent); Francine D. Blau and John W. Graham, *Black-White Differences in Wealth and Asset Composition*, 105 QUART. J. ECON. 321, 321 (1990) (reporting 18 percent).

26. See Shapiro, *The Hidden Cost*, *supra* note 25 at 47.

27. Rakesh Kochhar, *The Wealth of Hispanic Households, 1996-2002*, Pew Hispanic Center Report 2, October 2004.

28. Dalton Conley, *Decomposing the Black-White Wealth Gap*, 71 SOC. INQ. 39 (2001) (citing to Oliver and Shapiro, get original citation).

29. Laurence J. Kotlikoff and Lawrence H. Summers, *The Contribution of Intergenerational Transfers To Total Wealth: A Reply*, NBER Working Paper No. 1827 (Feb. 1986) (reviewing evidence accumulated after 1981); *See also* Laurence J. Kotlikoff and Lawrence H. Summers, *The Role of Intergenerational Transfers in Aggregate Capital Accumulation*, 89 J. POL. ECON. 706, 730 (1981) (intergenerational transfers are the “major element determining wealth accumulation” in the U.S.; eliminating intergenerational transfers would reduce wealth by \$3 trillion).

30. *See* OLIVER AND SHAPIRO, *BLACK WEALTH/WHITE WEALTH*, *supra* note 25 at 169 (wealth transfers matter most at the top and bottom of wealth spectrum).

31. Conley’s analysis controlled for income, occupation, age, family structure, education and a host of other demographic variables that might affect an individual’s net worth. DALTON CONLEY, *BEING BLACK, LIVING IN THE RED: RACE, WEALTH AND SOCIAL POLICY IN AMERICA* 47 (1999).

32. James Curtis, *Long-Run Differences in Wealth Among Blacks and Whites: Empirical Results from Structural Regression Decomposition*, 2001 Annual Meeting of the Social Science History Association Meetings, Chicago, Illinois, at 18.

33. Erik Hurst, Ming Ching Luoh, and Frank P. Stafford, *The Wealth Dynamics of American Families, 1984-1994*, *Brookings Papers on Economic Activity* 1 (1998).

34. *Census of Housing, Homeownership by Race and Hispanic Origin, Census 2000*.

35. Kerwin Charles and Erik Hurst, *The Transition to Home Ownership and the Black-White Wealth Gap*, 84 REV. OF ECON. AND STATISTICS 281, 295 (2002). Thomas Shapiro estimates that 46 percent of whites get assistance in some form, versus 12 percent of black

families. SHAPIRO, THE HIDDEN COST OF BEING AFRICAN-AMERICAN, *supra* note 25 at 112.

36. See Charles and Hurst, The Transition to Home Ownership, *supra* note 35 at 295.

37. See *id.*

38. See *id.* at 292.

39. Suzanne D. Withers, Carolina Reid, Racial Differences in Intergenerational Wealth Transfers and Access to Homeownership, Annual Meetings of the Population Association of America (Philadelphia).

40. Charles and Hurst, The Transition to Home Ownership, *supra* note 35 at 284.

41. OLIVER AND SHAPIRO, BLACK WEALTH/WHITE WEALTH, *supra* note 25 at 148.

42. DALTON CONLEY, BEING BLACK, *supra* note 31 at 58.

43. Dalton Conley, *Capital for College: Parental Assets and Postsecondary Schooling*, 74 SOCIOLOGY OF EDUCATION 59, 66-68 (2001) (reporting an advantage of .23 to .32 years of schooling). See also CONLEY, BEING BLACK, *supra* note 31 at 68 (reporting the same result for high school attendance and completion).

44. See ARTHUR, INCREASING RETURNS, *supra* note 12 at x.

45. See Clayton P. Gillette, *Lock-In Effects in Law and Norms*, 78 B.U. L. Rev. 813 (1998) (discussing network effects in norm dynamics). A number of authors have been less convinced of the operation of network effects. See LIEBOWITZ AND MARGOLIS, WINNERS, LOSERS AND MICROSOFT, *supra* note 14; Stanley Liebowitz and Steven Margolis, *Network Externality: An Uncommon Tragedy*, 8 J. ECON. PERSP. 133 (1994); Mark A. Lemley and David McGowan, *Legal Implications of Network Economic Effects*, *supra* note 11.

46. Alejandro Portes, *Social Capital: Its Origins and Applications in Modern Sociology*, 24 ANN. REV. SOCIOL. 1, 4 (1998).

47. David S. Wilson, *Gossip and Other Aspects of Language as Group Level Adaptations*, in COGNITION AND EVOLUTION (Charles Heyes and Lawrence Huber eds. 2000).

48. Sociologist Pierre Bourdieu defines social capital as the pool of actual or potential resources that are linked to membership in a network of acquaintance or recognition. Pierre Bourdieu, *The Forms of Capital*, in HANDBOOK OF THEORY AND RESEARCH FOR THE SOCIOLOGY OF EDUCATION 248, (ed. JG Richardson 1985).
49. Nan Lin, *Building A Network Theory of Social Capital*, 22 CONNECTIONS 28, 31 (1999).
50. Mark S. Granovetter, *The Strength of Weak Ties*, 78 AM. J. SOC. 1360, 2371 (1973) (reporting in a study of professional, managerial and technical workers that over 56 percent of employees found their jobs through references from social contacts). See also MARK S. GRANOVETTER, GETTING A JOB: A STUDY OF CONTACTS AND CAREERS.
51. See ROYSTER, RACE AND THE INVISIBLE HAND, *supra* note 10; MERCER L. SULLIVAN, GETTING PAID: YOUTH CRIME AND WORK IN THE INNER CITY (1989).
52. Lisa Finneran & Morgan Kelly, *Social Networks and Inequality*, 53 J. URB. ECON. 282 (2003).
53. Kenneth J. Arrow and Ron Borzekowski, *Limited Network Connections and the Distribution of Wages*, Staff Working Paper prepared for U.S. Federal Reserve Finance and Economics Discussion Group, August, 2004. See also James Montgomery, *Social Networks and Labor-Market Outcomes: Toward An Economic Analysis*, 81 AMER. ECON. REV. 1408 (1991).
54. An opposing school of thought, represented by the work of sociologist Nan Lin, argues that, at least in the case of more mature workers, strong ties increase a person's chances of connecting to people who have the authority to influence hiring decisions. Nan Lin, Walter M. Ensel, and John C. Vaughn, *Social Resources and Strength of Ties: Structural Factors in Occupational Status Attainment*, 46 AMER. SOCIOL. REV. 393 (1981). To ask someone in power to intervene in a hiring decision, the job candidate must have a fairly strong relationship to the decision maker, or must know someone who knows the decision maker quite well. Lin argues that blacks and Latinos may not have social networks with sufficiently strong ties to persuade decision makers to act on the candidate's behalf. Royster's work confirms this notion. In her study, although white and black male students took classes from the same high school shop teachers, the white shop teachers were far more likely to ask white students to do work on the side for them, or to put them in touch with the union foreman or some other person in high authority when job seeking.
55. See Granovetter, *The Strength of Weak Ties*, *supra* note 50 at 52.

56. RONALD S. BURT, STRUCTURAL HOLES: THE SOCIAL STRUCTURE OF COMPETITION (1995). Structural holes can create a competitive advantage for a person whose relationships bridge the holes or gaps. Holes provide this individual an opportunity to control the flow of information between the disconnected parts of the network. NAN LIN, SOCIAL CAPITAL: A THEORY OF SOCIAL STRUCTURE AND ACTION 70-71 (2001).

57. James D. Montgomery, *Social Networks and Labor-Market Outcomes: Toward an Economic Analysis*, 81 AM. ECON. REV. 1408, x (1991).

58. See LIN, SOCIAL CAPITAL, *supra* note 56 at 66.

59. Paul Krugman, *History and Industry Location: The Case of the Manufacturing Belt*, 81 AM. ECON. REV. 80 (1991); Arthur, *Increasing Returns*, *supra* note 12 at 49-67.

60. Leonard Rubinowitz and James Rosenbaum documented the results from the Gautreaux Assisted Housing Program, which moved over 7100 black families to predominantly white neighborhoods (with fewer than thirty percent black residents) in the Chicago suburbs as part of a consent decree. These scholars found that for those families who moved to neighborhoods in the suburbs, 54 percent of the children from those families enrolled in college, versus 21 percent of the control group who used their Section 8 benefits to stay in the city. Recent follow-up research has confirmed that these differences have persisted. LEONARD RUBINOWITZ AND JAMES ROSENBAUM, CROSSING THE CLASS AND COLOR LINES: FROM PUBLIC HOUSING TO WHITE SUBURBIA (2000). It is important to note that the original Gautreaux research (Gautreaux I) did not rely on random assignment for moving residents—those residents who moved chose to do so. In addition, no control group existed for the Gautreaux I research—only families that moved were studied, and comparisons were drawn between the neighborhoods into which the families moved. Thus, the research may be of relatively limited capacity in fully studying the impact of residential mobility. See Greg Duncan and Anita Zuberi, *Mobility Lessons from Gautreaux and Moving to Opportunity*, 1 NW J. L. SOC. POL. 110, 113 ().

Research from a government-funded program called Moving to Opportunity, in which mobility programs did not require that the better receiving neighborhood be racially integrated, did not produce the same results as Gautreaux I. Scholars speculate that this may well be because of the failure to require that residents move to racially integrated or predominantly white neighborhoods. See *id.* Research from a second round of Gautreaux moves (in which racial and poverty characteristics of the receiving neighborhoods also varied) is not yet complete. See *id.* at 111.

61. For studies looking at public finance, see Steven Durlauf, *Neighborhood Feedbacks, Endogenous Stratification and Income Inequality* in DYNAMIC DISEQUILIBRIUM MODELING (W. Barnett, G. Gandolfo and C. Hillinger eds. 1996); Steven Durlauf, *A Theory of Persistent Income Inequality*, 1 J. OF ECON. GROWTH 75 (1996); Raquel Fernandez and Richard Rogerson, *Income Distribution, Communities and the Quality of Public Education*, 111 QUART. J. OF ECON. 135 (1996); Thomas Nechyba, *Existence of Equilibrium and Stratification in Local and Hierarchical Tiebout Economies with Property Taxes and Voting*, 10 ECON. THEORY 277 (1997). Durlauf's work also included the effect of neighborhood distribution of incomes on the productivity of educational expenditures. Karla Hoff and Amartya Sen's study examined the way in which the value of a home is affected by expenditures of the neighbors. Karla Hoff and Anjit Sen, *Home-Ownership, Community Interactions and Segregation*, World Bank (2000).

62. See Mark Dynarski, Robert Schwab and Ernest Zampelli, *Local Characteristics and Public Production: The Case of Education*, 26 J. URBAN ECON. 250 (1989); Charles F. Manski, *Educational Choice (Vouchers) and Social Mobility*, 11 ECON. OF EDUCATION REV. 351, 356 (1992).

63. Benabou?

64. See Dennis Epple and Richard Romano, *Competition Between Private and Public Schools, Vouchers, and Peer Group Effects*, 88 AMER. ECON. REV. 33 (1998); Rachel Fernandez and Robert Rogerson, *Income Distribution, Communities and the Quality of Public Education*, 111 QUART. J. ECON. 135 (1996).

65. Roland Benabou, *Equity and Efficiency in Human Capital Investment: The Local Connection*, 63 REV. OF ECON. STUDIES 237, 238 (1996); See also Roland Benabou, *Human Capital, Inequality and Growth: A Local Perspective*, 38 EUR. ECON. REV. 817 (1994).

66. Beyond the self-reinforcing advantage to whites that historical monopoly conferred, blacks also suffered accompanying disadvantage in their ability to pay for housing in segregated neighborhoods. According to historian Arnold Hirsch, blacks paid more to buy housing in segregated neighborhoods, largely because supply was restricted to a smaller geographic space. At least in the rental market, blacks paid 15 to 50 percent higher rent than whites paid for similar accommodations. ARNOLD HIRSCH, MAKING THE SECOND GHETTO (1983).

67. See Benabou, Local Connection, *supra* note 65 at 247.

68. *Id.* at 257.

69. Kathleen Thelen, *How Institutions Evolve: The Political Economy of Skills in Germany, Britain, the United States and Japan* 289 (2004) (describing structuralist notions of positive feedback in political economy theories of change and persistence).
70. Thomas J. Espenshade, Chang Y. Chung and Joan L. Walling, *Admissions Preferences for Minority Applicants, Athletes and Legacies at Elite Universities*, 85 *Social Science Quarterly* 1422, 1430 (2004).
71. See James Traub, *Ivory Tower Intrigues: The Pseudo-Meritocracy of the Ivy League* (reviewing Jerome Karabel's *The Chosen*) *Slate Magazine* (viewed online at <http://www.slate.com/id/2128377>, on June 30, 2007).
72. Jerome Karabel, *The Chosen: The Hidden History of Admission and Exclusion at Harvard, Yale and Princeton* 21-24 (2005).
73. *Id.* at 170, 172, 176.
74. *Id.* at 132.
75. (Respondent's SCT Brief in *Gratz*, citing to Joint Appendix in Sixth Circuit).
76. See Benjamin Schneider, *The People Make The Place*, 40 *Personnel Psychology* 437 (1998). See also Benjamin Schneider, *The ASA Framework: An Update* 48 *Personnel Psychology* 747 (1995).
77. William G. Roy, *Socializing Capital: The Rise of the Large Industrial Corporation* (1997); see also Neil Fligstein, *The Transformation of Corporate Control* (1990).
78. Get cite.
79. Tom Hertz, *Rags, Riches and Race: The Intergenerational Economic Mobility of Black and White Families in the United States*, in *UNEQUAL CHANCES: FAMILY BACKGROUND AND ECONOMIC SUCCESS* (S. Bowles, H. Gintis and M. Osborne eds forthcoming).
80. See Eugene Marais, *The Soul of the White Ant* (1925) (arguing that termite colonies functioned as a single organism, with the queen of the colony functioning as the colony's brain.)
81. See Daria Roithmayr and Derek Robinson, *An Agent Based Model of Residential Segregation and Fair Housing Law* (draft on file with author). Agent based modeling is a method used by complex systems theorists to represent the interactions of individual agents in a complex

system according to simple rules of conduct. The computer simulation permits the modeler to set initial conditions and then to run the model to simulate dynamic evolution. *See* Robert Axelrod, *Advancing the Art of Simulation in the Social Sciences*, in SIMULATING SOCIAL PHENOMENA (Rosario Conte, Rainer Hegselmann and Pietro Terna eds. 1997).

82. Asset accumulation for each family increases each generation by 5% of the previous generation's assets, and by 3% of the average assets from neighbors. *See* Appendix A-1.

83. Whether the neighborhood is sufficiently attractive is determined by assessing whether the average neighbor's assets are at least fifteen per cent greater than the moving family's assets. *See id.*

84. Whether a family can afford to move into the neighborhood is determined by whether the family's assets are greater than or equal to the average of neighbor assets. *See id.*

85. Black families are assigned 60% fewer initial assets than white families, to reflect disparities in wealth that existed at the end of Reconstruction. *See id.*

86. The Appendix contains relevant programming information and initial parameter settings for the model.

87. *See* DOUGLAS S. MASSEY AND NANCY A. DENTON, AMERICAN APARTHEID: SEGREGATION AND THE MAKING OF THE UNDERCLASS 32-33 (1993).

88. *See, e.g.,* Deborah Malamud, *The Jew Taboo: Jewish Difference and the Affirmative Action Debate*, 59 OHIO STATE L. J. 915 (1989) (arguing that Eastern European Jewish immigrants came with a set of labor skills in the garment industry that matched to particular service needs in the U.S. economy, and that Jews were able to find work in the civil service sector, an area of employment not open to blacks).

89. Recent research indicates that, contrary to popular perception, racial gaps are quite persistent and robust. *See* WILLIAM A. DARITY & SAMUEL L. MYERS, PERSISTENT DISPARITY: RACE AND ECONOMIC INEQUALITY SINCE 1945 (1998). For example, a recent study suggests that the diminution of the racial gap in earnings is illusory, and wages between blacks and whites are not converging. This study argues that earlier literature is flawed because it has excluded non-earners from the calculus. *See* Amitabh Chandra, *Is The Convergence of the Racial Wage Gap Illusory?* 1-5, 21-36 (Nat'l Bureau of Econ. Research, NBER Working Paper No. 9476, 2003). *See also* Darity & Myers, *supra*, at 43-72. Likewise, recent groundbreaking research confirms a stable and substantial gap in education test scores, and argues that this gap is almost

wholly attributable to the quality of schools. See Roland Fryer & Steven D. Levitt, *Understanding the Black-White Test Score Gap In the First Two Years of School*, (Nat'l Bureau of Econ. Research, NBER Working Paper No. 8975, 2002). To be sure, controversy exists over the question of permanence. Some studies indicate that racial gaps are closing, albeit slowly. See e.g., EDWARD WOLFF, RACIAL WEALTH DISPARITIES: IS THE GAP CLOSING? 5 (Levy Econ. Inst., Public Policy Brief No. 66, 2000) (estimating that it will take another 72 years to close the wealth gap at current rates); THE BLACK-WHITE TEST SCORE GAP 6 (Christopher Jencks & Meredith Phillips eds., 1998) (earnings gap and education gap are narrowing slowly). Even in this literature, however, scholars acknowledge that some aspects of the gap are quite persistent. *See id.* at 154, 167 (documenting that blacks continue to be grossly underrepresented in the upper tails of distribution, and gaps in social science achievement are not narrowing at all). In addition, this research confirms that much of contemporary disparity is explained by cumulative disadvantage. *See Wolff, supra*, at 5.

90. Scott Page, *The Logic of Diversity*, *supra* note 67.

91. Jared Diamond, *Guns, Germs and Steel: The Fates of Human Societies* (1999).

Appendix A-1

Initial Condition Parameters

Lattice Size: 30X30
Neighborhood type: Moore Neighborhood of Range 2
Mean Black Assets: 40
Standard Deviation Black Assets: 20
Mean White Assets: 100
Standard Deviation White Assets: 40
Number of Iterations to Mobility Change: 20
Family Asset Accumulation Rate Per Iteration: 3%
Neighborhood Asset Accumulation Rate Per Iteration: 5%
Number of Sites Searched to Find Suitable Space: 50
Percent Open Space: 35%
Mutation Rate: .001 percent mutate to assets within S.D. 50

Rules for Moving:

- (1) First Period Constraint:
Black Families may not move into positions with any white neighbors
- (2) All Periods, All Families: Move When
 1. New Neighborhood Average Assets are at least 15% greater than Old Neighborhood Average Assets
 2. Family Assets are greater than or equal to New Neighborhood Average Assets
- (3) Activation: Randomized, Asynchronous:

Starting with a random Family, each Family is given opportunity to move once per iteration; All families move when possible.