ONE

WHAT IS THE MATTHEW EFFECT?

WE ARE ALL familiar with the popular saying that the rich get richer while the poor get poorer. Though it oversimplifies reality considerably, the saying captures an important insight into the workings of the social world. In many spheres of life, we observe that initial advantage tends to beget further advantage, and disadvantage further disadvantage, among individuals and groups through time, creating widening gaps between those who have more and those who have less. The distinguished sociologist Robert K. Merton called this phenomenon the Matthew effect, from a verse in the Gospel of Matthew (13:12), which observes that "for whosoever hath, to him shall be given, and he shall have more abundance: but whosoever hath not, from him shall be taken away even that he hath."[1]

The existence of Matthew effects in social life may seem obvious. Yet the more closely we examine the phenomenon, the more complex and less obvious it becomes. In the first place, it is not universally true that the rich get richer while the poor get poorer—whether the riches in question are money, power, prestige, knowledge, or any other valued resource. Sometimes it happens that the rich and poor both get richer. Sometimes, as in deep economic recessions, the rich and poor both get poorer. And sometimes, though rarely, we find the rich getting poorer while the poor grow richer. Initial advantage does not always lead to further advantage, and initial disadvantage does not always lead to further disadvantage.

A host of vexing questions thus arise. Why and under what circumstances do Matthew effects occur, and why do they sometimes fail to occur? Why do we observe Matthew effects across such a broad spectrum of social settings, from economic systems to scientific communities and from schools to political institutions? Insofar as such effects produce growing inequalities within social systems, what are their moral and political implications? Matthew effects sometimes may produce socially beneficial results, but surely they may also produce manifest injustices, breeding resentment and even reactive violence among those who are left behind. Do we really wish to create a future in which the chasms that exist between the advantaged and the disadvantaged continually widen?

Finally, are Matthew effects and the widening inequalities they create beyond human control? Are they a law of nature, like gravity, which we simply must accept as inevitable? Or are they social constructs, created by human beings and thus susceptible to human choice and change? Can we control Matthew effects and their consequences, or must they inevitably control us?

Those who study inequality, or what sociologists call social stratification, have invoked a multitude of factors to explain how inequalities in the distribution of resources originate among individuals and groups. Some have argued that the rise of inequalities is largely attributable to differences in motivation, talent, and personal initiative. Others find the roots of inequality in brute force and the exploitation of the powerless by the powerful.[2]

The study of Matthew effects, however, is concerned less with the sources of inequality than with how these inequalities persist and grow through time. It explores the mechanisms or processes through which inequalities, once they come into existence, become self-perpetuating and self-amplifying in the absence of intervention, widening the gap between those who have more and those who have less. No theory of stratification is complete without attention to such processes.

The study of Matthew effects can have disturbing implications, especially for those of us who have enjoyed more initial advantages than most. We want to believe that the advantages we were born with, and whatever further advantages we have managed to accumulate in the

course of our lives, are earned and well deserved. Meanwhile, we are surrounded on all sides by extreme social inequalities, not only in our own nation, but also within and among the nations of the world. If we are honest, we must acknowledge that some of us benefit personally from systems of inequality from which others suffer. Some part of us would prefer not to think about these issues; we may prefer to suppress these questions altogether, fearing that their answers will not profit us. Yet there is another part of us—some call it the social conscience—that activates a concern for the well-being of others and for the common good. That part of us, which Abraham Lincoln called the better angels of our nature, takes a special interest in how Matthew effects work, and will seek to know what, if anything, we can do to counteract their more destructive consequences.

Though we may be largely unaware of them, Matthew effects impinge on our lives and shape our futures. Most of us in advanced industrial societies are neither very rich nor very poor, but reside somewhere in the great gray middle. We may be advantaged in some respects—genetically, financially, educationally, socially—and disadvantaged in others. If we play our cards well, exploiting our advantages while mitigating our disadvantages—or if we are just plain lucky—Matthew effects may carry us in an upward spiral toward further advantage. On the other hand, if we play our cards poorly, or if unforeseen events, such as economic downturns, personal health issues, or family crises suddenly collide with our lives, the powerful undertow of Matthew effects may drag us downward. Sometimes neither our advantages nor our disadvantages are sufficiently great to set into motion either an upward or a downward spiral, and we find ourselves at a kind of break-even point, at which upward and downward effects roughly cancel each other out. But those who live in this great gray middle are continually vulnerable to the unexpected, to the uncontrollable, and to the impersonal mechanisms of Matthew effects. This book is primarily about the most advantaged and disadvantaged among us—the relatively rich and the relatively poor. But it is really about all of us, as we may all potentially encounter tipping points (Gladwell 2000) that sweep us either upward or downward into personal and social spirals. It is in our interest to understand how these

tipping mechanisms work and how they shape our lives for better or for worse.

An understanding of Matthew effects and their social implications is largely missing from current discussions of national and international policy. It is urgent that we raise awareness of the dynamics of cumulative advantage, particularly in the face of recent policy initiatives—such as proposals for a return to more regressive forms of taxation and for the rollback of civil rights laws—that threaten to further concentrate advantages in the hands of those who are already most advantaged. Matthew effects are a missing piece of the puzzle that must be set into place if we are to understand the deeper dynamics of inequality in the world, both locally and globally. My hope is that scholars, policy makers, students, and citizens at large will find in this book a thought-provoking introduction to one of the most important and least-known principles in the social sciences, and that they will find ways to translate its insights into humane practice.

THE ORIGIN OF THE TERM

The term *Matthew effect* was coined by the Columbia University sociologist Robert K. Merton (1968a) to refer to the commonly observed tendency, noted above, for initial advantages to accumulate through time. Merton found that in certain social systems, initial advantages are self-amplifying. Like the proverbial snowball that grows larger as it rolls down a hillside, resources tend to attract and accumulate more resources, which in turn accumulate still more resources. In his pioneering studies of prestige systems in scientific communities, Merton demonstrated that prestigious scientists and institutions tend to attract inordinate attention and resources, leading to the further accumulation of prestige, which in turn attracts further resources.

As noted above, Merton borrowed his term from the Gospel of Matthew (13:12), variations of which also appear in Matthew (25:29), Mark (4:25), and Luke (8:18 and 19:26). All these verses observe that to those who have, more will be given, while to those who have less, even that will be taken away[3]—or in popular parlance, the rich get

richer and the poor get poorer. While these scriptural passages superficially may seem to refer to material wealth, their context makes clear that wealth is to be understood as a metaphor for the accumulation of spiritual understanding and the development of talents.[4] When we say that the rich get richer, we do not limit ourselves to considering material inequalities alone. As social scientists have employed the term, Matthew effects are not confined to the realm of economic inequalities, but may amplify inequalities of any kind in the distribution of valued resources, whether economic, political, cultural, or personal.

Merton first identified Matthew effects in the institutions of science, but similar effects are observed across a broad range of institutional settings. Scholarly literature on Matthew effects turns up in a remarkably diverse range of fields of study, including sociology and other social sciences, educational psychology, legal and policy studies, and even biology. There are surprisingly few explicit references to Matthew effects in economics—the field in which we might most expect to find them—but we do find closely similar concepts, such as economist Gunnar Myrdal's (1944; 1957) notion of circular and cumulative causation, to which we shall return.

Matthew effects are also implicit in cybernetics and systems theory, particularly in the concept of feedback loops. Early systems theory in sociology, especially in the work of Talcott Parsons (1951), focused largely on social processes that maintain equilibrium or stability in society. These processes are analogous to what cybernetic theorists call negative feedback loops (Wiener 1961 [1948]:97). Like the thermostat in your house or the homeostatic processes in your body, negative feedback loops moderate the behavior of a system around a stable state or set point. Matthew effects, by contrast, resemble positive feedback loops, which typically amplify deviations from set points and thereby destabilize systems—in this instance, by producing ever greater social inequalities. We will have more to say about feedback loops and nonlinear systems as our story unfolds.[5]

This book attempts to weave the scattered strands of literature on Matthew effects into a coherent whole to demonstrate their prevalence and significance across social institutions. In doing so, we go beyond Merton's work to account for more than forty years of multi-

disciplinary scholarship that has accumulated since Merton first proposed the concept. Chapter 2 considers the dynamics of cumulative advantage in the fields of science and technology. Chapter 3 examines their significance in economic systems; Chapter 4 in politics and public policy; and Chapter 5 in education and other cultural spheres. Finally, Chapter 6 considers some moral and political implications of self-amplifying advantage. There, we ask whether the Matthew effect might rightly be regarded as a social-scientific law influencing the behavior of social systems in general, or whether it is better understood as a social construct that we can choose to counteract if we have the moral and political will to do so.

THE PARABLE OF THE MONOPOLY GAME

To clarify the concept of the Matthew effect, it may be useful to begin with a modern parable. In the board game of Monopoly, all players begin with equal resources. Yet equal opportunity at the start soon gives way to extreme inequalities in the distribution of resources. Though there may be ups and downs along the way, the richer players tend to get richer, and the poorer players poorer, until eventually the richest player has monopolized all resources and the poor are left with nothing at all. As successful players accumulate income-producing property through a combination of skill and luck, their cumulative advantages allow them to reinvest new income in accumulating still more property, producing still more new income. This snowballing pattern of self-amplifying accumulation results in a Matthew effect that ultimately allows the most advantaged player to crush all opponents.

The sociologist Leonard Beeghly (1989) invites us to imagine a slight variation on the game of Monopoly that more nearly resembles real life. In Beeghly's version, each player begins with a different sum of money. Let us suppose hypothetically that some players begin the game with $5,000, others begin with $1,000, and still others with only $500. Those who begin with $5,000 enjoy a considerable head start on the competition. They can well afford to acquire every property they

land on, and they soon own a disproportionate share of the income-producing properties on the board. Those who follow after them are less able to afford properties of their own, and instead usually find themselves spending their limited resources in rent payments, enriching the large owners and impoverishing themselves in the process. The laws of probability virtually ensure that under these conditions, the rich will get richer and the poor poorer, and through no special virtue or vice of their own. Initial advantages are parlayed into greater advantages, creating a widening gap between haves and have-nots—or, more precisely, between have-mores and have-lesses—through time.

It is true that everyone has some degree of opportunity to succeed in such a game, however small that chance may be, and in rare instances, a player who begins with fewer resources may win through some combination of luck and skill. But it is a statistical fallacy to claim that rich and poor players have an equal opportunity to succeed. The rules and initial conditions of the game virtually guarantee that inequalities widen as the game progresses, even among players who are identical to each other in every respect except initial monetary advantage. When two identical twins with the same level of talent and effort play this version of Monopoly against each other, the twin who begins with more resources almost always wins.

In many ways, American society resembles the skewed Monopoly game described above. Like skewed Monopoly, American society is a highly competitive system driven largely by the pursuit of material success, and participants begin with vastly differing resources. Yet despite these vast inequalities of initial condition, and despite the obvious advantages that these initial conditions confer upon the more privileged, many Americans remain steadfast in the conviction that ours is indeed a land of equal opportunity. They fail to distinguish between the statements that everyone in America has an opportunity to succeed and that everyone in America has an *equal* opportunity to succeed.

The first statement is undeniably true. The second is profoundly and demonstrably false. In the United States or any other modern so-

ciety, the probability of going from rags to riches exists, and one may produce carefully selected anecdotes to prove that this is commonplace. But in reality, the probability of going from rags to riches—or from riches to rags—is miniscule compared to the probability of going from riches to riches, or from rags to rags. Highly selective and unrepresentative anecdotes only obscure the larger statistical truth of the matter: Though some social mobility does occur, those who begin life with substantial advantages generally fare much better, on average, than those who do not.

As the old baseball joke has it, some begin life with two strikes against them while others are born on third base and think they've hit a triple. And while the former may reach home in some instances, and the latter may fail to do so, the probabilities overwhelmingly favor the latter over the former, as any good baseball statistician will verify. The respective chances of the two players are not even remotely equal, even when the two players are exactly equal in talent and drive. Would any rational and informed person seriously argue that the son or daughter of a billionaire and the son or daughter of a migrant farm worker share anything even remotely approaching an equal opportunity to acquire material wealth? Yet many among us seem implicitly to believe that this is the case, and grow hostile at the mere suggestion that it may be patently untrue.

ABSOLUTE VERSUS RELATIVE MATTHEW EFFECTS

The game of Monopoly is a particularly clear example of what we might call absolute Matthew effects. The rich get absolutely richer while the poor get absolutely poorer and eventually go bankrupt. But we may also speak of relative Matthew effects, which occur when the rich and poor both get richer, but the rich get richer by a larger margin, creating a widening gap between themselves and the poor. This latter type may be neatly illustrated through the familiar concept of compound interest. Suppose that you and I both deposit our money in a bank that generously offers (let us say for the sake of easy calcula-

tion) a 10 percent annual rate of interest on our deposits. Further suppose that I have $1,000 to deposit, while you have only $100. Thus the initial gap between us stands at $900. Now suppose that we track our respective bank accounts over time, reinvesting our interest by adding it to our accumulated principal compounded annually. By the end of the first year, I have $1,100 and you have $110. We have both grown richer by 10 percent, but the gap between our respective accounts has widened from $900 to $990. Over time, the size of this gap widens at an accelerating rate, so that by the end of ten years, I have $2,594 in my account and you have only $259 in yours. An initial difference of $900 is now a difference of $2,335. After 100 years, my account holds nearly $14 million and yours nearly $1.4 million. The ratio of my account to yours remains constant at 10 to 1, but the gap between the two stands at more than $12 million. We have experienced the same percentage growth in our initial investments. But wealth and buying power are not measured in percentage points; they are measured in units of currency, and in that regard, I have gained vastly more than you have, and through no moral virtue of my own. I have merely ridden the mathematical wave of the Matthew effect.

The example of compound interest illustrates a relative Matthew effect: Both accounts grow at the same rate, yet because my gains on a larger base vastly exceed yours, the gap between us widens dramatically over time. The gap widens even more rapidly when, as often happens in the real world of finance, those who begin with more receive a higher rate of return on their investments than those who begin with less.

Thus far, we have considered compound interest only from the point of view of the investor. Big investors stand to gain more from compound interest than small investors do. Now consider the situation from the perspective of the debtor, whose interest payments on the unpaid balance of a loan are also compounded, and whose compounded losses make the lender's compounded gains possible. As Boshara (2003:94) observes, "wealth, like debt, is self-replicating. Compound interest turns wealth into more wealth and debt into more debt." The lender grows richer while the debtor grows poorer—especially if the debtor borrows from a predatory lender and sinks even

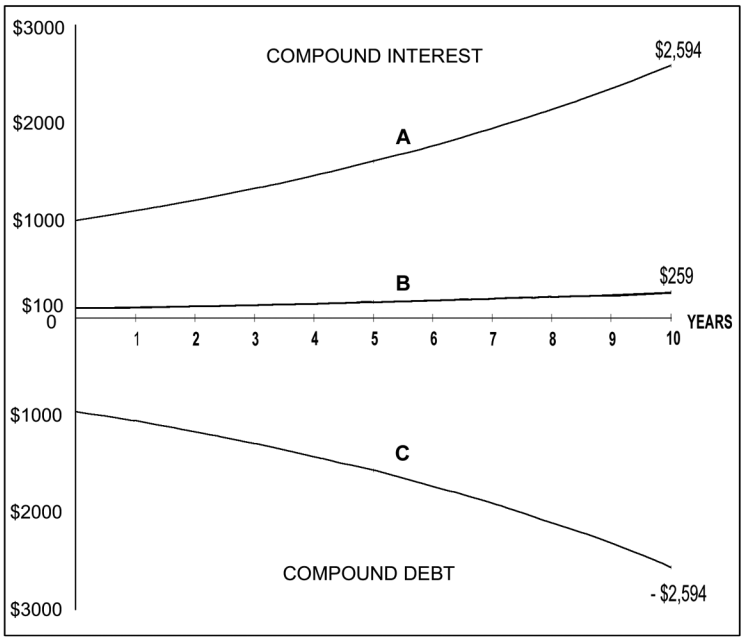
more deeply into debt. In such real life circumstances, the gap between rich and poor widens even more rapidly than in the previous example, producing not merely a relative but an absolute Matthew effect. As the appendix shows, something similar to this has occurred in many developing countries, as they have sunk ever more deeply into debt to banks in the developed world and cannot pay even the interest on their loans, let alone repay the principal. Developed countries themselves are not immune to the hazards of compound debt. The national debt in the United States currently exceeds $10 trillion, with the rapidly expanding interest on this debt to be repaid, theoretically, by future generations. The dynamics of compound interest and compound debt are illustrated in the accompanying figure.

The opposite of a Matthew effect is observed when the rich get poorer while the poor get richer. Historically, such effects are considerably rarer than Matthew effects, but they may occur when upper classes are brought down (through violent or peaceful means) and their resources are redistributed among the have-nots. In this instance, the gap between rich and poor narrows—that is, if the rich are not liquidated along with their assets. Finally, the rich and poor may grow poor together at varying rates, as can occur during economic depressions, when the total size of the economic pie shrinks and every stratum of society receives a smaller piece.

As we reflect further upon these types, we realize that there are actually six possible subtypes, or patterns of relations, between those who have more and those who have less when we account for the rates at which individuals or groups become richer or poorer. Let us leave aside for the moment those who are neither rich nor poor but somewhere in between, and consider only those at either extreme. When we compare the resources of two individuals or groups at two points in time, we may find any of the following scenarios:

THE GAP BETWEEN RICH AND POOR WIDENS WHEN . . .

1. The rich get richer while the poor get poorer, creating an absolute Matthew effect;



ABSOLUTE AND RELATIVE MATTHEW EFFECTS

The figure illustrates relative and absolute Matthew effects using compound interest and debt as examples. Line A represents an investor who deposits $1,000 for ten years at a hypothetical 10 percent rate of interest, compounded annually. Line B represents an investor who has only $100 to invest at the same rate. The relationship between A and B illustrates a relative Matthew effect. Both investors gain after ten years and the ratio of their respective gains remains constant at 10:1, but investor A's gains are far larger as the monetary gap between A and B widens from $900 to $2,335. Line C represents a borrower who cannot repay the principal on a $1,000 loan and is assessed annual interest and fees amounting to 10 percent compounded annually. The relationship between A (or B) and C illustrates an absolute Matthew effect, wherein the more advantaged gain while the less advantaged fall farther behind, in not only relative but absolute terms.

2. The rich get richer while the poor get richer at a slower rate, creating a relative Matthew effect;
3. The rich get poorer while the poor get poorer at a faster rate.

THE GAP BETWEEN RICH AND POOR NARROWS WHEN . . .

4. The rich get poorer while the poor get poorer at a slower rate.
5. The rich get richer while the poor get richer at a faster rate.
6. The rich get poorer while the poor get richer—the opposite of an absolute Matthew effect.

To understand the distinction between absolute and relative effects more clearly, we must understand what game theorists call zero-sum games. In a zero-sum game, the sum total of available resources is a fixed quantity. In this closed system, any gain made by one player can only be had at the expense of other players. If we add the gains of the winners and the losses of losers, the sum is zero—hence the term. In a zero-sum game, there can be no relative Matthew effects, no win-win outcomes wherein both rich and poor make gains. Thus economist Lester Thurow (1980) worried that, during periods of economic stagnation, all segments of society would fight over a fixed quantity of economic pie, resulting in socially destructive conflicts. Even more socially destructive would be a negative-sum situation, such as an economic depression, wherein all segments of society must fight for pieces of a shrinking pie.

Contrast the closed system with an open system, in which available resources are expanding. In this positive-sum scenario, relative Matthew effects and win-win outcomes are possible though not inevitable, as one or another player may attempt to monopolize the gains. Something like this appears to have happened in the United States from 1977 to 1989, when 60 percent of national gains in after-tax income (and 77 percent of gains in pre-tax income) found their way into the pockets of the richest 1 percent of the population (Nasar 1992). As the appendix shows, the story of the American economy over the past

thirty years largely has been a tale of growing accumulation of wealth and income at the top, with modest gains among middle-income groups and relative stagnation or absolute decline among the poor.

THE MATTHEW EFFECT IN MERTONIAN THEORY

Before we launch into an analysis of Matthew effects in science, economy, politics, and education, let us first deepen our understanding of the concept by considering its connection to other important concepts in social theory. The recognition of Matthew effects is not, after all, an isolated insight into the workings of the social world; it is an integral part of a complex network of ideas and their relationships, which Robert K. Merton developed throughout the course of his illustrious career. Three concepts in particular are essential to understanding the place of the Matthew effect in the larger corpus of Merton's social theory.

UNINTENDED CONSEQUENCES

First, Mertonian theory emphasizes that social actions often have unintended consequences (1936; 1968b). In a retrospective essay, Merton described the phenomenon of unintended consequences as an "enduring interest" in his intellectual life and a "core idea" from which other important concepts emanated. As a theorist in the functionalist tradition, Merton was interested not only in the subjective motives and intentions of social actors, but also in the objective functions or consequences of their actions for the sustainability of the social or cultural systems within which they occur. He believed that social and cultural systems are the products not of conscious design alone, but of unintended processes of social evolution as well (1998:304).

Merton (1968b:104–05) made an important distinction between manifest and latent functions. A function or consequence of a social phenomenon is said to be manifest if it is intended and recognized by system participants, but latent if it is unintended and unrecognized. Merton introduced a bit of confusion at this point when he conflated

consequences that are intended or unintended with those that are recognized or unrecognized. Hypothetically, a consequence could be intended but unrecognized, or recognized but unintended. Here, we focus not on whether the consequences of a given social phenomenon are recognized, but rather on whether they are intended, and whether such consequences are positive (functional) or negative (dysfunctional) for the sustainability of the social system as a whole. When Gottlieb Daimler invented one of the earliest gasoline-powered automobiles in 1886, he and others clearly intended and recognized that it would transport passengers from one place to another more rapidly than the horse and buggy could. The automobile's primary manifest function was to make transportation more efficient. Daimler probably did not intend or recognize, however, that his invention would have a multitude of other positive and negative consequences as well: It would usher in an era of drive-ins and drive-throughs, freeways and suburbs, petroleum dependence and climate change. For Daimler and those living in his day, these would have been latent functions or dysfunctions of the automobile.

We may take several lessons from the automobile's example. First, we cannot seem to do just one thing; virtually every social act has multiple consequences. The social impact of the automobile has radiated outward in all directions from its point of origin, influencing virtually every aspect of our lives for better and worse. Second, the consequences of social action are not only multiple, but often ambiguous and even contradictory. On the one hand, automobiles have brought us closer together by shrinking the temporal distances among us. On the other hand, they have also simultaneously created greater social distances among us by locking us into isolated moving compartments and allowing us to escape each other at ever greater speeds. Finally, whether one deems the consequences of social action to be positive or negative for society depends in part upon one's own values and interests, resulting in varied understandings of what constitutes the true or desired nature of the social system in question. Freeways and suburbs, which most Americans once regarded as desirable, are now seen increasingly as mixed blessings at best and accursed at worst. Whether petroleum dependency is a positive or a negative consequence of the

automobile may depend on whether one works for an oil company or an environmental defense organization. Thus, when we say that a given social practice is functional, helping to sustain a given society, we must always ask for whom it is functioning well. What kind of society are we trying to sustain, whose interests are to be served, and in what time horizon? The internal-combustion automobile, however functional it may have been for many in the industrial societies of the past, appears to be increasingly dysfunctional for the long-term sustainability of the postindustrial societies of the future.[6]

What has all this to do with Matthew effects? Are such effects intended or unintended, and are they functional or dysfunctional for the sustainability of the social structures in which they occur?

Let us take the first question first. Do social actors consciously design systems in such a way that they systematically favor those who are already advantaged and disfavor those who are not? In other words, are Matthew effects intentionally designed into social systems? We would be naïve not to acknowledge that such intentional design sometimes occurs. The cynic's golden rule—that those who have the gold make the rules—suggests that dominant groups often enjoy the power to design systems from which they themselves will accumulate further benefits.

There are limitations, however, to this rather conspiratorial view of the origin of Matthew effects. Social systems are not entirely the product of conscious design. Every social institution is in some measure an accumulation of unintended and undesigned accretions. Complex social institutions, such as religious and legal systems, evolve over the course of many centuries, reflecting the contributions of countless individuals and groups of diverse ideologies, often working at cross purposes with each other. If Matthew effects are found in these systems, can such effects be neatly ascribed to the self-interested machinations of their master designers? Or are the effects sometimes better understood as products of social evolution, the systemic properties of which are largely unintended and even unrecognized by system participants?

The position advanced here is that the intentionality of Matthew effects must be judged on a case-by-case basis, with close attention to

the particularities of the system under investigation. We may judge that politically engineered tax reforms conferring further advantages on those who are already advantaged—plainly speaking, tax cuts for the rich—are products of intentional and self-interested design. On the other hand, widening disparities in the performances of school children are almost certainly not the intended outcomes of educational systems, but rather unintended consequences. When Merton investigates Matthew effects in the allocation of status rewards in science, he does not argue that the effects have been engineered consciously into the apparatus of scientific work. Instead, he analyzes such effects primarily as latent functions and dysfunctions in the normal operation of scientific institutions; to use his phrase, they are largely "unanticipated and unintended" (Merton 1988:615).

Are Matthew effects functional or dysfunctional for the operation of the social structures in which they occur? In the context of his analysis of scientific reward systems, Merton clearly answers that they are both (Dannefer 2003). Merton's thought reflects an acute awareness of the intricate complexities, ironies, ambiguities, and multivalences of social life. Thus, in his study of elite scientists, he recognizes the positive functions that cumulative advantage performs in scientific communities, facilitating talent recognition and the maintenance of quality standards, while at the same time acknowledging that cumulative advantage can also breed dysfunctional talent suppression, inequity, and resentment among the ranks of well-qualified but lesser-known scientists.

Perhaps the most influential analysis of the positive functions of social inequality has been that of Davis and Moore (1945), who find inequalities in the distribution of rewards across all human societies. This suggests that some measure of inequality is functionally necessary for societal survival. Davis and Moore seek to explain this cultural universal by invoking two factors: the functional importance of positions in society and the scarcity of personnel available to fill them. They reason that some positions in society are more functionally important to societal survival than others. Not everyone has the talent and training to fill these positions competently, and so it is necessary to confer greater rewards upon those who possess the skills and are

willing to make the sacrifices needed to fill them capably. The resulting inequalities benefit society as a whole, the authors argue, ensuring that the most capable people perform the most socially important tasks.

Critics of the Davis-Moore theory of stratification have responded that it understates the negative consequences or dysfunctions of stratification for society. Melvin Tumin (1953) has led the charge, challenging each of Davis and Moore's principal arguments point by point. He notes that elites often restrict access to privileged positions and suppress the potential talent of those below them in ways that serve their own elite interests (an instance of the Matthew effect). Their privileged positions give them the political power needed to promote self-serving ideologies that rationalize their interests as "'logical, 'natural' and 'morally right.'" The resulting inequities are likely to breed hostility and resentment among the suppressed, leading to social unrest and instability. These and other dysfunctional consequences of stratification undermine the view that inequalities in human societies are unequivocally beneficial to society as a whole.

Merton's own stance employs elements of both these opposing views, acknowledging both positive and negative functions in the operation of Matthew effects in the reward system of science. While this book will give more attention to the dysfunctions of Matthew effects than Merton might have (I am tempted to describe the theoretical stance of the book as *dysfunctionalism*), his scholarship is a constant reminder of the need for a balanced appreciation of the many-sided complexities of social life, which defy ideological reduction.

OPPORTUNITY STRUCTURES

Merton's concept of opportunity structure is another essential key to understanding Matthew effects. Merton (1995a:25) defines opportunity structure as "the scale and distribution of conditions that provide various probabilities for acting individuals and groups to achieve specifiable outcomes." Opportunities are not distributed randomly in social systems, except perhaps in the rare case of universal lotteries; they are distributed in ways that favor some over others. Thus,

those who are variously located in the social structure have varying degrees of access to the things they aspire to—aspirations which may include but are not limited to economic advantage and social mobility (1995a:6, 20).

Opportunity structures, and access to them, are not static; they may expand or contract for different individuals or groups at different times and places in history. The G.I. bill in the aftermath of World War II dramatically expanded access to the educational opportunity structure for veterans who might not otherwise have contemplated the expensive option of going to college (Merton 1995a:18). Similarly, the civil rights legislation of the 1960s expanded access to structures of civic and economic opportunity for entire categories of Americans who had previously been systematically denied such access. But while one's location in the social structure strongly influences the extent of access to opportunity, it does not wholly determine social outcomes. Access to opportunity merely enhances the probabilities or chances of achieving success. In Merton's conceptualization, an important place remains for human agency and choice. It is not only the opportunities to which social actors have access that matters, but what they do with these opportunities. In the language of social theory, our lives are the products of structure, agency, and the subtle interplay of the two. The subjective perceptions, expectations, and motivations of social actors affect how they adapt and respond to the structural opportunities and barriers they encounter (Merton 1995a:17; Marwah and Defleur 2006) and, hence, play a part in shaping their objective outcomes.

Merton (1938) began to develop the concept of opportunity structures in his influential theory of deviance, in which he argued that deviant behavior often results when individuals or groups are deprived of socially legitimate access to culturally defined goals, such as material success. Merton's theory of deviance has often been invoked to account for the emergence of criminal organizations and delinquent subcultures among economic and ethnic groups in American society whose access to socially legitimated pathways of upward mobility has been blocked by more advantaged groups. Building on Merton's theory of deviance, Cloward and Ohlin (1960:86) hypothesize that "discrepancies between aspirations and legitimate chances of achieve-

ment increase as one descends in the class structure," and that "the discrepancy between what lower-class youth are led to want and what is actually available to them" is a source of frustration, which may lead them to explore illegal means to achieve culturally approved ends. Cloward and Ohlin take Merton's formulation a step further by distinguishing between legitimate and illegitimate opportunity structures (Merton 1995a; 1997). For some, deviant subcultures, such as those found in criminal organizations, offer alternative, though illicit, structures of opportunity and mobility to those deprived of access to socially approved means of ascent.

How are opportunity structures related to Matthew effects? Merton connects them explicitly in his analysis of opportunities and rewards in science. He observes that the interacting processes of individual self-selection and institutional social selection "affect successive probabilities of access to the opportunity-structure" of a field such as scientific research, and that when the individual's performance meets or exceeds demanding standards of performance, "this initiates *a process of cumulative advantage* in which the individual acquires successively enlarged opportunities to advance his work (and the rewards that go with it) even further" (Merton 1979:89; his italics). Merton acknowledges that other factors apart from individual performance are also at play. This suggests that opportunity structures are like social escalators, providing upward momentum to those who, whether through earned or unearned advantage, manage to reach the lower steps. Presumably, others must use the stairs.

Merton observes that, like individuals, elite research institutions also benefit from the Matthew effect, leveraging their status to accumulate the organizational resources required to attract top-performing scientists. The cumulative advantages of elite scientists and their elite institutions thus feed each other, each contributing to the rising fortunes of the other. Following Merton, we may perhaps speak of micro- and macro-level Matthew effects, the former occurring at the individual level and the latter at the organizational or institutional level, with potential interaction between the two.

We have noted that neither opportunity structures nor access to them is static. Social structures and the individuals who inhabit them

are always in flux to some degree. One of the dynamic elements in this flux is the Matthew effect itself. Because such effects are self-amplifying, they introduce an element of change to the systems in which they occur, altering the relative fortunes of social actors and organizations, and thereby expanding or diminishing the opportunities available to them. Whether in science, business, politics, education or everyday life, success tends to lead on to further success, and too often, failure to further failure.

SOCIAL MECHANISMS

The Matthew effect is one example of what Merton calls social mechanisms, defined as "social processes having designated consequences for designated parts of the social structure" (1968c:43). Following Merton and others, Hedström and Swedberg (1998:9) offer a more concrete formulation, represented in the pictograph I → M → O. Social mechanisms (M) transform a system's inputs (I) into outputs (O). The market mechanism in economics is a social mechanism that takes supply and demand inputs and processes them to influence the price and quantity of goods and services available in the marketplace.

Another social mechanism is represented in Merton's (1948) famous analysis of the self-fulfilling prophecy, one of his most celebrated concepts. Merton asks us to imagine that, in 1932, the Last National Bank is fully solvent and doing a thriving business. But on Black Wednesday a false rumor breaks out that the bank is on the verge of bankruptcy. The rumor spreads like an epidemic, and soon crowds of customers are rushing to the bank to withdraw their deposits. As a consequence of this false but self-fulfilling prophecy, the bank fails. In this instance, the rapid diffusion of rumor is the social mechanism that transforms rumors of the bank's financial insolvency into financial ruin, turning a false definition of the situation into a true one.

The logic of the Matthew effect is very similar to the logic of the self-fulfilling prophecy. In each case, an initial condition (I) is amplified by a social mechanism (M), producing an outcome (O) that transforms the initial condition and feeds it back into the system for further amplification. This is what we mean when we say that the

Matthew effect resembles a positive feedback loop. Merton (1968c) hoped that the discovery of social mechanisms would facilitate the development of "theories of the middle range" in sociology, avoiding the extremes of grand abstraction on the one hand and atheoretical research on the other. We revisit the concepts of unintended consequence, opportunity structure, and social mechanism from time to time throughout the course of this book. These and other of Merton's key ideas place our analysis of Matthew effects into the broader context of general social theory.

Merton's own research on cumulative advantage was confined largely to studying reward systems in science. Those who are familiar with his work in the sociology of science may be accustomed to thinking of Matthew effects within this relatively narrow and circumscribed context. But as his collaborator Harriet Zuckerman (1998:155) rightly observes, "the processes associated with cumulative advantage and disadvantage are generic, affecting stratification not just in science but also in other domains of social life," a view that Merton (1988) himself shared. Similarly, DiPrete and Eirich (2006:271) take the expansive view that "cumulative advantage is a general mechanism for inequality across any temporal process (e.g., life course, family generations) in which a favorable relative position becomes a resource that produces further relative gains." Researchers across multiple disciplines in the last several decades have long since brought down the barriers that confined research on cumulative advantage to the sociology of science and have opened up many new lines of inquiry, investigating Matthew effects in virtually every institutional domain. Many sociologists are themselves largely unaware of these emerging developments in other disciplines. This book begins to connect these multiple and often isolated disciplinary studies, joining them into a common discourse.

We have noted that Matthew effects are not all alike, but come in a variety of types. Some Matthew effects are absolute; others are relative. Some may be consciously and intentionally designed into social systems; others arise as unintended consequences of deliberate social action. In Merton's terminology, some are manifest while others remain latent and generally unacknowledged by system participants. Some cumulative advantages may be largely justifiable and deserved,

particularly in relatively meritocratic systems, such as scientific research, where they reward extraordinary performance. Others may be largely undeserved, as when they are simply inherited or otherwise received without effort. Finally, Matthew effects may be either positively or negatively functional (or both) for the systems in which they occur.

Because Matthew effects come in so many varieties, they may operate differently in different social contexts. The mechanisms and opportunity structures that we observe in scientific research settings are not identical to those that we observe among school children accumulating vocabulary words, or among entrepreneurs accumulating wealth in the marketplace, or among politicians gerrymandering legislative districts for partisan gain. The reward systems of these respective institutional domains vary considerably. Extraordinary scientific performance is rewarded largely (though not exclusively) in the coin of prestige among colleagues. The principal reward for surpassing academic expectations in school is educational advancement. For the entrepreneur, the primary reward is wealth. For the politician, it is political power. Moreover, the specific performances that are required to secure these rewards vary considerably from one institutional domain to another. Laboratory research, vocabulary acquisition, smart investment, and legislative skill are entirely different activities, with widely varying norms and standards of success. There is virtually no end to the variety of social contexts in which Matthew effects occur.

The concern of this book, however, is less with how the various Matthew effects differ from each other than with what they have in common. What can we say about Matthew effects in general that will allow us to connect the scattered literatures of several disciplines and create a common discourse among them?

Despite their variety, Matthew effects share a defining feature: They all assume the general form of positive feedback loops in systems of stratification. While this book seeks to render Merton's original thinking on Matthew effects faithfully, it also seeks to go a small step beyond Merton, in vocabulary if not in substance, by invoking the phenomenon of positive feedback loops as a recurring feature of cumulative advantage processes, as others have previously suggested (e.g., Allison and Stewart 1974; Allison, Long, and Krauze 1982). Positive feedback loops are said to occur when some part of the output (or

consequences) of a system returns to the system as new input and is further amplified, creating a self-perpetuating loop. The accumulation of compound interest is a simple example of such a process. We will have more to say about positive feedback loops in Chapter 3; here it suffices to say that while Merton himself does not rely explicitly on the language of positive feedback in his discussions of cumulative advantage, the concept seems consistent with his analysis. It is through such self-amplifying loops—social mechanisms par excellence—that advantage tends to beget further advantage, expanding structures of opportunity for their beneficiaries and widening the gap between those who have more and those who have less.[7]

We are arguing, in short, for a more expansive usage of the term *Matthew effect* than many sociologists are accustomed to. But that is the point: to expand and extend our awareness of cumulative advantage processes into unexplored realms, as researchers in several disciplines have already begun to do. We are not calling for a new research agenda so much as we are reporting a development in the social sciences that has been occurring for some time. Ours is less a work of new discovery than an attempt at integration and synthesis (Boyer 1990). Without such synthesis, we are left with scattered fragments of research and disconnected discourses.

This book does not argue that the Matthew effect is an iron law of nature or a master principle governing all social and economic outcomes. Clearly, social outcomes are determined by many other factors. Biological, economic, and cultural inheritance; skill, luck, hard work, and initiative; and duplicity and numerous other variables may play a part in determining life's outcomes. In addition, various countervailing forces, to be discussed in Chapter 6, limit cumulative advantage. Furthermore, we do not claim that initial advantages always result in further subsequent advantages. We think in terms of probabilities, not absolute certainties. Initial advantage only tends to beget further advantage, and sometimes it happens that fools—or even smart and hard-working but unlucky investors—and their advantages are soon parted.

The Matthew effect is not, then, the long-awaited universal explanation of everything. In a complex and multicausal world, in which there is reciprocal or circular causation among a multitude of inter-

acting factors (Myrdal 1944; 1957; Stanovich 1986), it is quite unlikely that any such universal principle exists. Single-factor explanations of social phenomena must always to be viewed with extreme skepticism (Myrdal 1944:1069–70).

What we do argue is that Matthew effects are real, found in many different spheres of social life, and potentially powerful determinants of social outcomes in the absence of countervailing factors. By becoming more conscious of these effects in our social systems, we may find more effective ways to counterbalance them when necessary and to neutralize their more pernicious consequences—or, when they are beneficial, to harness them in the service of a common good.