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They Can't All Be Stars: The Matthew Effect, Cumulative Status Bias, and Status Persistence in NBA All-Star Elections

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Abstract

This study investigates the extent to and mechanisms through which Matthew effects create persistent status hierarchies. We propose a model that highlights the role of cumulative status bias in the feedback loop that leads from initial status allocation to status confirmation. We investigate the formalized process of repeated status allocation in annual elections to the National Basketball Association (NBA) All-Star game. Using detailed records on player performances allows us to isolate the Matthew effect from actual productivity differences to show that a previous All-Star nomination improves the chances to be re-nominated. We demonstrate that this Matthew effect is partly explained by improved productivity after an All-Star nomination, but voters' evaluations are also directly biased by a player's prior status. Multiple previous nominations further improve a player's chances, confirming the importance of cumulative status bias. The resulting status-biased persistence of achieved status implies ever greater decoupling of productivity and status, undermining the meritocratic allocation of status and resources even more than the existing literature acknowledges.

Keywords

status bias, cumulative advantage, quantitative analysis, status hierarchies, meritocratic domains

Why did Kobe Bryant become a National Basketball Association (NBA) All-Star in 2016? Bryant had certainly been considered one of the best basketball players since the late 1990s. But in 2016, he was long past his productive peak. His team, the Los Angeles Lakers, was far from competing in the playoffs, let alone from contending for the championship. Moreover, Bryant's own contribution to his team's chance of winning was below that of an average player (*Eldorado* 2016). Still, having been elected 17 times, the public once again voted him a starter in the All-Star game for the Western conference team, a distinction

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supposedly reserved for the very best players each season. Some commentators interpreted Bryant's nomination as a reward for his career, this being his last season as a player. Others argued that Kobe Bryant was still one of the best players in the league in 2016 and fully deserved to be elected to the All-Star game, in spite of the statistical facts (*Bleacher Report* 2015). These perspectives suggest Kobe Bryant's persistent achieved status as an All-Star in 2016 is a prime example of a Matthew effect through cumulative status bias, the theme of our article.

Many disciplines describe cumulative processes as causes of increasingly unequal outcome distributions (e.g., Lee, Hosanagar, and Tan 2015; Newman 2001). In sociology, a large literature building on Robert Merton's work on Matthew effects diagnoses processes of cumulative advantage to cause the "heterogeneity of outcomes on the bases of status or position" (DiPrete and Eirich 2006:278, see also Ridgeway 2014). Referencing the Gospel of Matthew, "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath," Merton (1968) introduced the term "Matthew effect" to describe how a high-status signal provides academics with an advantage for accruing additional resources and biases evaluations of their contributions. In turn, their recognition grows, creating a feedback loop that fuels a process of cumulative advantage (DiPrete and Eirich 2006). Ample empirical evidence demonstrates Matthew effects (Ridgeway 2014; Rigney 2010; Sauder, Lynn, and Podolny 2012). Research on domains as varied as sports, product markets, academia, and culture illustrates how status distinctions affect subsequent resource allocation and how actors turn these resources into higher-quality products or better performances (e.g., Benjamin and Podolny 1999; Bol, de Vaan, and van de Rijt 2018; Kim and King 2014; Lynn et al. 2016; van de Rijt et al. 2014; van de Rijt et al. 2013).

The Matthew effect and the feedback loop started by initial status allocation are central to theoretical models that aim to explain the emergence and stability of status hierarchies in meritocratic domains (Gould 2002; Lynn, Podolny, and Tao 2009; Manzo and Baldassarri 2015). Existing formal models of stable status hierarchies focus on how the effect of status-on-status confirmation is mediated through status-induced productivity differences (Lynn et al. 2009; Podolny 1993, 2005). Following Merton's (1968) original analysis, the additional resources high-status scientists are able to accrue allow them to become more productive, confirming their status. These models imply that as soon as high-status actors fail to deliver higher-quality products or performances, their status will be revoked (see Benjamin and Podolny 1999). We argue that in as much as the existing literature highlights feedback loops in status hierarchies, this expectation underplays the extent to which status can also directly bias status confirmation. Status bias is the portion of cumulative advantage caused by the biased evaluation of an individual's productivity due to a status signal. Our major question is to what degree status bias explains why status hierarchies are self-reinforcing feedback loops and, as such, deviate from a meritocratic ideal of status allocation based on productivity.

For our major theoretical contribution, we build on ideas about the role of cumulative advantage in the emergence of stable status hierarchies to develop a model of cumulative status bias. The model posits that the affirmation of a status hierarchy is directly biased by an immediately preceding status signal *and* status signals accumulated up to that point. In explaining the feedback loop from initial status allocation to its confirmation, we focus on three quantities: (1) the overall relation between an initial status signal and its confirmation (the *Matthew effect* in status persistence); (2) the degree that status advantage is due to the assessment by those (re-)allocating status being biased by the preceding status allocation (*status bias* in status persistence); and (3) the degree the accumulation of preceding status signals further biases this (re-)allocation process (*cumulative status bias* in status persistence). We define cumulative status bias as the biased evaluation of an individual's productivity due to an accumulation of status signals. Our model explicitly separates the contribution of cumulative status bias from the accumulation of opportunities and material advantages that lead to entrenched status hierarchies. Cumulative status bias leads to persistent status hierarchies and indicates growing decoupling between productivity and status. It means that according to gospel, Kobe Bryant's 2016 All-Star nomination came on the heels of his prior nominations rather than his performance.

Our major empirical contribution is to analyze the full loop from initial status distinction to repeated allocation of achieved status in the setting of annually repeated NBA All-Star elections. Empirical studies on status advantages that imply feedback processes stop short of analyzing the full loop (e.g., Benjamin and Podolny 1999). Crucially, the NBA All-Star setting enables us to assess how the total Matthew effect links initial status distinction to repeated status allocation as well as to disentangle the underlying mechanisms. We use highly detailed performance data on NBA players to tackle the crucial issue that status and productivity are endogenously related (Azoulay, Stuart, and Wang 2013; Simcoe and Waguespack 2011). First, the data help us isolate the total *Matthew effect* in status persistence from productivity differences that existed before an initial All-Star election. Second, we assess which proportion of the Matthew effect is due to *status bias* net of status-induced differences in productivity between the initial All-Star election and the subsequent election. Third, we examine the extent to which the entrenchment of status positions over time is due to *cumulative status bias*. By observing NBA players over their entire careers, we can test if previously accumulated All-Star nominations affect being elected again, over and above the most recent election and independent of players' accumulated performance.

There are at least three reasons why our analysis of NBA All-Star elections yields transferable insights about the role of Matthew effects and cumulative status bias in status persistence. First, analyzing the NBA All-Star elections allows us to measure and to test processes that are likely to be less visible but no less present in other status hierarchies. Status hierarchies are confirmed or contested on a regular basis even if the process of status allocation is not explicit and formalized (Gould 2002; Lynn et al. 2009). Think of domains such as product markets (Why are some wine producers ranked consistently higher than others?) or academia (Why do some academics rack up grants or other distinctions?). We argue that alongside productivity gains due to initial status distinction, cumulative status bias is an important part of the answer to these questions. The annual NBA All-Star election makes its contribution measurable and thus provides a template for how to analyze status persistence in other domains.

Second, the elections take place at the intersection of sport and wider society, as the public chooses the All-Star game starters. Although it is always difficult to generalize from one specific status hierarchy—insights from research about status advantage in wine markets or academia might be particular to their domain—our study population of NBA fans is still selective but approximates a wider population. Our findings thus illuminate more general social dynamics underlying persistent status hierarchies in which a wider public allocates status. For instance, it is plausible that cumulative status bias figures into the incumbent bonus in democratic elections (Gelman and King 1990).

Third, our case study provides a conservative test for status advantages in status persistence. The NBA All-Star elections are a formalized process of status allocation with comparatively clear meritocratic ideals and the opportunity to observe productivity closely. To find evidence that accumulated status signals bias status confirmation here implies that growing decoupling of status from productivity over time is a greater issue in contexts where meritocratic ideals are less explicit and where productivity is harder to observe.

THEORETICAL BACKGROUND

Matthew Effects, Socially Endogenous Inference, and Socially Endogenous Investment

In Merton's (1968) original description of the Matthew effect, the feedback loop of status and resources emerges as an essential driver of cumulative inequality (DiPrete and Eirich 2006). He describes how high-status signals in academia initiate the feedback loop that enables individuals to garner even more resources (Merton 1968). This process of cumulative advantage is fueled by two mechanisms. First, Merton describes how audiences, in assessing collaborative work, estimate contributions by the higher-status academic to be greater, even if (or especially if) they do not have any information on the actual distribution of the workload. Based on this assessment, audiences award greater resources, such as citations or research grants. Correll and colleagues (2017) call this process of status-biased assessment and resource allocation "socially endogenous inference." Socially endogenous inference is well established. High-status signals cause advantageous outcomes in various domains—even if they claim to allocate resources meritocratically (Ridgeway 2014; Rigney 2010; Sauder et al. 2012). Examples range from high-status academics getting cited more and accumulating research grants (Allison, Long, and Krauze 1982; Azoulay and Lynn 2020; Azoulay et al. 2013; Bol et al. 2018; Simcoe and Waguespack 2011), to high-status brands yielding higher prices in product markets (Benjamin and Podolny 1999; Podolny 1993, 2005), to high-status athletes having longer careers and receiving preferential assessment of their performance (Kim and King 2014; Petersen et al. 2011; Waguespack and Salomon 2015).

Second, Merton observes how higher-status academics turn advantageous resource allocation into further output. Correll and colleagues (2017) call this "socially endogenous investment." Several studies document socially endogenous investment, showing how high-status actors use their advantaged positions to increase productivity (Sauder et al. 2012). For instance, Benjamin and Podolny (1999) show how high-status wineries, once they reap higher rewards compared to their lower-status peers, invest such surplus in producing higher-quality wines. As a direct consequence of high status, rather than advantageous resource allocation, status distinction also helps actors improve their productivity by boosting their confidence (Bothner, Kim, and Smith 2012; Frank 1984; Rosen 1981). Thus, studies document (1) how the initial status signal affects subsequent resource allocation, and (2) how actors convert additional resources and status boosts into higher productivity. But existing empirical studies stop short of analyzing how gained advantages feed back into status hierarchies.

Matthew Effects and the Persistence of Status Hierarchies

The sociological literature offers elaborate theoretical models of why status hierarchies tend to persist (Gould 2002; Lynn et al. 2009; Manzo and Baldassarri 2015). Matthew effects and the mechanisms of socially endogenous inference and socially endogenous investment are central in this work. Formal models stress the behavioral impact of status beliefs on social network members of higher and lower status (Berger and Fişek 2006; Ridgeway 1991; Ridgeway and Erickson 2000; Webster and Hysom 1998). For instance, the perceived status differences between men and women, or between White and Black individuals, lead to status-differentiated resource allocation (Bertrand and Mullainathan 2004; Castilla 2008; Ridgeway 1997). High-status actors obtain and use additional resources, which underscores social perceptions of difference, eventually causing the confirmation of status beliefs and the persistence of status hierarchies (Ridgeway and Correll 2006; Ridgeway and Erickson 2000).

The predominant explanation of why a status signal causes socially endogenous inference is uncertainty. Status serves as a signal of underlying productivity when there is a lack of information on actual productivity (Azoulay et al. 2013; Lynn et al. 2016; Sauder et al. 2012; Simcoe and Waguespack 2011). The literature discusses alternative mechanisms that come into play when the action that follows a status signal is public. Highlighting the symbolic nature of such acts in the context of status confirmation, those allocating status can gain from the public display of deference-giving (Gould 2002). For instance, conspicuous consumption of high-status goods can confirm the social position of the consumer while at the same time affirming the high status of the producer (Malter 2014; Veblen 1899). In situations of relatively low uncertainty, actors confirm status hierarchies because they prioritize the status hierarchy they anticipate third parties would want to enact over their information about actual productivity (Correll et al. 2017).

The substantiation of status beliefs through perceived productivity differences over time is essential. If status confirmation takes place in public, conspicuous consumption or coordination with third parties could mean that those allocating status can benefit from confirming status hierarchies even though status and productivity are misaligned. But when the element of public deference is absent, models of stable status hierarchies imply that the reallocation of status is justified by the observation of productivity differences. These differences follow socially endogenous inference and socially endogenous investment. The status-based model of market competition (Lynn et al. 2009; Podolny 1993, 2005) is perhaps the clearest in implying that status rankings will only persist as long as they are correlated with actual differences in underlying quality. Status stability emerges as the equilibrium in a process in which high-status actors use their advantaged position to produce at a higher quality in the spirit of socially endogenous investment. The feedback loop relies on actors making use of their advantages and distinguishing themselves to observers. If they fail to do so, their status will catch up with them (Lynn et al. 2009; Podolny 1993, 2005).

Socially endogenous investment ensures that status and underlying quality are highly correlated in this explanation of the stability of status hierarchies, but it does not preclude decoupling. Otherwise, one might ask, what is status but a shorthand for quality (Sauder et al. 2012:269)? How far decoupling can go depends on what the initial status ordering is based on. If it is a diffuse status signal, such as race or gender, that is not correlated with actual productivity differences, status-induced cumulative advantage will only compound the misalignment of status and underlying quality and thus lead to strong decoupling (Lynn et al. 2009).

But what if the initial ranking is about achieved status? Achieved status hierarchies are typically based on meritocratic principles and introduced by third-party actors, such as external judges or referees (Sauder 2006, 2018). The status-based model of market competition has it that in such nominally meritocratic settings, not only is the initial status hierarchy already correlated with productivity differences, but regular reappraisals will keep decoupling from ever becoming so extreme as to lead to rank reordering in terms of status compared to quality (Lynn et al. 2009). Benjamin and Podolny's (1999) study of Californian wine markets is maybe the best-known empirical test of the model and a rare example of a study that empirically investigates separate steps of the loop that cause the reproduction of status orderings. Here, wine producers achieve their status via their affiliations with appellations whose respective positions in a status hierarchy are corroborated by industry experts. Whether wineries' status is deserved is checked through (blind) tests of their products and adjusted accordingly. To keep their status, wineries must invest in the quality of their wines and pay to keep their high-status affiliations (Benjamin and Podolny 1999). The study does not test whether high-status organizations reacquire their status, but it illustrates the steps by which status-biased assessment might add to a stable status difference over time. It also implies that the process will not lead to a lower-productivity actor ending up at a higher status than an actor of higher productivity (Lynn et al. 2009). Instead, judges update their beliefs, uncertainty will diminish, and status and underlying quality will align (see also van de Rijt 2019).

The existing theoretical models do not explicitly deny the role of status bias in status persistence. But their explanation of status persistence clearly revolves around status-induced (perceived) productivity differences. Benjamin and Podolny (1999) show how status leads to greater returns and quality, but they do not directly test how initial status distinctions are confirmed in subsequent status orderings, or how much of this loop could be explained by socially endogenous investment. Thus, the question remains of how much mechanisms other than status-induced productivity differences contribute. Because of the dearth of empirical studies that consider the full loop from initial status to status confirmation, the accuracy of the models remains at least an empirical question. Additionally, we argue that the existing models lack a clear formulation of how status and the accumulation of status signals can directly bias status reallocation.

A Model of Cumulative Status Bias

The original motivation for developing models of status persistence is that the decoupling of status and underlying quality results in persistent inequality that conflicts with meritocratic ideals of resource allocation. We suggest these models do not fully capture the extent to which status biases the reallocation of status in two respects. First, the existing models of persistent status hierarchies pay little attention to how status signals directly influence the reallocation of status. We argue that status biases not only the allocation of resources but also directly biases the allocation of status itself. Status confirmation is biased directly by socially endogenous inference. If true, these models likely underestimate the extent to which status bias leads to a decoupling of status and underlying quality, as they must assume the observed iteration of a status hierarchy largely reflects underlying quality differences.

This first issue might be allayed if we believe that regular reappraisals rein in status bias in status confirmation. However, this might not hold, because, second, the models neglect the potentially cumulative nature of status bias. Formal models of status hierarchy dynamics assess status advantages in single iterations, that is, how a status signal in one period creates advantages through socially endogenous inference and socially endogenous investment that lead to an affirmation of status in the next (Gould 2002; Lynn et al. 2009; Manzo and Baldassarri 2015). Focusing on the effect of the immediately preceding status signal implicitly assumes that the effect of prior status signals is entirely mediated through the status we are observing or through differences in underlying quality. This misses the cumulative nature of the process beyond single iterations. Many fields theorize and model cumulative processes over several iterations to explain the emergence of power-law distributions (e.g., Lee et al. 2015; Newman 2001), as have sociologists (Allison et al. 1982; DiPrete and Eirich 2006). But in as much as cumulative advantage is seen to result in entrenched status hierarchies, our reading is that we should pay more attention to how accumulated status signals bias status confirmation because of the implications for the decoupling between status and productivity.

Allen and Parsons (2006), for instance, although not analyzing the closed loop of one status hierarchy, demonstrate that for players to receive the status of a baseball Hall of Famer, judges take in the signal of various status rankings as well as objective productivity markers accumulated over a player's career. We propose that the reallocation of distinct status is biased not only by the immediately preceding status signal but by the accumulation of distinct status signals. For instance, in the likely event that judges are aware of multiple previous status distinctions, they might perceive this as a stronger overall status signal. Evaluations will not only be biased by the fact that an actor was allocated high status once, but there will be cumulative status bias. We propose that repeated status allocation will increase status bias linearly, which conflicts with the notion, built into existing models, that beliefs will be corrected in light of updated information on productivity. If the reallocation of status is biased by previous status and the accumulation of status distinctions, the entrenchment of status hierarchies implies ever greater decoupling of status and productivity over time.

Our theoretical model of cumulative status bias yields three theoretical mechanisms of interest in relation to the status-induced confirmation of status hierarchies. First, the *Matthew effect* means that an initial status advantage will increase the likelihood that the initial status will be confirmed. Second, *status bias* means that the status-induced confirmation of the status hierarchy will at least partly occur because of the biased perception of productivity by those confirming status. Third, *cumulative status bias* means the accumulation of status signals over time will increase the bias in status confirmation over and above the bias induced from a directly preceding status signal. In the following, we introduce the annual NBA All-Star elections as our case study and translate these considerations into three estimands (Lundberg, Johnson, and Stewart 2021).

EMPIRICAL SETTING AND THEORETICAL IMPLICATIONS

The Annual NBA All-Star Elections

The annual NBA All-Star game traditionally takes place midway through the season (usually in January or February, with one exception in March). The game was first introduced in 1951 with the purpose of showcasing the talent in the league. Its purpose is to pit the best players of the ongoing season against each other in a game between the Eastern and Western conferences. Becoming an All-Star is essential for players' status in the league and their legacies (Wright 2020). For some players, financial bonuses are contractually tied to becoming All-Stars. Until 1974, players were exclusively selected by members of the media in different cities. Since 1975, the public elects the five players who start the game. After the public votes and the starting line-up is determined, coaches in the respective conferences nominate seven reserve players. In total, 24 players are selected for the All-Star game every year.

The NBA All-Star election provides a unique setting for the analysis of Matthew effects, cumulative status bias, and status persistence, because the formal nature of the repeated status allocation makes usually hidden processes explicit and because it provides a rich data source to disentangle mechanisms. Specifically, first, it is an example of an annual election in which external judges (the public and coaches) impose a status ranking with the intention to reward productivity, as the game is supposed to be played by the best players. The repeated nature of the process enables us to model the cumulative portion of Matthew effects in status persistence in a setting that involves the wider population.

Second, in contrast to many other fields (e.g., business, science, or the arts), in sports, we can observe and measure objective differences in productivity. The central methodological problem identified for research on status effects is that status is endogenous to underlying quality (Azoulay et al. 2013; Sauder et al. 2012; Simcoe and Waguespack 2011). The challenge for determining to what extent status generates advantages is to be able to differentiate between the status effect and actual productivity differences.[1] Over the past decade, the NBA has increasingly captured players' productivity in statistical data (for previous applications, see, e.g., Norris and Moss-Pech 2022; Staw and Hoang 1995; Zhang 2017, 2019). To isolate the Matthew effect and to isolate status bias and cumulative status bias, these rich data allow us to tackle alternative explanations that can be broadly grouped into three categories. First, general player characteristics, such as race, playing position, or height might raise

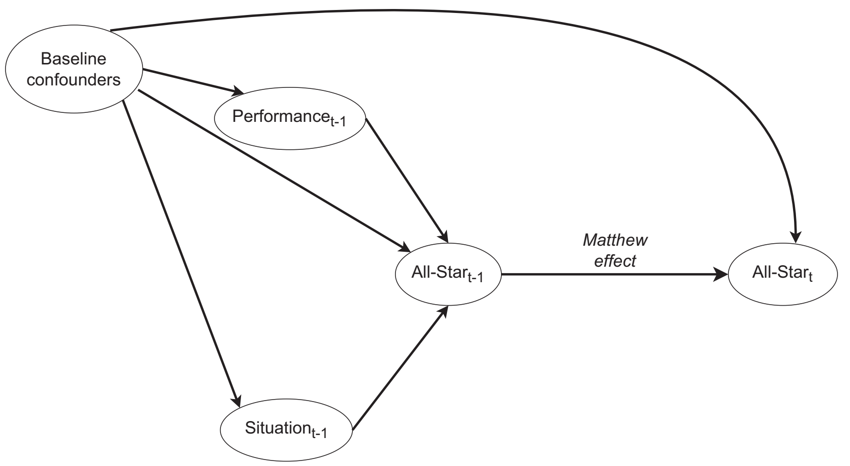

Figure 1. DAG for the Matthew Effect in Status Persistence in NBA All-Star Elections

players' likelihood to become an All-Star and thus confound the relationship between being an All-Star in one year and the next (*baseline confounders*). Second, a player's *performance*, in terms of his ability to score, to rebound, or to assist is likely to have a strong impact on becoming an All-Star. Third, a favorable *situation*, such as the team a player is playing on provides a context for players to perform and directly affects voters' willingness to elect a player.

Theoretical Implications of Matthew Effects and Cumulative Status Bias in the NBA

Our first hypothesis restates the Matthew effect in the context of the annual NBA All-Star election:

> *Hypothesis 1 "Matthew effect":* Having been an NBA All-Star in the previous year increases the likelihood of being elected to become an NBA All-Star this year, ceteris paribus.

Figure 1 illustrates Hypothesis 1 and shows our model for the Matthew effect in the form of a directed acyclic graph (DAG) (Elwert 2013; Pearl 1995). The DAG specifies how we link our theoretical estimands to observable data and arrive at empirical estimands (Lundberg et al. 2021). To isolate our first estimand, that is, the status advantage implicated in the Matthew effect, from productivity differences, we need to account for baseline characteristics of players as well as their performance and situation before an initial All-Star nomination.

Our second hypothesis identifies status bias as one mechanism through which the Matthew effect occurs:

> *Hypothesis 2 "status bias":* Having been an All-Star in the previous year increases the likelihood of becoming an NBA All-Star this year through biased evaluation, ceteris paribus.

Figure 2 illustrates how the NBA All-Star election setting allows us to separate status bias, our second estimand, from other mechanisms underlying the Matthew effect after the All-Star election at $t - 1$.

To test whether status bias increases the likelihood of becoming re-elected, we need to disentangle it from status-induced productivity gains in the sense of socially endogenous investment. Even if we compare two players who start out at the same level but only one of whom was elected to the All-Star game in the previous year, and we find that the nomination increases this player's likelihood to be elected again, we need further data to determine to what extent this is due to status bias.

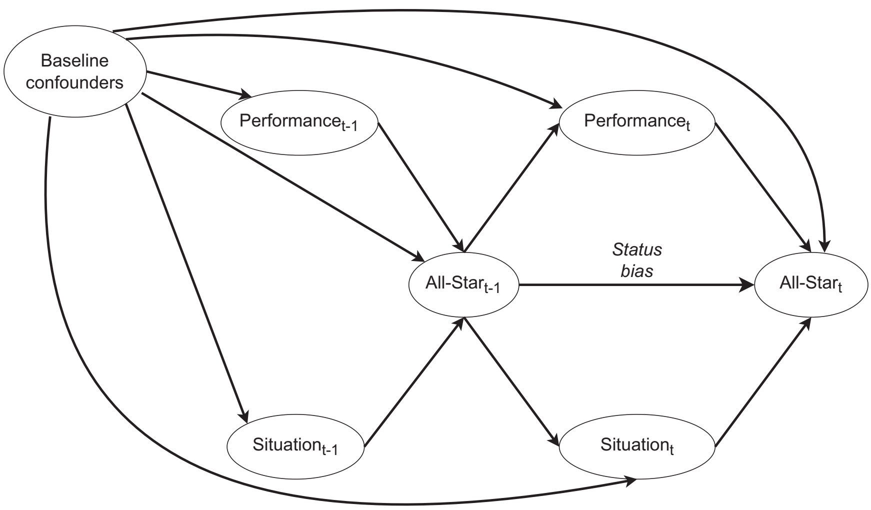

Figure 2. DAG for the Mechanisms Underlying the Matthew Effect in NBA All-Star Elections

We can distinguish two different routes via which a player's status can help him get reelected that do not imply decoupling of status and underlying quality. First, a player might simply improve his *performance* following his All-Star election. Previous research has discussed such performance boosts in terms of growing confidence and as an internal investment in ambition that follows from greater incentives to produce higher-quality work (Ridgeway and Correll 2004; Rosen 1981). Second, a higher-status player might be put in a better *situation* to succeed. Coaches might be more willing to allocate playing minutes to players who were elected to the All-Star game. Being an All-Star might also increase a player's chances to be traded to a better team, which in turn might increase his chances to be re-elected. The two mechanisms largely follow the idea of socially endogenous investment, although players will be less able to intentionally invest in their performance and situation than firms, for instance. We interpret the portion of the Matthew effect that cannot be explained by improved performance and situation as status bias, where voters use the signal of a previous All-Star nomination to inform their election choice.

Finally, our third hypothesis states that cumulative status bias, in addition to direct status bias, improves the chances to be re-elected:

> *Hypothesis 3 "cumulative status bias":* Having been an NBA All-Star in prior years increases the likelihood of becoming an NBA All-Star this year beyond having been an All-Star in the previous year, ceteris paribus.

In the status-based model of market competition, the argument that Matthew effects do not lead to strong decoupling between status and productivity relies not only on status bias being less important in comparison to actual productivity, but also on the constant re-evaluation of status hierarchies based on increasing information about productivity (Benjamin and Podolny 1999; Lynn et al. 2009; Podolny 1993, 2005). If anything, status bias should decrease over time. If, however, status bias accumulates and prior status distinctions affect the current assessment over and above how they affect the immediately preceding status hierarchy, there is a threat to the congruence of status and quality and thus to meritocratic ideals.

To identify cumulative status bias, our third estimand, we need to measure productivity precisely and consistently over several iterations. Figure 3 illustrates how we can estimate

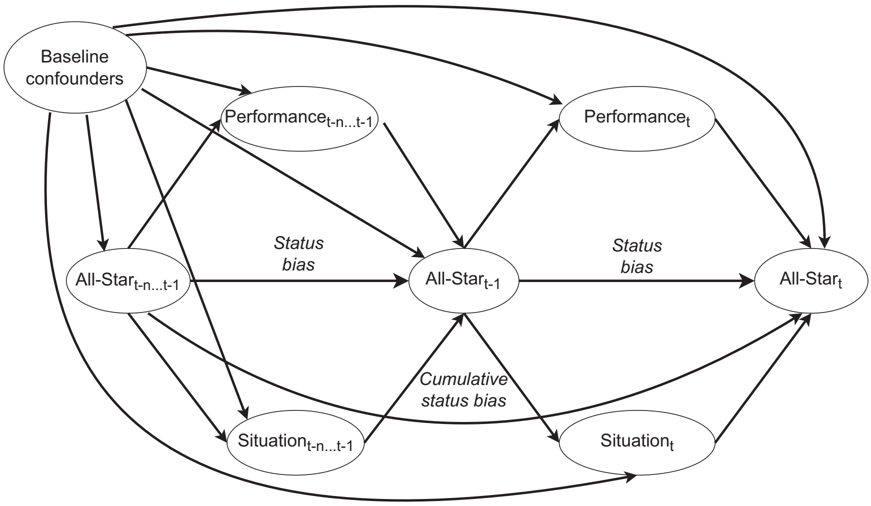

Figure 3. DAG for Cumulative Status Bias in NBA All-Star Elections

whether previous All-Star nominations affect the current election beyond their impact on the election in the previous year. Previous All-Star nominations, from the time a player entered the league at $t - n$ up until the previous All-Star game, might affect the current election through various pathways, including a player's *performance* and *situation* during this period. Importantly, previous nominations might directly affect the chance of a player being elected to the previous All-Star game. Only if there is an additional impact on the current election over and above these paths can we ascertain that there is cumulative status bias and thus entrenchment of status hierarchies because of growing decoupling. If status bias only ever occurs from one election to the next, and the advantageous status signal is lost once the higher status is not allocated, there might be decoupling of status and quality, but adjustments can be made quickly. Cumulative status bias, however, would cause greater persistence in status hierarchies and cause ever stronger decoupling.

DATA AND VARIABLES

Basketball Reference

We draw on data for NBA All-Star elections, All-Star games, regular seasons, and playoffs from the 1983/84 to the 2015/16 season from Basketball Reference, a website collecting detailed statistics on the NBA (https://www.basketball-reference.com/).[2] Previous studies using NBA data used readily available aggregated data, such as average performances by season (e.g., Norris and Moss-Pech 2022; Zhang 2017, 2019). We compiled the statistical records for every player of all the single games they played to be able to construct indicators that are strictly constrained to games played before and between the All-Star elections, which take place about mid-season. On the website, player statistics are displayed on separate pages for each season, as are player characteristics and information on the annual All-Star game.

We used a web-scraping algorithm to acquire this comprehensive data. We then constructed our sample starting with approximately 1.2 million game logs from the 3,300 players who had ever played in the NBA since 1964 until 2016, in addition to data on player characteristics and records from the annual All-Star game and voting process.[3] We excluded years prior to 1983 because the full array of performance statistics is consistently available only from the 1983/84 season onward. Our observation window closes after 2016 because, since 2017, the All-Star voting mode is no longer comparable to earlier years.

To start with a cohort of players without any All-Star experience we further restricted the sample to only include players who joined the NBA in the 1983/84 season or later. Because our analyses require observations in at least two years, we also excluded players with only one playing season. Finally, we dropped observations with missing values on any of the covariates (N = 109), leaving us with 10,188 yearly observations from 1,829 players.

Dependent Variable

Our outcome is a dichotomous measure of being nominated to the All-Star game at t. The 24 annual All-Star slots are filled as follows: The public election process is stratified by position so that in each of the two conferences, the one center, the two forwards, and the two guards who received the most votes become All-Star game starters. Since 2013, two backcourt players (equivalent with guards) and three frontcourt players (equivalent with forwards and centers) start per conference. In rare instances (N = 19), players elected to be All-Star starters were injured before the game and did not actually start. The league commissioner chooses their replacements. The head coaches of all teams in the two conferences decide on the seven reserve players for their respective team in the All-Star game. The reserves consist of two guards, two forwards, one center, and two additional players of any position.

Independent Variables

Our first central independent variable is having played in the All-Star game at $t - 1$. Unlike for our dependent variable, here we assign the value 1 to players who actually played, rather than those who were nominated, as we are interested in the status signal of having been an All-Star.[4] Our second central independent variable is a count variable that adds all All-Star games played by a player up until $t - 1$ to measure the cumulative effect of previous All-Star elections.

Baseline Confounders

Several characteristics of players and their careers might determine players' average chances of becoming an All-Star and thus confound the relationships we are interested in. Given that the All-Star election is stratified by position, we include dummies for player position (center/forward/guard). Height (in cm) is essential for being a competitive basketball player and thus another baseline trait that might explain repeated All-Star elections. We also include a player's race to catch potential racial discrimination in All-Star elections. Information on race is not available from the original data source, so race was coded manually based on online photos of players. We coded players as either Black or another race. Three independent coders reached an agreement for roughly 94 percent of players. To model a player's career stage and age, we include the age at league entry and number of years spent in the NBA. To allow for likely nonlinearity in the relationship with All-Star elections, we include the squared term of both variables. We also include the year of the election as a covariate to adjust for overall differences in the likelihood of becoming an All-Star over time, for example, due to changes in the number of players in the league.

Covariates Prior to All-Star Election at t – 1

To estimate our first estimand, the Matthew effect, we add a set of productivity indicators to our baseline confounders. All-Star player status at $t - 1$ is determined by players' *performance* prior to the All-Star game election at $t - 1$. We have statistics on every game played, so we can compile measures that average the player's performance until the All-Star voting finishes (approximately two weeks before the All-Star game). We calculate average indicators for player's points, rebounds, and assists.[5] We standardize these indicators by the minutes a player played and multiply by 36 (per 36 is the default standardization in the NBA).

To avoid equating players who are very productive in limited playing time with players who shoulder a bigger burden, we also include the average amount of minutes played per game. Minutes played is our first covariate that models a player's *situation*, as the amount of time a player is allocated determines his opportunity to make a case for becoming an All-Star. Further variables to model a player's situation are measured at the team level, because basketball is a team sport and a player's performance is usually regarded as part of a team effort. The team's performance will usually determine a player's chances to become an All-Star. We include the average win percentage of the team in the time up to the All-Star election. We also include a dummy that indicates whether the team was in the playoffs in the previous season. Additionally, we include a dummy for players on big market teams, defined as the 10 biggest media markets (Los Angeles, New York, Boston, Dallas, Chicago, Philadelphia, Toronto, San Francisco, Atlanta, Washington, and Houston), because teams located in big media markets generally receive more coverage, which might affect the attention of the voting public. Teams in these cities usually have larger fan bases, too. Including the dummy therefore adjusts for baseline differences in the number of votes players on different teams can hope for.

Covariates Post All-Star Election at $t - 1$

For our second estimand, we want to isolate whether voters' repeated allocation of All-Star status is status biased. To this end, we need to net out alternative mechanisms that emerge after the All-Star game at $t - 1$. First, All-Star status might boost a player's *performance*. Second, All-Star status might bring players into a better *situation*. We model the first mechanism with variables that average the performance between the All-Star game at $t - 1$ and the All-Star vote at t.[6] Again, we compile average points, rebounds, and assists standardized by minutes played times 36. A player's performance might improve post All-Star nomination because of growing confidence. It might also deteriorate because a player might feel he has reached his goals. Either way, the effect of All-Star status on a repeated nomination might be mediated through performance in between elections.

We model the second mechanism by including the average minutes played post All-Star game at $t - 1$. Being an All-Star might increase average minutes played because coaches consider such players more valuable or because coaches might be inclined to give the fans "what they want," that is, to see the star players play. Players might also get the chance to play on better teams, either by switching teams or by their teams improving, for instance, by acquiring better teammates. Team quality is again measured by a team's average win percentage and a dummy for its participation in the playoffs. Finally, switching to a team in a big media market might provide greater publicity and increase the fan base. We use a dummy to measure big media markets.

The coefficient that remains after adjusting for these variables is what we interpret as our second estimand, status bias, that is, the advantage due to a status signal that cannot be explained by actual productivity differences. One might argue that a player's performance and his situation after the election at $t - 1$ already reflect instances of status bias. Players' performance might be affected by team members' or opposing teams' status-biased treatment of an All-Star. The minutes a coach allots to a player or a move to another team might be the result of status-biased assessment, too. Still, as theorized in accounts of how socially endogenous inference enables social endogenous investment, these changes would constitute changes in productivity. Because we are interested in status bias in the NBA All-Star election, that is, whether the chance to get nominated deviates from an assessment purely based on productivity, there is no danger of over-control bias.

Cumulative Covariates Prior to All-Star Election at t – 1

To isolate our third estimand, that is, the effect of cumulative All-Star elections prior to the election at t – 1, we include covariates that measure average *performance* and *situation* of a player up until t – 1.[7] We include previous career averages of points, assists, and rebounds standardized by minutes times 36. We also include average minutes played, average team win percentages, the rate of playoff participation, and the rate of big market teams a player has played on.

ESTIMATION STRATEGY

Our empirical analysis proceeds in three steps that mirror our DAGs in Figures 1, 2, and 3. Each step uses logistic regression to model the probability of an All-Star nomination at t $\boldsymbol{A_t}$ conditional on prior All-Star game participation and different sets of covariates.[8,9] In the first step, we establish the unadjusted association between All-Star nomination and prior All-Star game participation $\boldsymbol{A_{t-1}}$ (Model 1). We adjust for baseline covariates $\boldsymbol{C}$ (Model 2). Finally, we adjust for performance and situation prior to the All-Star game participation $\boldsymbol{V_{t-1}}$ (Model 3). Model 3 thus estimates the total Matthew effect (estimand 1) in terms of the average marginal effect of prior All-Star game participation.

$$Logit\left(A_t = 1\right) = \alpha + \beta A_{t-1} + \gamma C + \delta V_{t-1}$$

With the next set of models, we aim to isolate status bias from performance and situation effects of All-Star game participation (estimand 2). Therefore, we first adjust for the performance following the All-Star game $\boldsymbol{P_t}$ (Model 4) and then the current team situation of the player $\boldsymbol{S_t}$ (Model 5).

$$Logit\left(A_t = 1\right) = \alpha + \beta A_{t-1} + \gamma C + \delta V_{t-1} + \zeta P_t + \theta S_t$$

In our final model, we examine the association between All-Star nomination and cumulative All-Star game participation (estimand 3). To this end, we add the number of All-Star game participations until t – 1 $\boldsymbol{CA}_{\sum t-n...t-1}$ along with cumulative average measures of performance and situation $\boldsymbol{P}_{\overline{t-n...t-1}}$ and $\boldsymbol{S}_{\overline{t-n...t-1}}$ until t – 1 (Model 6).[10]

$$Logit\left(A_t = 1\right) = \alpha + \beta A_{t-1} + \tau CA_{\sum t-n...t-1} + \gamma C + \delta V_{t-1} + \zeta P_t + \theta S_t + \xi P_{\overline{t-n...t-1}} + \phi S_{\overline{t-n...t-1}}$$

For ease of interpretation and comparability between models, we evaluate average marginal effects in each step of the analysis. We use robust standard errors clustered by player.

Our estimands are the total Matthew effect, status bias, and cumulative status bias (Lundberg et al. 2021). Their identification in our analysis rests on several assumptions. Figure 4 shows how unobserved factors might threaten identification. Specifically, identification of a causal effect in the models estimating the Matthew effect (Model 3) rests on the assumption there is no unmeasured confounding between being nominated to the All-Star game at t – 1 and being elected at t (U1 in Figure 4). In the models isolating status bias (Model 5) and cumulative status bias (Model 6), our identification strategy additionally rests on the assumption that no unmeasured confounders affect our measures after prior All-Star nominations and the outcome (U2 in Figure 4; to reduce complexity, we omit edges connecting U2 to situation factors). If there was such a factor, adjusting for the performance and situation indicators measured in between All-Star elections might induce collider bias (Elwert and Winship 2014). Finally, a prior All-Star nomination might affect unmeasured factors besides our performance and situation indicators that, in turn, affect All-Star election at t (U3 in Figure 4). If that was the case, the coefficient we interpret as (cumulative) status bias in Models 5 and 6 might be overestimated because it includes pathways through U3. We ran a

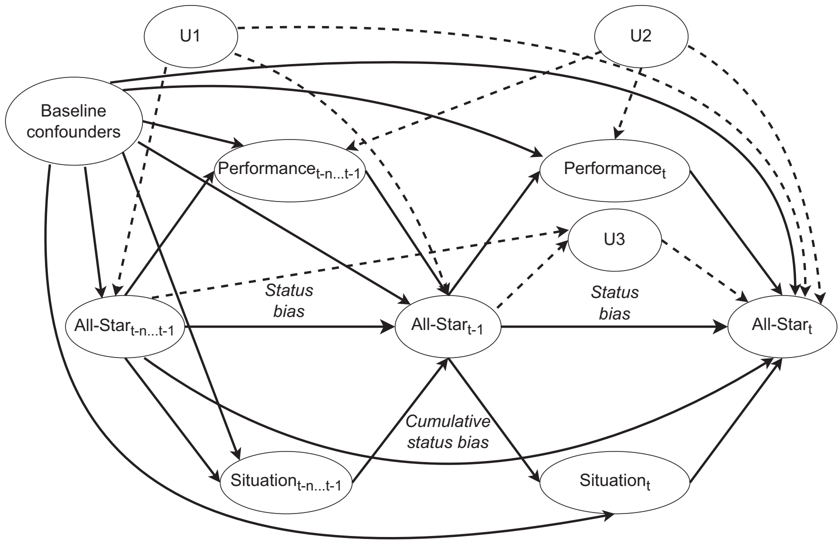

Figure 4. DAG Displaying Potential Unobserved Factors Threatening Identification

battery of robustness checks, detailed in the results section "Is it status? Is it bias?" But, because we cannot entirely exclude that other mechanisms induced by All-Star status affect our outcome (U3) or that confounding factors such as a player's charisma cause endogeneity issues (U1, U2), we refrain from using strong causal language.

RESULTS

Descriptive Results

In our sample of 1,829 players who we observe from the time they entered the league, a total of 172 ever become an All-Star. This makes All-Star nominations a highly selective status signal, but players who are ever nominated have a relatively high likelihood to accumulate multiple nominations. Panel A in Figure 5 shows how many players achieved one or more All-Star nominations. Only 61 of the 172 players were ever elected once, but 111 received two or more nominations. Kobe Bryant is the only player in our sample who achieved a total of 18 nominations.[11]

All-Star nominations correlate with performance indicators. Panels B, C, and D in Figure 5 plot the number of All-Star nominations against cumulative standardized points, assists, and rebounds. Across the full sample there are clear positive correlations between the number of All-Star nominations and the three performance indicators. However, there are outliers as a few players acquired a relatively large number of All-Star nominations. Standout players also frequently excel at one or two of the three performance indicators. Kobe Bryant, for instance, has the highest amount of career points. Among players with multiple All-Star nominations, he also amassed a large number of assists. But due to the position he played (shooting guard), his rebounding numbers are less extraordinary.

Players who never become All-Stars differ on many dimensions from players who are nominated at least once. Table 1 shows averages for baseline traits of the two groups. Players who ever become All-Stars are slightly taller, enter the league at a younger age, and have been in the league more than twice as long at time of observation, indicating longer careers. Black players constitute 75 percent of the players who never become All-Stars, yet they contribute 84 percent of the players who ever play in an All-Star game. Playing

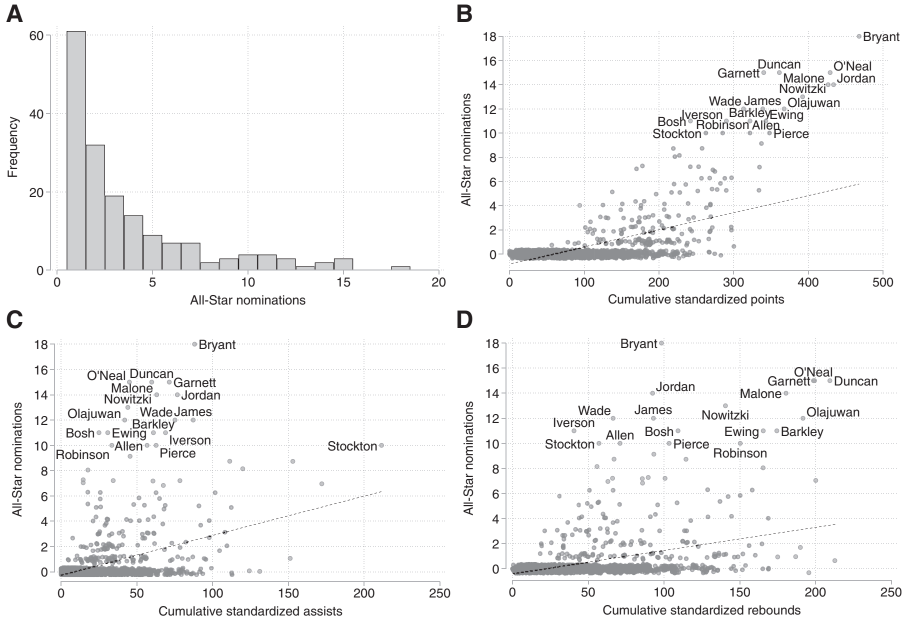

Figure 5. Distribution of All-Star Nominations among Players Who Ever Became All-Stars (Panel A) and Correlations of All-Star Nominations with Performance Indicators (Panel B: Points; Panel C: Assists; Panel D: Rebounds)
Data source: basketball-reference.com.
Note: All calculations by the authors.

Table 1. Sample Description (Baseline Variables by Ever All-Star)

	Never All-Star	Ever All-Star
Height (cm)	200.52	201.07
Age at league entry	22.96	21.68
NBA tenure (in obs. period)	6.54	13.58
Black	.75	.84
Center	.20	.22
Forward/Power/Small	.40	.35
Guard/Point/Shooting	.40	.42
Observations	1,657	172

Data source: basketball-reference.com, except data on race.
Note: All calculations by the authors.

positions correspond with the distributions on the court, but centers and guards have slightly higher chances to be among the All-Stars relative to forwards. This indicates the coaches are more likely to use the positionless reserve spots to pick centers and guards.

Table 2 provides an overview of the average performance and situation indicators in our analysis for players who were not elected to the All-Star game in the last election and those who were. Strikingly, players who were not an All-Star at $t - 1$ and remain in the sample at t have only a 3 percent chance to be elected. By contrast, players who were All-Stars and are still in the league have a 63 percent chance to be re-elected. Players who

Table 2. Sample Description (Variables Before and After All-Star Nomination at $t - 1$ by All-Star Status at $t - 1$)

	No AS at $t - 1$	AS at $t - 1$
Allstar t	.03	.63
Avg. points per 36 min. $t - 1$	11.84	19.80
Avg. assists per 36 min. $t - 1$	2.64	4.21
Avg. rebounds per 36 min. $t - 1$	5.77	7.06
Minutes played $t - 1$	21.19	37.68
Team reached playoffs $t - 1$	.39	.75
Team win percentage $t - 1$	.48	.59
Big market team $t - 1$	.44	.43
Avg. points per 36 min. t	11.73	19.61
Avg. assists per 36 min. t	2.65	4.25
Avg. rebounds per 36 min. t	5.78	6.97
Minutes played t	21.19	37.40
Team reached playoffs t	.45	.81
Team win percentage t	.48	.58
Big market team t	.45	.44
NBA tenure t	4.91	6.75
Observations	10,001	626

Data source: basketball-reference.com.
Note: All calculations by the authors.

were All-Stars at $t - 1$ performed better and were in better situations prior to that election than those who did not get nominated. For instance, per 36 minutes playing time, they scored 19.80 points, gave 4.21 assists, and grabbed 7.06 rebounds, compared to 11.84 points, 2.64 assists, and 5.77 rebounds. They played more than 37 minutes, on average, compared to 21 minutes, and their teams made the playoffs in 75 percent of the cases in the prior season, compared to 39 percent. In the season running up to the All-Star election at $t - 1$, their teams averaged a 59 percent win percentage, in contrast to 48 percent. The only trait for which we find no difference between players is whether they played for big media market teams.

The contrast between players who became All-Stars in the previous election and those who did not looks very similar when comparing their average performances and situations for the time frame between the previous All-Star game and the current election. They perform better in terms of points (19.61 versus 11.73), assists (4.25 versus 2.65), and rebounds (6.97 versus 5.78) per 36 minutes played. They are also in better situations to perform, as indicated by the differences in minutes played (37.40 versus 21.19), their teams making the playoffs (81 versus 45 percent), and their teams' win percentage (58 versus 48 percent). Again, the probability of playing in a big media market does not differ. Finally, players who were nominated have been in the league longer, on average (6.75 versus 4.91 years at t).

Regression Results

Table 3 compiles the average marginal effects of previous All-Star nominations on the chance to be re-elected from our six models. Model 1 is the raw bivariate association without any covariates. Close to what we saw in our descriptive tables, a player who was an All-Star in the previous year has a 61 percentage points higher likelihood of becoming an All-Star in the current election than does a

Table 3. Average Marginal Effects from Logistic Regression Models of All-Star Nomination

	AS $t-1$	Cumul. AS
M1: unadjusted		
β	.607***	
SE	.026	
M2: adj. for baseline confounders		
β	.445***	
SE	.031	
M3: M2 + adj. for prior situation + performance		
β	.048***	
SE	.008	
M4: M3 + adj. for current performance		
β	.035***	
SE	.007	
M5: M4 + adj. for current situation		
β	.024***	
SE	.006	
M6: M5 + cumul. AS + cumul. mediators		
β	.020***	.004**
SE	.005	.001

Data source: basketball-reference.com, except data on race.
Note: All calculations by the authors. Full models can be found in Table B1 in Part B of the online supplement.

player who was not an All-Star in the previous year. Model 2 includes our set of baseline confounders. Stratifying the sample by playing position, height, race, and so on reduces the association to 45 percentage points. To isolate the Matthew effect, Model 3 introduces the covariates measuring performance and situation before the All-Star election at $t-1$. Having been an All-Star at $t-1$ raises the likelihood of becoming an All-Star at t by 4.8 percentage points, even if players were comparable in terms of baseline traits and performance and situation indicators prior to the All-Star election at $t-1$. The reduction in this step underscores that, by and large, All-Star status is allocated because of productivity, that is, the election is about selecting the best players.

To isolate status bias in the Matthew effect from performance and situation changes after the All-Star election at $t-1$, Models 4 and 5 include the average performance and situation indicators between the All-Star game at $t-1$ and the All-Star election at t. Including performance indicators reduces the association to 3.5 percentage points. Adding situation indicators reduces the association further to 2.4 percentage points. Indeed, a notable part of the Matthew effect is explained through status-induced changes in productivity, which we can interpret as socially endogenous investment.[12] Still, the remaining 2.4 percentage points increase in the likelihood of becoming an All-Star after having been an All-Star in the previous year cannot be explained by baseline differences and our set of performance and situation indicators from prior and after the election at $t-1$. We interpret this as the status-biased assessment in NBA All-Star elections and as evidence for a decoupling between productivity and status.

However, decoupling might only be temporary. The loss of a status signal might lead to quick realignment between productivity and status in the next period. In our final model, we introduce indicators for cumulative All-Star nominations and cumulative mediators, that is, the average performance and situation up to $t-1$ to see whether status bias increases over time. Cumulative status bias indicates entrenched decoupling. Including cumulative All-Star nominations and cumulative mediators, Model 6 shows that having been an All-Star in the previous year has a slightly reduced coefficient of 2 percentage points, and every All-Star nomination prior to that adds another .4 percentage points to the likelihood of becoming an All-Star this year. Multiple previous All-Star nominations make a difference to a player's chances over and above the direct association with the previous election. This is evidence for cumulative status bias and growing entrenchment of status hierarchies in NBA All-Star elections.

Contextualizing the Size of Matthew Effects and Cumulative Status Bias

The analysis so far delivers evidence for Matthew effects and cumulative status bias in status persistence in NBA All-Star elections. We find a Matthew effect of 4.8 percentage points, average status bias of 2.4 percentage points, and cumulative status bias of All-Star status by an additional .4 percentage points for each previous All-Star nomination. Coefficient sizes are in the ballpark of existing findings from the literature on status advantage in sports. For instance, Kim and King (2014) find that baseball umpires are 4.8 percentage points more likely to misclassify a ball as a strike for high-status pitchers.

What do the coefficient sizes mean in the context of NBA All-Star elections? We should not interpret the coefficients for our covariates as causal effects (Keele, Stevenson, and Elwert 2020). However, they provide a frame of reference. In Model 3, we estimate that one additional point scored per 36 minutes at $t-1$ is associated with a .55 percentage points higher likelihood to be nominated for the All-Star game at t. This indicates that a player with the same baseline traits and otherwise matching performance and situation indicators would have to score roughly nine points more per 36 minutes to even out the All-Star status signal of a competitor. At the population average, Model 6 predicts that cumulative status bias increases a player's likelihood to be elected by 2 percentage points through an immediately preceding nomination and by a further .4 percentage points for every additional prior nomination. Calculating the chance for Kobe Bryant to be elected again in 2016, the inclusion of his directly preceding nomination and his accumulated nominations yields a 25 percentage points higher likelihood compared to a player with the same characteristics and performance indicators but without any preceding nominations.[13]

Given that there are around 450 active players in the league in a year,[14] the unconditional chance to become one of the 24 All-Stars is about 5.3 percent. Considering this, 4.8 (Matthew effect) or 2.4 (status bias) or .4 (cumulative status bias) percentage points denote a significant move of the needle, especially because this is the average across the whole distribution. An average player could almost double his chance to become an All-Star if he acquired the signal of a previous All-Star nomination.

The latter point and Kobe Bryant's stark advantage raise the question of effect heterogeneity and sound counterfactuals. The sample in the main analysis includes all players in the league. Comparing players who were All-Stars in the previous year to the entire rest of the league might be an unrealistic counterfactual. Figure 6 compares the coefficients from Models 3, 5, and 6 for the full sample and for a restricted sample of players who ever received enough votes to rank highly for their position in the All-Star election (N = 309).[15] Among these more comparable players, Model 3 indicates a Matthew effect of 12.5 percentage points, and Model 5 indicates a status bias of 6.6 percentage points. Finally, Model 6 shows a direct status bias of a previous All-Star nomination of 5.6 percentage points and an additional cumulative status bias of 1.3 percentage points for each previous All-Star nomination. This indicates that players with a realistic shot at becoming an All-Star benefit notably more from the signal of a previous All-Star nomination.

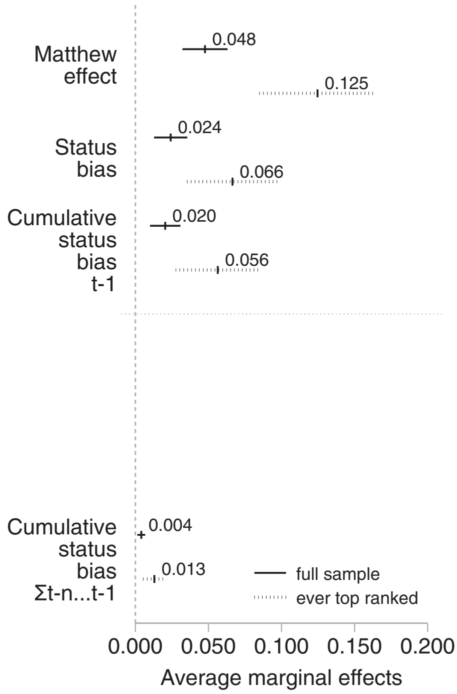

Figure 6. Comparison of Full Sample and Players Ever Top Ranked in All-Star Elections

Note: Figure is based on Model 3 (Matthew effect), Model 5 (status bias), and Model 6 (cumulative status bias) in Table B2 in Part B of the online supplement. Lines represent 95 percent confidence intervals.

IS IT STATUS? IS IT BIAS?

We interpret our findings as evidence of cumulative status bias. Two distinct issues could contest this interpretation. The first is potential alternative explanations for why players with initial All-Star nominations tend to accrue further nominations. Is it actually the status signal of an All-Star nomination that causes further status recognition? In our analysis, this would imply bias due to unobserved heterogeneity in the shape of a common cause for the initial and subsequent All-Star nominations. The second issue is whether voters' repeated endorsement of players in spite of others with higher productivity truly indicates a biased assessment. If it is the status signal of a previous All-Star election, rather than some unobserved common cause leading to status persistence, what does the signal mean to voters and what are the conditions under which we can claim this to constitute bias? We present additional analyses and discuss both issues in the following sections.

Is It Status? The Problem of Unobserved Heterogeneity

Alternative explanations in the form of unobserved heterogeneity could invalidate our conclusions about the effect of cumulative status signals on status persistence. Because of our detailed measures of performance and situation, we can adjust for relevant heterogeneity between players in terms of their productivity. Besides measures of productivity and baseline variables included in our models, an unmeasured confounder that precedes the initial status signal, such as a player's charisma, could bias the association (U1 in Figure 4). We check whether unobserved heterogeneity might drive our findings in several ways.

First, we take the fact that the main effect for having been an All-Star at $t - 1$ does not decrease much after inclusion of the cumulative term as a sign that unobserved heterogeneity does not bias our estimates. The cumulative term can be viewed as a proxy for a lagged dependent variable. A lagged dependent variable adjusts for time-constant unobserved heterogeneity given the assumption that unobserved factors will have affected previous outcomes in the same way. Players with similar past outcomes are likely to be similar in terms of their unobserved confounders (O'Neill et al. 2016). Prior work notes that lagged dependent variables might bias estimates themselves (Dafoe 2018). We take reassurance from the fact that the estimate does not differ across specifications.

Second, we test how well our battery of covariates can predict first All-Star nomination (see Table A1 in Part A of the online supplement). If our productivity indicators and baseline confounders predict All-Star status well before Matthew effects start driving status allocation, we might assume that unobserved factors, such as charisma, do not confound our relationships of interest. The Pseudo R^2 of .60 indicates the performance indicators considerably improve the model fit compared to a model without predictors, which bolsters our confidence that unobserved factors are not biasing our findings. To check whether prior status signals already affect the status hierarchy of NBA All-Stars, we add an indicator for whether a player has been elected "rookie of the year" in his first season. This coefficient is not statistically significant, nor does its inclusion increase the R^2. We take this as further indication that first time All-Star nominations are based on productivity.

Third, we test the robustness of our estimates to unobserved confounding by using voting information for the All-Star game in a regression discontinuity design (RDD) (for more detail, see the description, Figure A1, and Table A2 in Part A of the online supplement). We use a subsample of players who received significant shares of votes in the All-Star election and then compare the chance to be elected in the next year between players who were voted by the public to become a starter this year with those who did not make it (1,219 yearly observations for 290 players). Players in this sample should be highly comparable in terms of unmeasured factors such as charisma and popularity. Our RDD yields strong evidence for a Matthew effect that is unbiased by unobserved heterogeneity. In fact, like our analysis of the restricted sample of players who were ever close to a nomination, the RDD subsample yields a notably larger effect of more than 20 percentage points. Without a quasi-random threshold for cumulative nominations, we cannot model cumulative status bias in the RDD setup. But results for the Matthew effect underscore the robustness of our findings. Although we cannot fully rule out all alternative explanations, these tests suggest it truly is the status signal of previous All-Star nominations that leads to further nominations.

Even if our estimate of the Matthew effect is accurate, we might overestimate the contribution of cumulative status bias if our covariates do not exhaustively net out endogenous changes to productivity (U3 in Figure 4). The models we present here include a reduced set of the available productivity indicators. We ran a series of analyses that extend our battery of productivity measures (see Table A3 in Part A of the online supplement). Additionally adjusting for steals, blocks, turnovers, and personal fouls does not change our findings. Nor does using a player's "plusminus," a comprehensive performance statistic measuring the point differential for when a player is on the court. Our findings also remain unchanged if we separate playoff and regular season performances to allow for a potentially greater impact of a player's productivity in the playoffs. Our models are robust to alternative ways of modeling productivity, indicating we are able to net out the contributions of cumulative status bias.

Is It Bias? Conflicts with Meritocratic Ideals and Underlying Mechanisms

If the status signal of a prior All-Star election and not an unobserved confounder drives the cumulative advantage in status confirmation, the question remains of how to interpret the direct effects of (cumulative) status signals. Does decoupling from productivity truly signify bias in the awarding of repeated All-Star status? We distinguish two notions of bias. In a first, broader sense, existing work declares the social distribution of outcomes to be biased as soon as they deviate from a meritocratic ideal. Studies invoke status bias when higher-status academics are more likely to receive another grant for a comparable proposal (Bol et al. 2018), when higher-status wine producers fetch higher prices for a wine of comparable quality (Benjamin and Podolny 1999), or when employers differently reward comparably qualified workers from different status groups (Ridgeway 2014). The implication is that basing the distribution of outcomes on a status signal conflicts with our understanding of merit. It also implies a second, more narrow notion of bias, which is that external judges are unaware they deviate from the meritocratic ideal. The assumption is that judges want to reward productivity but lack information to make the appropriate decision on who to reward. A consequence of this understanding of bias is that status bias should flourish under uncertainty (Correll et al. 2017; Lynn et al. 2016; Sauder et al. 2012). When lacking information about productivity, judges use high status as a signal of productivity and believe they distribute outcomes in line with meritocratic ideals.

To claim that our findings are evidence of cumulative status bias in the broader sense, we need to establish whether there is a public meritocratic ideal for the All-Star elections. The All-Star game was introduced to pit the best players of the ongoing season against each other. But, because there are no official instructions or mechanisms to enforce this meritocratic ideal, the public could vote for their favorite players, not the most productive players. Our evidence to rule out unobserved confounding implies that whether a player is a fan favorite is likely downstream of status signals, meaning All-Star status is still the root driver of the vote. But instead of signifying bias, deviation from productivity in All-Star nominations could express alternative ideas of what the election is about. Historical examples support this claim. The most famous is the 1992 NBA All-Star nomination of Earvin "Magic" Johnson. Johnson became an All-Star when he returned to the league after retiring due to contracting HIV. He had not played a single regular season game before the All-Star game. Hence, his nomination was clearly related to his status as a star in the league and previous All-Star selections. Voters must have been aware that his election contradicted the meritocratic ideal.

Despite cases such as Johnson's selection, there is evidence that a public meritocratic ideal aligns All-Star status with highly productive players. First, our model presented in the previous section shows productivity indicators are powerful predictors of first All-Star nominations, indicating that voters appreciate the All-Star election is about electing the best players. This is underlined, second, by the public discussion of All-Star nominations. Johnson's 1992 nomination has always been considered a noteworthy exception, as evidenced by the special mention of the incident on the Wikipedia page for the 1992 All-Star game (*Wikipedia* 2022). The media and the public clearly frame the idea of whether nominations are "deserved" based on who the best players are that season. For instance, various publications have compiled lists of the most "undeserving" players to ever become an All-Star (e.g., *Eldorado* 2016; Fromal 2015; Kram 2022; Scaletta 2015). When making their case against players, these pieces frequently reference other players who statistically performed better and thus are seen to be more deserving. Finally, the result of the election is taken to represent the meritocratic ideal. Getting elected has real consequences regarding bonus payments and higher salaries, as well as long-term consecration to the Hall of Fame (Scaletta 2015).[16] All this implies a meritocratic ideal underlying the All-Star election, meaning our findings constitute bias at least in the broad sense.

Whether voters adhere to this ideal and why they might deviate from it is another question. Can we argue that the status-induced confirmation of status we find amounts to bias in the narrow sense that voters are unaware their vote does not fully reflect productivity? Statistical information about player productivity is easily obtainable. There was no doubt Johnson's productivity could not measure up to the requirement, as he did not even play that season. As we have no systematic data on voters' reasoning, one could reasonably assume that voters knowingly vote for someone who is not among the best players of the ongoing NBA season. We can cite anecdotal evidence to illustrate the biased arguments voters might make to cognitively align their choice with the meritocratic ideal. For instance, although statistically Kobe Bryant's 2016 selection was one of the least deserved ever (*Eldorado* 2016), many voters, peers, and even NBA commissioner Adam Silver argued he still deserved the selection

(Pandian 2015; Pincus 2015). More systematically, we can follow existing research (e.g., Azoulay et al. 2013; Lynn et al. 2016; Malter 2014; Simcoe and Waguespack 2011) and test the assumption that bias increases under conditions of greater uncertainty, as implied by the narrow understanding of bias.

Our first test compares different time periods based on the assumption that statistical information about player performance has become more accessible over time. This resembles Malter's (2014) study design, in which he tests whether status bias in wine prices decreases because the internet has made wine ratings more accessible in recent decades. In the case of the NBA, not only has the internet enabled easier access to performance data, but the role of statistical information has also increased over the past decades in professionals' approach to basketball, in media coverage, and in the public's perception. We split our sample into two eras of elections—from 1985 to 1998 and from 2000 to 2016, with the lockout year 1999, in which the All-Star game was canceled, serving as a separator.

Figure 7 shows a smaller Matthew effect, smaller status bias, and smaller cumulative status bias from 2000 to 2016. The reduced sample leads to relatively large confidence intervals, which is why we remain cautious in interpreting the differences between the eras. Still, the comparison suggests decreasing bias in NBA All-Star elections because of lower uncertainty. This supports the claim that status effects can be explained by the narrow notion of bias, that is, voters using high status as a signal of productivity without being aware of how they deviate from rewarding actual productivity.

Our second test rests on the assumption that despite the statistical information about players available to the voting public, NBA coaches will still have an informational edge, simply because they are professionally involved with the players and analyze performance data constantly. As the public votes for the five starting players in each conference and the coaches elect the seven reserves, we should observe less status bias among the reserves than among the starters. Because coaches elect reserves only after the starters have been selected, our analysis needs to take into account that their choices are conditional on the voting public's choices. We use a Heckman correction model that estimates the probability a player is not elected by the public and thus remains in the sample from which the coaches choose (Heckman 1979). From this first model, we can extract the average marginal effect of previous All-Star status on *not* getting elected by the public, that is, the average marginal effect on getting elected times –1. The second step uses the estimated probabilities to calculate the average marginal effect of previous All-Star status on getting elected by the coaches, conditional on players still being in the sample. We run

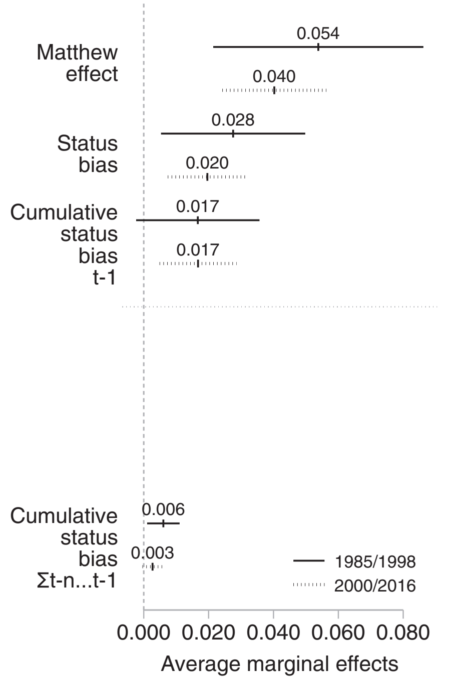

Figure 7. Comparison of All-Star Elections in Two Time Periods
Note: Figure is based on Model 3 (Matthew effect), Model 5 (status bias), and Model 6 (cumulative status bias) in Table B3 in Part B of the online supplement. Lines represent 95 percent confidence intervals.

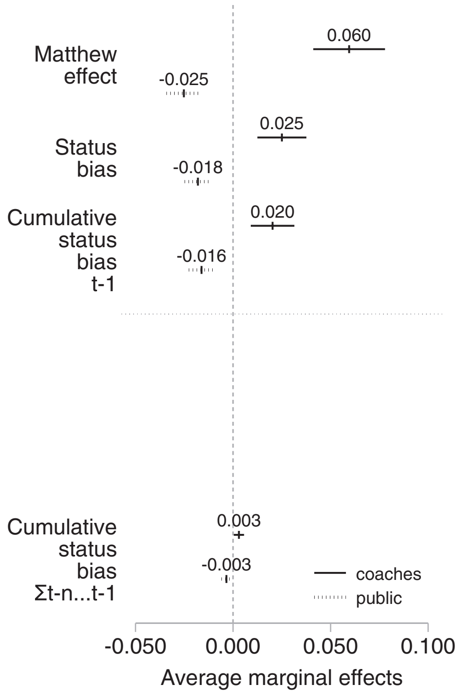

Figure 8. Comparison of All-Star Nominations by the Voting Public and Coaches
Note: Figure is based on Model 3 (Matthew effect), Model 5 (status bias), and Model 6 (cumulative status bias) in Table B4 in Part B of the online supplement. Lines represent 95 percent confidence intervals.

the Heckman models using the same sets of covariates as in our main analysis.

Figure 8 compares the coefficients from Models 3, 5, and 6 for the public and the coach vote. The coefficients for the public vote are negative because of the reversed dependent variable but otherwise fully comparable. Surprisingly, coaches exhibit larger status bias, if anything (2.5 compared to 1.8 percentage points). This seemingly undermines the notion that uncertainty increases status bias and, by extension, that voters are unaware of their bias. However, there is another explanation.

We have so far focused on uncertainty as underlying the decoupling of productivity and status. Because the vote is anonymous, symbolic acts of public deference-giving should play a reduced role. Thus, we have not considered alternative mechanisms, such as conspicuous consumption or coordination with third parties (Correll et al. 2017; Malter 2014). But, while it is plausible that individual voters are unaffected by potentially being observed when voting, this might be less true for coaches. Which coach votes for which player is not public. But the fact that there are only a small number of coaches in the league (currently 15 per conference) might mean their choices can be considered not fully anonymous. Absent the condition of anonymity, mechanisms to explain status bias via symbolic action rather than uncertainty become relevant. In our case, coaches' choices might be best explained by third-order inference. Correll and colleagues (2017) suggest that in some contexts, actors might base their choice not on the information they have but on what they believe third parties think to be the right choice. To please the fans, coaches might choose players who they think the public would want to see elected, despite thinking other players have performed better. As the public vote happens first, coaches know which players the public would have elected after electing the starters. In our sample, the coaches awarded 376 of the 626 All-Star nominations. Of these 376, only 59 were players who were not ranked highly in the public vote.[17] Thus, coaches might decide not only based on their information about player productivity, but they might take cues from the voting public when selecting the All-Star reserves. Our interpretation is that in the first step of the election, the public's uncertainty about productivity causes status bias. Coaches' symbolic action of third-order inference explains status bias in the second step. Ironically, this implies coaches still act on the status bias caused by the public's uncertainty.

Our findings suggest status bias in the broader sense of inducing a deviation from an established meritocratic ideal as (1) there is a general correlation between productivity and status, (2) the meritocratic requirements are frequently debated in the public, and (3) the elections have material consequences relying on a meritocratic interpretation. Whether we observe status bias in the narrow sense of voters taking the status signal to inform their choice under uncertainty is less clear. The decrease in status advantage over time suggests that better-informed voters exhibit smaller bias. But supposedly better-informed coaches exhibit greater bias than the public. We suggest this can be explained by third-order inference given the lower anonymity of coaches' selections.

CONCLUSIONS

Summary

In this article, we examined the role of Matthew effects and cumulative status bias as drivers of status persistence in a nominally meritocratic environment. Existing models of Matthew effects in meritocratic domains emphasize that status signals will cause biased resource allocation, which helps high-status actors retain their relatively higher productivity. Through socially endogenous investment, they seem to deserve the confirmation of their status (Benjamin and Podolny 1999; Lynn et al. 2009; Podolny 1993, 2005). Work in the social stratification tradition considers cumulative advantage to be problematic mostly when initial status signals are ascribed, such as race and gender, and thus arguably unrelated to productivity. But even here, the emergence of status beliefs causing status stability is hypothesized to work through (perceived) changes in productivity and behavior (Berger and Fişek 2006; Berger, Rosenholtz, and Zelditch 1980; Gould 2002; Ridgeway 1991, 2014). We extended existing theories of status persistence to develop a model of cumulative status bias in which an initial status signal increases the likelihood to have that status confirmed (*Matthew effect* in status persistence), this status advantage being partly explained by the status signals directly biasing the confirmation of status (*status bias* in status persistence), and status signals accumulating over time, causing status persistence (*cumulative status bias* in status persistence). Our model explicitly allows for a greater degree of decoupling between status and productivity.

We used data on annual, repeated elections to the NBA All-Star game and detailed statistics for NBA player performances from 1983 until 2016. We isolated cumulative status bias by modeling productivity differences before initial status allocation as well as in between iterations of status allocation. In line with existing theories, a significant portion of status-induced cumulative advantage, that is, the Matthew effect, could be explained through better performances and improving situations for players after an initial All-Star nomination (Benjamin and Podolny 1999; Lynn et al. 2009; Podolny 1993, 2005). But as about half of the Matthew effect remained, we interpreted this as the status signal of a previous All-Star nomination directly biasing its confirmation. Contrasting the expectation that regular reappraisal in meritocratic settings will help rein in status bias over time (Lynn et al. 2009; van de Rijt 2019; van de Rijt et al. 2014), we demonstrated that accumulating nominations increased status bias over and above the direct effect from one year to the next, thus indicating cumulative status bias. We conclude that cumulative status bias plays a significant part in explaining the rigidity of status hierarchies. Over time, these persistent status hierarchies decouple more and more from actual productivity.

Cumulative Status Bias in Other Domains

Cumulative status bias likely permeates other meritocratic hierarchies. In the following, we walk through how cumulative status bias will play out in persistent status hierarchies in wine markets and academia, two domains in which numerous studies have established the presence of status advantages (e.g., Azoulay and Lynn 2020; Benjamin and Podolny 1999; Malter 2014; Merton 1968). We use these examples to discuss three important factors that determine to what degree cumulative status bias decouples status and productivity: the salience of meritocratic ideals, the observability of productivity, and public visibility of the status allocation process.

In wine markets, cumulative status bias means that not only does an initial status distinction allow wine producers to ask for higher prices and then reinvest profits into making better wine (Benjamin and Podolny 1999), but individuals who confirm status hierarchies (e.g., judges for wine guides) are directly biased by observing the status signal. Moreover, the accumulation of status signals, that is, the status history of a wine producer, would cause further decoupling between status and the quality of wines. In academia, it means the status signal of a prestigious grant would not only increase the likelihood of another grant by allowing a researcher to produce more highly cited publications (Bol et al. 2018), but it also biases evaluators' assessment of another grant proposal directly. Accumulating multiple grants further improves the likelihood of another grant, as evaluations are not only biased by the most recent signal but by their accumulation over a researcher's career.

We suggest that cumulative status bias is likely present in any process of status confirmation, but our research implies that the extent of cumulative status bias in status confirmation will depend on several factors. First, are there clear meritocratic rules and criteria to assess deservedness of outcomes? Even though some claim the All-Star election is a popularity contest, there is still an evident meritocratic ideal to vote for the best players of the season. It is reasonable to assume that cumulative status bias is larger when evaluation criteria are unclear. For instance, the criteria to determine the quality of a wine are less clear, so the status history of a wine producer might have a greater impact on the confirmation of rankings (if not actively counteracted via blind testing, for instance). Similarly, the criteria as to what constitutes high-quality academic research are up for debate (many readers will have first-hand experience of this debate). Thus, a candidate who has already accumulated numerous grants will be more likely to receive another grant (Bol et al. 2018). This will be partly mediated through productivity increases induced by previous grants, but the allocation of the new grant will also be biased by the observation of the status signal from previous grants. In both wine markets and academia, the contribution of bias is likely to be larger than in our case study.

Second, uncertainty about underlying productivity is a central explanation of status bias (Lynn et al. 2016; Sauder et al. 2012). In the NBA, information on player productivity is detailed and easily accessible. Adding to existing evidence (Azoulay et al. 2013; Simcoe and Waguespack 2011), our additional tests lent tentative support to the uncertainty mechanism. When there is little information about productivity, cumulative status bias will be larger. Because it is less clear what high-quality wine or high-quality research is, productivity measures such as wine ratings or citation counts will be less informative and uncertainty should be greater. Again, the observation of prior status distinctions and their accumulation will have a larger effect on the confirmation of status in wine markets and academia than in the NBA.

A third factor we discussed is whether the confirmation of status takes place in public. We argued that without the potential of public deference-giving, uncertainty will be the main driver of status bias. Our finding that coaches exhibit larger status bias than the arguably less-informed public indicates that when status is allocated publicly, cumulative status bias could also be driven by symbolic acts of deference-giving. Public visibility of the status-confirmation process thus adds another motive to confirm prior status hierarchies. If both mechanisms combine in public arenas, total cumulative status bias could be larger. Awarding research grants might be a comparatively hidden process, implying uncertainty as the main driver. In wine markets, however, it might mean that greater information about quality might not lead to less cumulative status advantage, because conspicuous consumption drives the decoupling of productivity and status. Note that the fact that consumers might consider status as part of the quality could be interpreted as less decoupling. Malter (2014), for instance, argues that conspicuous consumption explains why status differences in wine prices persist in the internet age. Buyers do not infer quality from the status signal of a wine producer, but they are willing to pay higher prices to associate themselves with high-status products. Status can be viewed as part of the product's quality that consumers are willing to pay for. The status-based model of market competition would need to be modified to account for additional pathways outside of productivity differences to be more realistic in explaining status-induced stability in status hierarchies (Lynn et al. 2009; Podolny 1993, 2005).

The configuration of clear meritocratic ideals, observability of productivity, and public visibility of status confirmation will determine the extent to which an accumulation of status signals biases status confirmation. The discussion of these factors also supports our claim that our case study yields conservative estimates of the role of cumulative status bias.

Implications and Further Research

For the study of cumulative and persistent social inequality, our findings imply that the role of status bias might still be underestimated, both methodologically and theoretically (Ridgeway 2014). Methodologically, our findings suggest a need for awareness of prior status signals even when one is only interested in an immediate status advantage. Without adjusting for previous status signals, our analysis of status advantages rests on the assumption that their effect is mediated completely through the one that is observed in the study. The accumulation of status signals might not seem to be an immediate problem if status is not regularly reallocated in the domain under consideration. A Nobel prize winner is a Nobel prize winner. But there might be heterogeneity in how the status signal is perceived, for example, because of time passed and intermittent events (Farys and Wolbring 2021). As the process of interest is socially endogenous, the crucial demand is on data availability and the ability to parse status from productivity over several time periods. Even considering the advantages of our data and the battery of robustness checks, there were remaining threats to causal identification. Finding exogenous variation for a single status signal is difficult, but this difficulty is multiplied if the aim is to model the accumulation of status signals. Experimental designs, such as audit studies, might be one way to go forward (Bertrand and Mullainathan 2004; Correll, Benard, and Paik 2007). But given their limitations in terms of external validity, the onus is on detailed observational data to get a full grasp on the role of bias in the decoupling of status and productivity.

We could also only provide indicative evidence on whether uncertainty is the central underlying mechanism of cumulative status bias. To distinguish between uncertainty and alternatives such as conspicuous consumption or third-order inference, we would optimally need data on decision-makers. Conspicuous consumption is well established as driving some consumer choices in organizational research, but why individuals make biased decisions when awarding prizes or making hiring decisions usually comes down to the interpretation of a residual. Even experimental research frequently relies on the assumption that if we adjust for productivity differences, remaining outcome differences must indicate bias, for example, in research on discrimination in hiring (Correll et al. 2007). Emerging research focusing on employers helps better understand these decisions (e.g., Di Stasio and van de Werfhorst 2016). Data on people who confirm status in domains such as culture or academia could significantly advance research on cumulative status bias.

Regarding theory, the existence of cumulative status bias draws our attention to the issue that status can be confirmed and calcified in meritocratic settings even without concurrent developments in productivity. Meritocratic status hierarchies lend an air of legitimacy to social inequality in the allocation of resources and status because they are subject to regular reappraisal according to clearly outlined rules. Intuitively, cumulative advantage seems always at odds with ideals of basing resource allocation on merit alone (Castilla and Benard 2010; Ridgeway 2014). But if Matthew effects were mediated through actual increases in productivity, persistent inequality would not necessarily offend meritocratic sensibilities (Lynn et al. 2009; Podolny 1993, 2005). Our findings imply, however, that status itself can lead to entrenched status hierarchies through cumulative status bias. The chances of strong decoupling between status and underlying productivity are greater than models that focus on mediation through productivity changes assume. Theories and tests of how status causes and legitimizes social inequality need to allow for a greater degree of social construction (Lynn et al. 2009).

Studying cumulative status bias is also important in domains that differ from the relatively controlled NBA setting. The inclusion of a wider public in our case study encourages us to speculate about other domains in which public elections determine an achieved status hierarchy. For instance, in democratic elections, the signal of multiple prior elections is likely part of a candidate's incumbency bonus (Gelman and King 1990). Moreover, if cumulative status bias leads to growing decoupling in the relatively controlled settings of achieved status hierarchies with clear meritocratic ideals and observable productivity, it likely permeates social processes in which multiple status hierarchies—achieved or ascribed—intersect.

We analyzed the accumulation of one specific status signal over time. Of course, actors accumulate status signals from different domains that might be relevant for various outcomes and for the confirmation of a status position in a complex network of hierarchies (Sauder et al. 2012). For instance, ascribed status characteristics are likely to figure largely into many meritocratic status hierarchies (Allen and Parsons 2006). For hierarchies based on gender or race, decoupling of status and productivity can be assumed from the start, and the role of bias is larger than in our setting, as evidenced by research on gender and racial wage penalties (Castilla 2008; Correll et al. 2007; Lynn et al. 2009). We could also imagine that the accumulation of achieved status hierarchies yields differential advantages for groups with different ascribed characteristics. Within the context of everyday situations, where multiple signals of ascribed and achieved status interact, where productivity is much more difficult to assess, and where guidelines to align the allocation of resources with productivity are less salient, the chances to violate meritocratic principles are tremendously high. Cumulative status bias helped Kobe Bryant obtain an 18th All-Star nomination in the limited low-uncertainty setting of the NBA All-Star election despite lacking high performance. It is likely to permeate any nominally meritocratic domains, underscoring persistent social inequality.

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Notes

1. Even the best data on productivity would not help if productivity and status are fully co-determined

(Simcoe and Waguespack 2011). Because All-Star status is limited to 24 players each year, there is a sharp discontinuity in the All-Star status allocation, akin to Merton's phenomenon of the 41st chair. In reference to the French Academy, which traditionally ruled that its membership must be constrained to a cohort of 40, Merton (1968:56) argued that "[t]his limitation of numbers made inevitable, of course, the exclusion through the centuries of many talented individuals." The limited number of seats on the Academy creates a discontinuity in the alignment of status and performance, as the 40th member of the Academy is likely not much more qualified than the individual who is ranked 41st. Yet, number 40 reaps the benefits of the status distinction and 41 is left empty-handed. The limited number of All-Star nominations ensures decoupling between productivity and status.

2. Replication files can be found at https://doi.org/10.17605/osf.io/ntwdy.
3. We excluded records from the American Basketball Association (ABA). The ABA was a second league that existed from 1967 to 1976.
4. In robustness checks, we compared our results with an analysis that uses having been elected to be an All-Star game starter as the independent variable, as some might argue this might send a stronger signal. We find no substantive differences to our main results (see Table A4 in Part A of the online supplement).
5. In their analysis of racial differences in career length in the NBA, Norris and Moss-Pech (2022) use Player Efficiency Rating (PER), a composite performance indicator that is a weighted combination of a player's field goals, assists, rebounds, and so on instead of separate indicators. We opt for the inclusion of separate indicators for two reasons. First, the composite indicator also includes team-level performance. Using it would keep us from separating performance from situation when analyzing the causal pathways of the Matthew effect. Second, separate indicators enable us to compare coefficient sizes to our main independent variable and provide a more meaningful frame of reference, compared to contrasting the size of the Matthew effect with PER.
6. Because of the NBA lockout, there was no All-Star Game in 1999. We average the performance and situation between the 1998 All-Star Game and the 2000 All-Star Game to model the performance and situation mediating the effect of 1998 All-Star nominations on the 2000 All-Star election.
7. This resembles how studies in organizational research model a producer's reputation (e.g., Malter 2014).
8. Using linear probability models instead is not appropriate because the associations of interest are not linear across the distribution, as we show in additional analyses (see discussion of Figure 6).
9. Dealing with (time-constant) unobserved heterogeneity by using panel fixed-effects models would unduly limit the variance used in the models. Because logistic fixed-effects models only include units that show a change on the dependent variable (Allison 2009), a within-estimator would solely rely on players who became All-Stars at some point ($N = 172$). Variance used in the estimation would be further reduced for our coefficients of interest because models would use only observations of these players for years in which they experience a change in their All-Star status, that is, either turning from non-All-Star to All-Star or the other way round, and when their cumulative number of All-Star nominations goes up. For instance, players who get consistently elected—who, one might argue, are central to our argument—could only contribute to the estimate of the cumulative indicator, and only in years in which their outcome changes.
10. In robustness checks, we also allow for an interaction between All-Star nomination at $t - 1$ and the number of All-Star nominations until $t - 1$ $\varphi A_{t-1}\bar{A}$. We add this interaction to Model 6 to assess whether the effect of cumulative All-Star nominations differs when a player was an All-Star at $t - 1$ or not. Figure B1 in Part B of the online supplement shows that the coefficient for cumulative All-Star nominations is negligibly smaller for players who also were All-Stars at $t - 1$.
11. Bryant was elected to the All-Star game 18 times (in 1998 and 2000–2016) but missed three of the games due to injury.
12. Additional analyses, in which we model the impact of an All-Star nomination at $t - 1$ on our various indicators of performance and situation net of differences before having become an All-Star, show significant effects on almost all indicators except the likelihood to move to a big market team (see Table A5 in Part A of the online supplement). For instance, players average almost two more points per 36 minutes after receiving an All-Star nomination compared to players with similar productivity but who were not nominated.
13. This difference is larger than it would be at the population average due to the nonlinearity of the logistic model (see Mood 2010). We address the issue of larger effects for players with greater chances to be elected in the models displayed in Figure 6.
14. The actual number of players depends on the number of teams, which has varied historically. Additionally, some players might drop out of the league during the season and others get picked up, which increases the total number of individual players. When there are 30 teams with 15 active players, the total number of players is roughly 450.
15. To be considered highly ranked, a center would have to be among the top 5 vote-getters in their conference for their position, and a guard or forward would have to be in the top 10. Between 2013 and

2016, a frontcourt player would have to be in the top 10 and a backcourt player in the top 15.

16. Cumulative status bias also likely plays out in terms of long-term consecration. Among our sample, 35 players have been selected to the Hall of Fame. All elected players had been All-Stars during their careers (except some players who entered the Hall of Fame based on their international career). All were All-Stars at least four times, except for Dennis Rodman who was elected with two All-Star selections. Still, All-Star selections appear to be a necessary but not sufficient condition for consecration. Some players, like Shawn Kemp and Jermaine O'Neal, were six-time All-Stars but have not yet been elected to the Hall of Fame. This aligns with findings by Allen and Parsons (2006), who show that consecration in the Baseball Hall of Fame requires a combination of status signals, supportive discourse, and objective productivity differences.
17. See note 15 for our definition of "highly ranked."

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