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From a fixation on sports to an exploration of mechanism: The past, present, and future of hot hand research

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We review the literature on the hot hand fallacy by highlighting the positive and negative aspects of hot hand research over the past 20 years, and suggesting new avenues of research. Many researchers have focused on criticising Gilovich et al.'s claim that the hot hand fallacy exists in basketball and other sports, instead of exploring the general implications of the hot hand fallacy for human cognition and probabilistic reasoning. Noting that researchers have shown that people perceive hot streaks in a gambling domain in which systematic streaks cannot possibly exist, we suggest that researchers have paid too much attention to investigating the independence of outcomes in various sporting domains. Instead, we advocate a domain-general mechanistic approach to understanding the hot hand fallacy, and conclude by suggesting approaches that might refocus the literature on the important general implications of the hot hand fallacy for human probabilistic reasoning.

Psychologists have long been interested in the human tendency to perceive patterns in random events (for a review, see Nickerson, 2004). For example, during the London Blitz of World War II, many Londoners believed that German bombers targeted specific areas of the city, although analyses showed that the bombs fell randomly (Gilovich, 1991). The London Blitz case demonstrates that people overemphasise anomalous data points in an attempt to draw meaning from noisy data. The reverse is also true—when asked to spontaneously generate random streaks, people inadvertently introduce patterns by too-frequently alternating among potential outcomes

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(for a review, see Wagenaar, 1972). The world consists of a vast array of stochastic processes in which people misperceive patterns, from weather changes to financial processes. In this paper, we review the literature on one such phenomenon—the hot hand fallacy—and encourage the field to redirect its attention from its current fixation on examining the fallacy in an ever-increasing range of sporting domains.

In the original paper demonstrating the hot hand fallacy, Gilovich, Vallone and Tversky (1985; see also Tversky & Gilovich, 1989a, 1989b: subsequently, these three papers are referred to as *GVT*) showed that people sometimes perceive patterns where they do not exist. They illustrated this effect in a domain in which perceptions about patterns were strongly ingrained, so their proof of the absence of such patterns would be counterintuitive, and their conclusions persuasive.

The domain was basketball performance, and the illusory pattern was streak shooting—more commonly known as the hot hand fallacy. In a set of statistical analyses, GVT showed that streaks were no more prevalent than one would expect were shots truly independent of each other. Despite the remarkable impact of their paper, GVT's decision to concentrate on the hot hand in basketball was to some extent detrimental; rather than encouraging researchers to explore the mechanisms that contribute to the human tendency to misidentify patterns, rejoinders to GVT's paper tended to debate whether streak shooting in basketball and other sports is actually illusory. Indeed, many researchers' beliefs in the hot hand in basketball were so strongly entrenched that they were driven to challenge GVT's analyses. Twenty years later, the controversy remains unresolved. Researchers have argued that GVT's statistical analyses were flawed (e.g., Sun, 2004; Wardrop, 1995) and that statistics cannot account for the complexity of the game (e.g., Hooke, 1989; Larkey, Smith, & Kadane, 1989).

In their attempts to prove the existence of the hot hand in new domains, researchers have chosen not to examine a deeper truth about human reasoning. The central point of GVT's paper—that people erroneously detect patterns in random data—is crucial to our understanding of the cognitive mechanisms that underpin human probabilistic reasoning. Accordingly, the purpose of this paper is twofold. Our first aim is to review the hot hand fallacy research. We begin by examining the research that focuses on proving the existence of the fallacy in specific sporting domains. We believe this research has limited theoretical value, as it tells us little about the psychological processes underlying pattern detection. We then review more psychologically informative domain-general factors of the fallacy and the fallacy's implications for reasoning. We will also propose several new lines of research that explore the mechanisms that govern how people make sense of probabilistic data.

FIXATION ON SPORTS

The debate about the existence of the hot hand fallacy in various domains is as vibrant now as it was in the decade following GVT's original study (Gilovich et al., 1985). Many of these studies centred on the shortcomings of GVT's statistical methodology. For example, Sun (2004) criticised GVT's decision to adopt a simple binomial model in their analyses. Wardrop (1995) questioned the nature of the data set that GVT used, arguing that laypeople were processing different data from those that researchers like GVT were analysing.[1] In a similar vein, Adams (1992) argued that GVT left a "loose end" by failing to consider temporal issues. Adams noted that a hot streak might dissipate with time, so a successful shot is more likely to follow a successful shot if the interval between the two shots is short. However, Adams' reanalysis confirmed GVT's conclusion that the hot hand is an illusion.

Other researchers have argued that GVT's model failed to reflect what constitutes a hot hand in the observer's mind. For example, Larkey et al. (1989) argued that when observers appraise a player's performance, they take into account factors like the difficulty of the shots the player has attempted and the extent to which the opposing team concentrates its defence on that player. Similarly, Hooke (1989) noted that GVT ignored the interaction between offence and defence when attempting to model scoring data. Hooke's analysis implied that, whereas fans watching a game might build the performance of the defence into their calculations, GVT's model overlooked this important component of a shooter's success.

Just as early studies focused on the hot hand fallacy in basketball (Adams, 1992, 1995; Hooke, 1989; Larkey et al., 1989); baseball (Albert, 1993; Albright, 1993a; Albright, 1993b; Hooke, 1989; Stern & Morris, 1993); and tennis (Silva, Hardy, & Crace, 1988), researchers in the past 10 years have explored the existence of the hot hand in professional men's golf (Clark, 2003a, 2005); professional women's golf (Clark, 2003b); tennis (Klaassen & Magnus, 2001); golf putting and darts (Gilden & Wilson, 1995); tenpin bowling (Dorsey-Palmateer & Smith, 2004); and even horseshoe tossing (Smith, 2003). Most striking, perhaps, is researchers' undying interest in the hot hand fallacy in basketball (e.g., Gula & Raab, 2004; Hales, 1999; Koehler & Conley, 2003; Miyoshi, 2000; Sun, 2004; Wardrop, 1995).

[1]However, in their original paper, Gilovich et al. (1985) eliminated the relatively mundane possibility that belief in the hot hand fallacy could be due to a memory bias. They presented basketball fans with short sequences of hit and miss data and found that participants classified these sequences as "chance shooting"—sequences of hits and misses that mimicked the behaviour of a coin across several tosses—when the probability of alternation between hits and misses was between 0.7 and 0.8, rather than 0.5. Thus, people conceive of chance as excessively rapid alternation between equally likely options, which explains why they tend to construe even short strings of consistency as evidence of streaks or a hot hand.

Whereas these studies may be useful in understanding human motor performance and sports performance across a range of sporting domains, they shed no light on the cognitive processes that attend the hot hand fallacy.

The plethora of recent studies listed above shows that, some 20 years later, researchers still attempt to attack and defend the original finding, a line of research that illuminates little about the broader phenomenon of human probabilistic reasoning. Researchers debating the existence of the hot hand choose not to address a theoretically rich examination of the implications of the hot hand fallacy for human probabilistic reasoning. At least two published studies have shown that people endorse the hot hand fallacy in the domain of roulette, where each event is objectively independent of the previous event (Croson & Sundali, 2005; Wagenaar, 1988), implying that the hot hand belief exists in at least one domain where streakiness is statistically impossible. Similarly, we approached 40 passers-by outside a casino in Atlantic City, and found that the majority endorsed the hot hand fallacy in the dice game of craps and reported a tendency to bet more when they believed they were experiencing a streak of success. Given that people perceive streaks in the domains of craps and roulette, the existence of the hot hand fallacy is unassailable. Thus, whether or not such patterns exist in basketball, or any other specific domain, is beside the point. As long as people erroneously perceive streaks and patterns in at least one domain, the bias is demonstrably real—and, if the effect is real, researchers should focus on the domain-general implications of the hot hand fallacy for human probabilistic reasoning.

Accordingly, we believe that researchers would gain more by focusing on the mechanisms underpinning the hot hand fallacy, rather than trying to prove that belief in the hot hand is either erroneous or justified in various domains. Encouragingly, although the majority of research has employed a domain-specific focus, several researchers have attempted to elucidate the general mechanisms behind the hot hand fallacy. We discuss those studies in the next section of this paper.

MECHANISTIC ACCOUNTS

Recently, a small but encouraging body of literature has begun to consider the mechanisms that underpin the hot hand fallacy. These studies represent a small minority[2] of the research exploring the hot hand fallacy and most

[2]A quick survey of the published research on the hot hand fallacy shows that approximately 23 papers have reported domain-specific, non-mechanistic studies of the hot hand fallacy, whereas only five published manuscripts have explored the mechanisms that underpin the hot hand fallacy. We also discuss a handful of unpublished manuscripts in our review that adopt mechanistic approaches; although they contribute to the "mechanistic" side of the scale, they have not yet been peer reviewed. This tempers their impact and makes it difficult to guarantee their methodological efficacy.

were conducted by a small cabal of researchers, some of whom contributed to several of the papers discussed below. Moldoveanu and Langer (2002) provided a useful framework by offering an account of the mechanisms that determine how people engage in probabilistic reasoning. They suggested that people approach probabilistic phenomena with prior assumptions about the processes that underlie those phenomena. When surprising outcomes violate those assumptions, people are forced to interpret those violations in light of the tenets of their original model. For example, when people assume that a process is random, they expect a more rapid alternation between outcomes than stochastic modelling would suggest (Falk & Konold, 1997). When they witness an unexpected streak (e.g., several heads from a series of coin tosses, or numerous scoring shots in basketball), their interpretation of this streak depends on prior assumptions. Whereas people expect coin tosses to be random, they are willing to entertain the possibility that streaky performance in a human-driven domain like basketball implies a degree of skill. Thus, they are likely to anticipate an outcome of tails from a coin toss as "balancing" the series of heads, leading them to endorse the gambler's fallacy—the mistaken belief that the odds of a random event occurring are less likely after the event has recently occurred (Tversky & Kahneman, 1974). Conversely, once people decide that a basketball player has violated the assumptions of randomness, his skill is attributed to a "hot hand". This explains why the same streaky outcome leads people to adopt opposing expectations; the attribution of streaks to skill licenses a departure from randomness, whereas people expect an unambiguously random process to generate frequently alternating outcomes.

Several recent empirical papers tested Moldoveanu and Langer's (2002) assumption that people interpret subjective violations of randomness by consulting naïve process models. Researchers generally found that people expected human-generated streaks to continue and randomly generated streaks to end (Ayton & Fischer, 2004; Boynton, 2003; Burns & Corpus, 2003; Caruso & Epley, 2004; McDonald & Newell, 2005; Oskarsson, Hastie, McClelland, & Van Boven, 2005; see also Wagenaar & Keren, 1988, for a similar early account). Thus, people endorse the hot hand fallacy when they attribute streaks to skill or human idiosyncrasy, whereas they endorse the gambler's fallacy when they believe the process is random.

However, the findings in certain studies were more nuanced. McDonald and Newell (2005; see Boynton, 2003, Study 2, for similar results) showed that people pay little attention to the cause of the streak when outcomes alternate frequently. After a run of frequently alternating outcomes, people assume that the streak will end, regardless of whether it represents successful basketball shots or coin toss outcomes. This finding is intuitively satisfying, as it suggests that people believe that an erratic basketball player is no more capable of sustaining a short streak than is a randomly tossed coin. However, when outcomes alternate infrequently, people pay greater attention to the method of outcome generation, which leads them to expect skill-driven streaks to continue and randomly generated streaks to end.

In two related studies, Boynton (2003), and Ayton and Fischer (2004) showed that people expressed greater confidence in their subsequent expectations after a series of correct guesses, regardless of whether they expected a streak to continue (evidence of the hot hand fallacy) or to end (evidence of the gambler's fallacy). These findings suggest that people posit a theory about how the data are produced and, once they have evidence to support that theory, they become more confident in their estimates. The authors of both papers provided evidence to support this interpretation by showing that people form theories about how outcomes are generated on the basis of the data. When outcomes alternated rapidly, participants attributed those outcomes to random processes like coin tosses, whereas participants attributed streaky data to performance in skill-based domains like basketball, football, and tennis. A recent study by Altmann and Burns (2005) found similar results. The experimenter told participants that a random coin toss generator might have a "bug" that would cause earlier outcomes to influence later outcomes. When they experienced moderate streaks, participants expected those streaks to end; however, once the computer generated long streaks (exceeding five like outcomes), participants appeared to decide that the process was non-random and robustly predicted that the streaks would continue. Thus, people in all three studies developed theories about the underlying process of data generation based on the pattern of outcomes.

Researchers have also invoked motivational mechanisms to explain why people sometimes adopt the hot hand fallacy whereas at other times they adopt the gambler's fallacy. Choi, Oppenheimer, and Monin (2003) found that people's predictions following a streak are consistent with the outcome that leads them to benefit. In one study, Choi et al. told participants that they needed 12 heads or 12 tails out of 20 tosses to win a prize. After each coin toss, participants predicted the outcome of the following toss. When they benefited from a streak (e.g., a streak of heads when they needed 12 heads from 20 coin tosses), participants predicted that the streak would continue; in other words, they adhered to the hot hand fallacy. Conversely, when the streak frustrated their attempts to toss a particular outcome, they expected the streak to end, demonstrating their endorsement of the gambler's fallacy. However, this pattern only occurred after streaks—people were not foolishly optimistic in believing that every coin toss would lead to a favourable result. Thus, streaks amplify people's motivational biases, leading them to predict that helpful streaks will continue and harmful streaks will end.

In a similar vein, Fedotova and Oppenheimer (2006) found that people believe a random process is more likely to generate a favourable outcome when previous outcomes felt similar to that favourable outcome. For example, when people were asked to bet money on the possibility that a number between 90 and 100 would appear, they bet more money when a previous streak included numbers from 80 to 89 and less when the streak included numbers from 1 to 10, relative to a baseline streak of numbers from 45 to 55. Thus, people not only perceive streaks, but impute meaning to those streaks depending on how close they subjectively feel to the desired outcome. This finding accords with that of Choi et al. (2003), as both studies suggest that people are more likely to anticipate beneficial outcomes after previous outcomes that are objectively (Choi et al., 2003) or subjectively (Fedotova & Oppenheimer, 2006) favourable.

One common thread linking the numerous mechanistic studies described above is that they demonstrate maladaptive behaviour in the laboratory context. For example, in some studies participants perceived illusory patterns in randomly generated data (e.g., Wagenaar & Keren, 1988), and in others they experienced false hope in the presence of a near miss (Fedotova & Oppenheimer, 2006) However, other researchers have suggested that the hot hand fallacy may be adaptive in many contexts. This adaptiveness perspective may also illuminate the mechanisms that govern people's beliefs in the hot hand fallacy (Burns, 2004).

Burns argued that, even if the hot hand is a fallacy in the basketball domain, people benefit from using streaks as a cue when deciding which player should receive the ball. Burns showed that better players (i.e., players that have a higher base rate of success) are more likely to shoot consecutive scoring shots—consistent with Gilovich et al.'s (1985) data—which both fosters a belief in the hot hand fallacy and improves basketball passing allocation decisions by directing players to pass to their better team-mates. Burns concluded with a discussion of the conditions under which following streaks is and is not an effective strategy. By demonstrating that a belief in the hot hand fallacy can be adaptive, Burns showed that positive reinforcement is at least one mechanism that leads people to maintain their belief in the fallacy, even when the evidence suggests that events are independent (e.g., in the gambling domain: Croson & Sundali, 2005; Wagenaar, 1988).

While there are important benefits to the adaptiveness approach, we believe it also has significant shortcomings. While it may be true that the hot hand fallacy provides a useful approximation of base rates of success in many domains, it is important to note that people use the same reasoning strategy in situations where it is maladaptive and actual base rates are available or obvious (e.g., our Atlantic City gambling studies described earlier). It is also interesting to consider why people cannot adjust their reasoning strategies when events are independent. In other words, why do people continue to believe in the hot hand when it cannot possibly be true? Even when people are aware that events are independent (e.g., in the domain of craps), they fail to treat a random streak as random. Situation-specific adaptation would certainly be the most adaptive approach to probabilistic reasoning. This highlights a second problem with the approach—it focuses on one domain to the exclusion of others. Even mechanistic approaches like Burns's adaptiveness approach suffer when they remain rigidly fixated on basketball.[3]

Thus, although a small minority of researchers has recently focused on elucidating the mechanisms that underpin the hot hand fallacy, even mechanistic accounts of the fallacy are sometimes constrained by studies in specific domains with idiosyncratic characteristics. In the final section of this paper, we suggest a range of approaches to studying the hot hand fallacy that might advance our understanding of general human probabilistic reasoning.

SUGGESTIONS FOR FUTURE HOT HAND RESEARCH

As we have already suggested, there is little point in debating whether people are correct to believe in the hot hand in specific domains. There is ample evidence that, in at least some circumstances, people perceive illusory correlations that drive probabilistic fallacies like a belief in the hot hand. Other naturalistic examples abound: in one study, 18 arthritis patients indicated that their condition was highly dependent on the weather, whereas there was actually no relationship between their symptoms and weather conditions (Redelmeier & Tversky, 1996). Similarly, Hamilton and Rose (1980) demonstrated that people sometimes develop and maintain stereotypical beliefs in the absence of a relationship between particular behaviors and the stereotyped group.

We still have much to learn about the mechanisms behind these errors in probabilistic reasoning. One fruitful avenue for future research would be to explore the nature of the naïve cognitive models that drive people's probabilistic reasoning. The hot hand fallacy demonstrates that people sometimes abandon the tenets of randomness, although researchers have not

[3]Furthermore, proponents of the adaptiveness approach fail to consider alternative models that may be more adaptive. For example, although Burns (2004) showed that streaks gave players useful information about which of their team-mates are most likely to score in the long run, there may be other approaches that more effectively identify competent team-mates. Specifically, Burns did not compare the hot hand model to models that consider other performance data, like each player's percentage of scoring shots across the entire game. Adaptiveness is therefore difficult to evaluate in the absence of alternative models of behaviour that would provide a necessary comparison standard.

developed a solid understanding of why this occurs. Steyvers and Brown (in press) have found individual differences in the way people detect changes in data patterns. In their studies, they asked participants to predict the next number in a sequence, where the numbers stayed within a two- or three-number bound (e.g., numbers 1 to 3) before randomly moving to a new range of three numbers (e.g., numbers 8 to 10). Thus, a sequence consisting of the outcomes 1, 2, and 3 (e.g., 1, 1, 2, 1, 3, 1, 2) would precede a sequence consisting of the outcomes 8, 9, and 10 (e.g., 8, 8, 9, 9, 10, 9, 8). Steyvers and Brown measured how quickly participants would make the jump from predicting outcomes of 1, 2, or 3, to predicting outcomes of 8, 9, or 10. They found that some participants would anticipate changes before they happened; for example, some participants who experienced the sequence 1, 2, 2, 1, 3, 6, 3, 2, 1 would jump to predicting outcomes of 5, 6, and 7 following one anomalous outcome of 6. Others would be slow to realise that the range changed. However, we do not know why some people are prone to perceive pattern shifts when they do not occur, whereas others fail to notice that the distribution underlying a stream of data has changed. This study also suggests that research examining individual differences in the extent to which people endorse the hot hand fallacy may further expose its underlying mechanisms.

A second approach that might illuminate the naïve theories that govern people's interpretations of randomness is the dual process conceptual framework (Petty & Cacioppo, 1986; see also Kahneman & Frederick, 2002). According to the dual process model, people process information using one of two approaches. When people process information using the *heuristic* approach, they do so rapidly, neither examining the information carefully nor processing it deeply. As a result, their judgements tend to reflect the naïve or default theories that they hold about the target. Conversely, when people process information *systematically,* they expend significant effort in examining the information before reaching a conclusion. People are more likely to override naïve theories when they engage in systematic processing, as they are more likely to attend to data that distinguish a particular judgement from similar default judgements. Given that most real-world stochastic events are non-random (e.g., Ayton & Fischer, 2004; Burns, 2004), people are likely to anticipate non-random patterns when they process data without investing great cognitive effort. Future research might uncover reliable differences in probabilistic reasoning under conditions that elicit heuristic processing (e.g., cognitive load and time pressure) vis-à-vis systematic processing.

Whereas the studies discussed earlier assume that people hold certain theories about randomness, other emerging studies have considered the factors that shape people's naïve theories of randomness. One recent investigation by Blinder and Oppenheimer (2006) considered the criteria that people use when determining a priori whether data are random. This was the first empirical consideration of a question that Wagenaar and Keren (1985) raised when they noted certain consistencies among processes that people perceive to be random. Blinder and Oppenheimer found that the most important determinant of whether people perceive a process as random is whether each event is independent of the others in a sequence. For example, people believe that coin tossing is random because each coin toss in a sequence is independent of the other tosses. However, they deem the process of drawing coloured balls from a bag as non-random when the balls are not replaced after they have been removed from the bag—specifically, later outcomes depend on earlier outcomes and become easier to predict as the number of balls in the bag decreases. Notably, when people endorse the hot hand fallacy in domains like gambling (e.g., Croson & Sundali, 2005; Wagenaar, 1988), they appear not to associate the independence of outcomes with the randomness of the process. As yet, researchers have not determined why people abandon this association—it is possible that they no longer perceive outcomes as independent (e.g., they develop an illusion of control over outcomes) or that they merely disregard the association altogether. Future studies could disentangle these mechanisms by increasing the salience of this relationship, or asking people to indicate whether they still believe that events are independent.

A similarly mechanistic but more mathematical approach, inspired by Teigen's (1994) discussion of subjective significance testing, suggests that people might be too hasty in rejecting the "null hypothesis" that a series of data is random. One obvious benefit of Teigen's approach is that it adopts the language of significance testing, which has the appeal of familiarity to psychologists. More importantly, however, this approach might inspire researchers to test a variety of subtle alternative explanations for the hot hand fallacy. One possible explanation for the hot hand fallacy is that people overestimate the rarity of streaks under the null hypothesis, which biases them to reject the null hypothesis in the presence of streaks that are consistent with random data. This proposition coheres with Wagenaar's (1972) conclusion that people are too eager to alternate among a set of outcomes when they attempt to generate random data sequences. An alternative explanation for the hot hand fallacy might be that people have an inflated estimate of the likelihood that the alternative hypothesis—that steaks occur in a particular domain—is true. Decades of hot hand research in the basketball domain show that people are all too ready to perceive streaks of scoring shots as non-random. Simply, they believe *a priori* that hot hands exist in basketball, which predisposes them to interpret a series of scoring shots as evidence of a non-random hot streak. This approach lends itself to *Signal Detection Theory* (SDT: Green & Swets, 1966), which provides a framework for describing how people make decisions under uncertainty. According to SDT, decisions fall under four categories: hits (in this context, correctly rejecting the null hypothesis that data are random); correct rejections (correctly retaining the null hypothesis that data are random); false alarms (mistakenly rejecting the null hypothesis that data are random); and misses (mistakenly retaining the null hypothesis that data are random). If people overestimate the rarity of streaks under the null hypothesis, or if they believe that streaks are more common than they actually are, they will be predisposed to make false alarms.

Although most studies have focused on people's predictions of future outcomes, others have looked at whether naïve conceptions of randomness influence how people make inferences about or remember streaks of outcomes generated by random sequences (Olivola & Oppenheimer, 2005; Oppenheimer & Monin, 2006). Oppenheimer and Monin found that people's schemas of random streaks determined the assumptions they made about unobserved past random events. Similarly, Olivola and Oppenheimer (2005) asked people to remember a sequence of numbers that were either described as randomly generated or systematically generated. People's memories were biased such that they tended to under-report the length of streaks when they believed the sequences were randomly generated, which is consistent with findings that schemas of randomness entail rapidly alternating sequence of outcomes (e.g., Ayton & Fischer, 2004; Boynton, 2003; McDonald & Newell, 2005). These studies suggest that people's endorsement of the hot hand fallacy affects cognitive processes other than prediction. Investigating the extent to which other cognitive operations are affected by belief in the hot hand (e.g., top-down influences on perception, attention, or linguistic patterns) might be a fruitful area for future research.

The studies discussed above touch on an important theoretical distinction that might motivate future research. The studies fit into one of three categories: *explanation* studies, in which participants decide whether a series of outcomes is due to chance (e.g., Ayton & Fischer, 2004; Boynton, 2003); *prediction* studies that ask participants to predict the next outcome in a series of random events where randomness is guaranteed (gambling studies: e.g., Croson & Sundali, 2005; coin toss studies: e.g., McDonald & Newell, 2005), or where participants must infer whether the sequence is random based on the data (e.g., Altmann & Burns, 2005); and, finally, *generation* studies, in which participants are asked to behave like random outcome generators (Wagenaar, 1972). Although there is evidence that people perform poorly in all three domains, future studies might attempt to determine how people perform in each domain relative to the others. These results might give researchers an insight into the particular aspects of probabilistic reasoning—among explanation, prediction, and generation—that most severely hamper people's attempts to make sense of data strings.

In conclusion, we have shown that the majority of research on the hot hand fallacy has addressed the relatively restricted question of whether the hot hand actually exists in a variety of sporting domains. Nonetheless, there are exceptions to these studies that have examined the mechanisms that underpin the hot hand fallacy. For example, some studies have shown that people tend to endorse the hot hand fallacy when they believe outcomes are generated by a non-random process. Other studies have suggested that people commit the fallacy in the laboratory and when gambling because it is usually adaptive and tends to lead to positive outcomes.

We have also suggested avenues for future research. In particular, we encourage researchers to seek a deeper understanding of the naïve models that lead people to adopt the hot hand fallacy. In sum, we believe that researchers should abandon their fixation on examining the hot hand fallacy in basketball and other increasingly imaginative domains. Rather, we encourage researchers to advance our general understanding of human probabilistic reasoning by exploring the underlying mechanisms that govern the hot hand fallacy.

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