Manuscript accepted for publication in Journal of Behavioral Decision Making

May the intentional candidate win: The effect of global performance information on intentionality attributions and managerial hot-hand predictions

João Niza Braga

Católica Lisbon School of Business and Economics, Universidade Católica Portuguesa, Portugal

Sofia Jacinto

School of Social Work, University of Applied Sciences and Arts Northwestern Switzerland, Olten, Switzerland

Centro de Investigação e Intervenção Social (CIS-Iscte), Instituto Universitário de Lisboa (Iscte-IUL), Lisbon, Portugal

Declarations of interest: none

The data that support the findings of this study are available from the corresponding author upon reasonable request.

This research was supported by grants from the Portuguese Foundation for Science and Technology (SFRH/BPD/122028/2016) to the first author

Corresponding author: João Niza Braga

Address: Católica Lisbon School of Business & Economics, Universidade Católica Portuguesa, Palma de Cima, 1649-023 Lisboa, Portugal.

E-mail address: joaonizabraga@ucp.pt

Manuscript accepted for publication in Journal of Behavioral Decision Making

May the intentional candidate win: The effect of global performance information on intentionality attributions and managerial hot-hand predictions

Abstract

In organizational contexts managers often have to judge and predict others' performance. Previous research has consistently shown that when predicting someone's performance, people expect that a local sequence of successful outcomes will continue – the hot-hand. The present work proposes that hot-hand predictions occur when local streaks are dispositionally attributed to agents' intentionality and explores how the inclusion of global performance success-rates may guide intentionality inferences and moderate predictions of success after a streak. Three studies, using within and between subjects' designs manipulate agent's global success-rate and show that after a local streak intentionality attributions and predictions of success are lower when success-rates are low (vs. high, or unknown); intentionality attributions mediate the effect of success-rate on predictions; hot-hand predictions are lower for low success-rate agents (vs. high or unknown) as they are not perceived as more responsible for streaky than for alternated performances.

Keywords: Performance prediction, Intentionality, Hot-hand, Success-rates, Managerial decisions

Manuscript accepted for publication in Journal of Behavioral Decision Making

May the intentional candidate win: The effect of global performance information on intentionality attributions and managerial hot-hand predictions

When a manager sees agents closing 4 deals in a week, it is hard to think that these agents will not successfully close their next negotiation. This tendency to expect streaky performances to continue, called the hot-hand belief (e.g., Gilovich et al., 1985), is pervasive and important for any context where people need to predict how others, or themselves, will perform in the future (e.g., Alter & Oppenheimer, 2006; Oskarson et al., 2009). This belief was initially investigated in the context of sports (Gilovich et al., 1985). For instance, a basketball player is thought to be more likely to score their next throw after 3 consecutive successful attempts because they are having a "hot-hand". In the organizational context, managers often decide based on performance predictions (e.g., March, 1991). To whom should they delegate new projects, who should they hire or who should they promote? Thus, it is likely that managers and people alike will judge their agents with a recent local series of successes to be more likely to continue their successful performances. Interestingly, local performance streaks are expected to continue because people think that the person was intentional and had control over the successful series of outcomes (Caruso, et al., 2010). Inferring high intentionality from others' performance, implies a dispositional inference of effort and ability to act in a certain way (e.g., Heider, 1958; Malle & Holbrook, 2012; Malle & Knobe, 1997; Reeder & Brewer, 1979; Weiner, 1985) and is associated to an accountability judgment, where the person is held responsible for the behavior outcome and its future continuation (Alicke, 2000; Uttich & Lombrozo, 2010). Nonetheless, global information about a others' performance, by reflecting behavior consistency, also leads to dispositional inferences and guides predictions of successful outcomes in future performances (Trope & Higgins, 1993, Weiner, 1985). It is yet unclear how local streaks of success and global

performance information, like the success-rate over a semester, interact to determine intentionality attributions and performance predictions, particularly when global and local performances do not suggest the same level of intentionality. The present work explores how the dispositional inferences drawn from the agents' global performance influences attributions of intentionality and predictions drawn from the agents' local performance of consistent success.

Local Performances and Hot-hand Inferences

The hot-hand refers to the intuition that a short run of repeated successes is likely to continue, even if this pattern is illusory (e.g., Gilovich et al., 1985; Tversky & Gilovich, 1989). Nonetheless, recent research suggests that expecting streaks to continue might actually be an adaptative response rather than a bias (e.g., Miller & Sanjurjo, 2018; Raab, et al., 2012). The robustness of hot-hand predictions has been highlighted in meta-analysis and systematic reviews about the hot-hand phenomenon (e.g., Avugos, et al., 2013; Bar-Eli, et al.,2006) and such belief that local series of success will continue has been shown to guide judgments and predictions not only among sport fans, but also among coaches and athletes (e.g., Camerer, 1989; Gilovich et al., 1985), gamblers (e.g., Camerer, 1989; Sundali & Croson, 2006), and investors or fund managers (e.g., Offerman & Sonnemans, 2004; Stöckl, et al., 2015). For instance, people mostly buy funds that were repeatedly successful in the past, believing in the fund managers' ability to prolong the performance record (e.g., Barber, et al., 2005; Sirri & Tufano, 1998; Stöckl et al., 2015).

Yet, why do people expect streaks to continue? Research exploring the determinants of such belief have been proposing different explanations, mostly focusing on the inferences people make about the agent generating the outcomes (see Oskarsson, et al., 2009). Specifically, people tend to predict that streaks performed by a human or a non-random agent (e.g., a basketball player shooting) will continue whereas those generated by a random agent

(e.g., a coin tossing device) will end (the gambler's fallacy) (Ayton & Fischer, 2004; Boynton, 2003; Burns & Corpus, 2004; Morris, et al., 2007; Tyszka, et al., 2008). Research has further suggested that intentionality inferences about others, the agents of the performance, may be key to the belief that the successful performance will continue. Specifically, streaky performances are expected to continue when agents' intentions are clear, salient, or among individuals who tend to attribute intentions to objects (Caruso et al., 2010). In another study, showing how self-serving motivations may guide predictions of streaks' continuation when observing others' performances, Braga and colleagues (2016) further found that such motivational effect is mediated by causal attributions to the agents performing the sequence of outcomes (Braga et al., 2016). That is, people expect desirable series of outcomes to continue, and undesirable ones to end, to the extent that they judge the others performing the streak are responsible and able to control the performance outcome (Braga et al., 2016). In these studies, intentionality and causal attributions were inferred from the agents' local performance to predict streaks' continuation, suggesting that hot-hand predictions may underly a dispositional attribution process.

It is, nonetheless, important to acknowledge that there are considerable individual differences in how individuals respond when experiencing winning or losing streaks in gambling contexts (e.g., Ball, 2012; Marmurek et al., 2013). Winning or losing streaks have been suggested to impact perceptions of control and contribute to gambling problems (e.g., Custer & Milt, 1985; Rosecrance, 1987). Winning streaks may increase wagering, such as when gambler's feel they are playing with the "house's money" (e.g., Thaler & Johnson, 1990) but may also result in lower risk taking as an attempt to maintain the positive affect (e.g., Schneider, et al., 2016). Losing streaks may lead to an increase in risk taking (gambler's fallacy) as an attempt to recover from previous loses (e.g., Schneider, et al., 2016; Studer et al., 2015), but may also reduce risk and serve as an opportunity for reflection (e.g., Phillips &

Landon, 2016). These findings indicate that experiencing local winning or losing streaks may impact agents' goals and emotional responses in different ways, which is congruent with the observers' tendency to draw attributional inferences from local streaks when predicting others' performance.

Dispositional Attribution and Intentionality Judgments

Recognizing others' intentional behaviors helps people to make predictions and to perceive control over their environment (e.g., Dennett, 1987; Heider, 1944, 1958). Intentional behavior is expected to reflect others' internal dispositions, their control over the behavior and, consequently, behavior stability over time and across situations (Heider, 1958; Weiner & Kukla, 1970). Thus, inferring intentionality from observed behaviors, implies a dispositional attribution about an agents' ability and motivation to act in a certain way (Lewis, 1973). Indeed, individuals who behave systematically towards a goal (i.e., intentional agents), are perceived to be skillfully guiding their behavior and to control its outcomes (e.g., Malle & Knobe, 1997; Reeder et al., 2001),

In organizational contexts research on accountability and intentionality judgments has particularly explored the motivational mechanisms and motivational effects on leaders' attributions in their rewarding/punishing decisions (see Harvey et al, 2014 for a review). For example, managers showing higher self-serving tendencies were found to attribute more responsibility/blame for negative outcomes to their subordinates, resulting in more negative evaluations (Goerke et al., 2004). In another example, negative outcomes were more likely attributed to individuals within a team, while positive outcomes seemed to be attributed to the team as a unit (Naquin & Tynan, 2003). Previous research was, however, less concerned with how intentionality attributions impact judgments and predictions of future performance based on local behaviors/performances (Martinko et al., 2006; Martinko et al., 2011). Importantly, these dispositional inferences and attributions result from largely automatic processes in

which the context is neglected as a potential account for the behavior, which results in attributing the behavior to the person (Gawronski, 2004; Gilbert & Malone, 1995; Jones & Harris, 1967). However, less is known about how the interplay of the two different types of information on agents' performance – circumstantial local behavioral information and stable global information about agents' behavior – affects attributions of intentionality and predictions of future behavior, when assessing others' performance.

Consideration of the Global Performance

The consideration of global information about someone's behavior, like base-rates of performance success or general behavioral trends, often allows for more accurate predictions of future performance outcomes and, under some circumstances, people seem to use such global information in their judgments and predictions (e.g., Fischhoff et al., 1979; Gigerenzer, 1991; Ginosar & Trope, 1980; Ledgerwood et al., 2010; Raab et al., 2012; Raab & MacMahon, 2015). Base-rates, as probabilistic information, can be directly used to predict a future outcome. However, base-rates of human performance, like success-rate in a task, also inform about behavior stability and is thus expected to guide dispositional attributions, including intentionality inferences from agents' performance (e.g., Weiner, 1985). Therefore, agents with higher performance success-rates are not only more likely to achieve success, as they are also more likely to be perceived as having the ability to control the outcomes of their performance and display high intentionality.

However, in the presence of local individuating information, global performance information may be neglected (e.g., Link & Raab, 2022; Koehler, 1996; Tversky & Kahneman, 1974; Kahneman & Tversky, 1973; Nisbett & Borgida, 1975). For instance, even scientifically trained individuals often rely on their individualized clinical experiences rather than on global statistical evidence, even though the later provides more accurate judgments (e.g., Dawes et al., 1989; Swets et al., 2000). Local information tends to be more vivid (e.g.,

Nisbett & Ross, 1980), and emotionally more involving (Small & Loewenstein, 2003) than global probabilities, which may increase its use in judgments and predictions.

Interestingly, expecting local performance streaks to continue, the hot-hand prediction, is usually reported when no other information about the agents or their performance is available except the local series of successes/failures (e.g., Oskarson et al., 2009). It is, thus, unclear whether people will take global behavioral information, such as performance base-rates, into consideration in their attributional inferences and predictions when this information is explicitly presented together with a local performance that consists of a streak of successes.

Hypotheses and Studies Overview

Previous research suggests that hot-hand predictions after local performance streaks may underly dispositional attributions of the observed streak to the agents' intentionality (e.g., Braga et al., 2016; Carusso et al., 2010). The present work tests this assertion in the context of performance in organizational domains and tests whether global success-rate information, which indicates behavioral stability, moderates hot-hand predictions and the underlying intentionality inferences drawn from the local performance streaks. In other words, if local streaks are expected to continue because they lead to infer high intentionality in the agents' performance, these inferences are expected to interact with global performance information, like success-rates. Specifically, agents with high success-rates, like sellers who close 90% of their deals, are expected to consistently achieve success and to be judged to have the ability to act in a planned and controlled way to achieve success (e.g., Heider, 1985). In this research, it is argued that local streaks of success are attributable to the agents' intentionality and are thus expected to continue. On the contrary, agents with low global success-rates cannot consistently act in a way that achieves success. This may lead to the inference that the agent is not skilled nor motivated enough to control the outcomes of their

performance. Consequently, local streaks of success will not be attributed to the agents' intentionality and are not expected to continue. In sum, it is hypothesized that hot-hand predictions, as an attributional process, are moderated by global success-rate information through intentionality attributions of the streaky performance.

This hypothesis is tested in three studies that ask participants to play the role of managers who need to predict the performance outcome of an employee or candidate to a job position. After a recent streak of successful performances, participants are asked to predict the following performance outcome and to judge the extent to which the agent was intentional or responsible for their performance. The agents' global performance success-rate is then manipulated between (Studies 1 and 2) and within subjects (Study 3). Study 1 tests whether intentionality judgments mediate the effect of global success-rate in predictions of streaks continuation. Studies 2 and 3 further manipulate local performances' pattern by including both streaky (consecutive closed deals) and alternated (alternation between closed and failed deals) local performance patterns. Study 3 further explores how local and global performance information impact managerial decisions like the selection of candidates for a job-position.

Study 1

Study 1 tests whether the tendency to predict the continuation of a successful performance (hot-hand) through intentionality attributions occurs in organizational performance contexts and is thus moderated by global information about the success-rate of the agent. Study 1 further tests whether attributions of intentionality mediate the effect of success-rate on performance predictions.

Specifically, Study 1 explores three levels of success-rate (and an unknown success-rate condition) in a negotiation scenario: a very high success-rate of 90%, a medium success-rate of 50% and a very low success-rate of 10%. Previous research has shown relatively low

sensitivity to base-rates, justifying the use of extreme values, 10% and 90% success-rates (e.g., Bago & De Neys, 2017). For a less extreme base-rate, although 50% represents chance level in binary events, given the performance context under analysis, an agent performing at chance level may be considered a medium or even a relatively poor employee. Thus, it is expected more predictions of success and stronger attributions of intentionality for the 90% success-rate than for the 50% success-rate condition, which in turn is expected to lead to more predictions of success and higher attributions of intentionality than the 10% success-rate condition.

Importantly, when the global success-rate of the agent is unknown, it is expected to observe hot-hand predictions, i. e., more streak continuations than expected by chance. Thus, if global success-rate moderates hot-hand predictions through intentionality attributions, it should lead to more continuations of success and to higher attributions of intentionality when success-rate is unknown than when compared to the medium (50%) or very low (10%) success-rates but is expected to lead to lower predictions of success and lower intentionality attributions when compared to very high success-rates (90%).

For all the studies described, it is reported how sample size was determined, all data exclusions (if any), all manipulations, and all measures in the study. Moreover, for this and for all the studies described the materials and data that support the findings of this study are available from the corresponding author upon request.

Method

One-hundred-and-ninety-eight participants (38% females, 60% male, 1% transgender, 0.5% preferred not to say their gender; M_{age} = 38.5 years, SD_{age} = 10.7) from amazon Mechanical Turk voluntarily took part in Study 1. Informed consent was obtained from all participants included in Studies 1 to 3. Sample size was determined before data analysis based on power analysis[1].

Participants were asked to play the role of the manager of a sales department. Their task was to predict a salesperson negotiation performance, after a local sequence of negotiation outcomes. Negotiations could turn out to be a success (closes the deal) or a failure (does not close the deal).

Participants, playing the role of managers, were informed about the salesperson global success-rate (the probability of closed deals). Participants were randomly assigned to one of four conditions: 90% success-rate; 50% success-rate; 10% success-rate; and unknown success-rate.

After reading about the agent's success-rate, participants were shown 3 sequences of local performances from that person. Each sequence corresponded to the agent's local performance in different months of the same year. All performance sequences depicted 10 outcomes (5 successes and 5 failures), arranged with a final streak of 3 successes (because incremental reaction to streaks often peaks at three consecutive outcomes, see Carlson & Schu, 2007). After each performance sequence participants were asked to predict the following negotiation outcome (success/failure) and to judge how intentional it was, from 1 – not intentional at all to 7 – completely intentional.

Results

A univariate ANOVA comparing the four success-rate levels on the proportion of predictions of successful deals revealed an effect of global success-rate ($F(3, 194) = 16.63$; $p < .001$, $\eta^2_{partial} = .21$). Participants were more likely to predict the continuation of successful deals for the 90% success-rate condition ($M_{90} = 0.88$, $SD_{90} = 0.25$) than for the 50% condition ($M_{50} = 0.52$, $SD_{50} = 0.40$; $t(97) = 5.45$, $p < .001$, $d = 1.10$). Participants in the 50% condition were more likely to predict a continuation of the streak than the 10% condition ($M_{10} = 0.38$, $SD_{10} = 0.38$; $t(99) = 1.79$, $p = .076$, $d = 0.36$) but this difference does not reach statistically significance. Additionally, when comparing the different global success-rate conditions with

the unknown success-rate condition (M_{Un} = 0.62, SD_{Un} = 0.41), it was found that predictions of success continuation were higher for the 90% condition (t (95) = 3.87, p < .001, d = 0.79); lower for the 10% condition (t (97) = 2.99, p = .004, d = 0.60); and although lower for the 50% condition, the difference was non-significant (t (97) = 1.22, p = .225, d = 0.24).

Success-rate manipulation also had an effect on intentionality judgments (F(3, 194) = 5.88, p < .001, $\eta^2_{partial}$ = .08). Participants inferred higher intentionality for the 90% success-rate (M_{90} = 5.66, SD_{90} = 1.09) than for the 50% (M_{50} = 5.04, SD_{50} = 1.38; t (97) = 2.47, p = .015, d = 0.50), which in turn inferred higher intentionality compared to the 10% condition (M_{10} = 4.41, SD_{10} = 1.56, t (99) = 2.13, p = .035, d = 0.46). Compared to the unknown success-rate condition (M_{Un} = 5.00, SD_{Un} = 1.76), intentionality inferences were higher for the 90% condition (t (95) = 2.19, p = .031, d = 0.65), and although lower for the 10% condition, the difference is not significant (t (97) = 1.78, p = .078, d = 0.36). The 50% condition did not differ from the unknown condition (t (97) = 0.10, p = .918).

A linear regression explored whether intentionality predicts the continuation of closed deals when participants are in the unknown success-rate condition. Indeed, when participants are unaware of the success-rate of the salesperson, their performance predictions is accounted by judgments of intentionality (R^2 = .41, F(1, 48) = 32.77, p = .009; β = .64, t (48) = 5.72, p < .001). It was further explored whether the observed sensitivity to different levels of global success-rate when predicting the continuation of successful "deals" was mediated by the perceived intentionality of the actor (Figure 1). The simplest and less conservative test to this hypothesis used the highest and lowest success-rate conditions (90% and 10%) as a dummy predictor and revealed that global success-rate was a significant predictor of successful performances' continuation (β = .622, t (97) = 7.77, p < .001). Global success-rate was also a significant predictor of intentionality judgments (β = .422, t (97) = 4.56, p < .001) and judgments of intentionality were a significant predictor of local streaks' continuation (β =

.224, t (97) = 2.61, p = .010). The direct effect of global success-rate on predictions of local streaky performance's continuation was still significant (β = .527, t (97) = 6.15, p < .001). Bootstrapping analysis with 10000 resamples and 95% bias-corrected (Hayes, 2017) revealed that the indirect effect was also significant (*ab* = .095, CI [.018, .169]) indicating that the effect of global success-rate on predictions of local streaks' continuation is mediated by the perception of how intentional the local performance was. That is, higher success-rates led to infer more intentionality, which in turn contributed to predict another successful outcome. The same analysis was performed on a more conservative pair, 90% and 50%, success-rate and led to the same conclusion. Global success-rate was a significant predictor of predictions of success after a streak (β = .48, t (98) = 5.45, p < .001) and of intentionality attributions (β = .24, t (97) = 2.47, p = .015). Intentionality significantly accounts for participants' predictions of success (β = .23, t (98) = 2.57, p = .012). Although success-rate still accounts for predictions of success when controlling for intentionality attributions (β = .43, t (98) = 4.82, p < .001), the indirect effect is significant (β = .05, CI [.001, .005]), indicating that the mediational model, where intentionality judgments mediate the effect of global success-rate on predictions continuing the successful performance, fits the data.

Discussion

Study 1 shows that in the absence of global performance information, local streaks of successful performances are expected to continue (the hot-hand) and that these predictions seem to underly intentionality attributions. Importantly, predictions of streaks' continuation are higher when global success-rate is high (90%) and lower when it is low (10%). According to the argument that expecting successful streaks to continue results from dispositional (intentionality) attributions of the observed performance, the present findings suggest that global performance information also affects dispositional attributions of the local performance. Additionally, judgments of intentionality were found to partially mediate the

effect of global success-rate on performance predictions. In sum, Study 1 suggests that global performance information impacts perceptions of whether agents were accountable for the successful streak, which in turn guides predictions of whether they will continue succeeding, or not.

Study 1 generally supports the hypothesis, yet the effects of success-rate were particularly clear when comparing rather extreme success-rates. This may be an issue because such extreme success-rates may be perceived as unrealistic in the present scenario, particularly the very low success-rate of 10%. The more plausible, yet relatively low, success-rate of 50% did not lead to significantly different judgments when compared to the unknown success-rate condition (but also when compared to the lower 10% success-rate condition), which may suggest that the 50% success-rate was interpreted as uninformative, and participants may have reacted as if success-rates were unknown. On the other hand, this explanation may contrast with the observed non-significant difference in predictions for the 50% success-rate condition when compared to the very low success-rate of 10%, suggesting that the medium success-rate was perceived as relatively low. It is possible that because participants were asked to imagine judging their own employees, their predictions were self-serving, favoring positive outcomes (closing deals) when judging individuals with lower success-rates (e.g., Braga et al., 2016). Finally, Study 1 does not control for inconsistent local performances that are expected to be less informative about the agents' intentionality. Study 2 addresses these issues.

Study 2

The tendency to predict a continuation of the last outcome of a sequence is expected to occur when local performances exhibit a series of successful outcomes (hot-hand) but not when performance is inconsistent, alternating between successes and failures (e.g., Braga et al., 2018). This tendency is congruent with the causal attribution account of the hot-hand

tendency since higher behavior stability leads to higher dispositional inferences and to expect behaviors to continue (Dweck et al., 1995; Weiner et al., 1976). Nonetheless, such inferences and predictions from the observed pattern of performance may depend on the individuals' global success-rate.

In this research, it is argued that high success-rates should lead to infer high intentionality on local streaky performances because consecutive successes are representative of agents who consistently achieve success (e.g., Dweck et al., 1995; Weiner et al., 1976). Comparing with inconsistent/alternated local performances, high success-rates should lead to lower intentionality attributions, since that performance is incongruent with being a high success-rate agent. Consequently, predictions of continuation of success for streaks should be particularly higher for streaky local performances than for alternated performances. Global performances of lower success-rate (50%), on the other hand, while leading to infer lower ability and/or lower effort (than 90%), should lead to attribute lower intentionality to both streaky and inconsistent/alternated local patterns of success. Thus, although a hot-hand response pattern is still expected for low success-rates, it should result in lower predictions of success regardless of sequences' pattern.

Importantly, if participants are sensitive to success-rate information, inferences drawn from the local performance pattern should be smaller in the presence of success-rate information than in conditions where success-rates are unknown. In other words, the hot-hand effect (the tendency to predict more continuations after a streak than after an alternation) should be higher when global performance is unknown.

To test this interaction, Study 2 manipulates the local performance pattern, presenting streaky (consistent) and alternated (inconsistent) performances. Study 2 further attempts to replicate Study 1 and to run a more conservative test of the current hypotheses, ruling out the low plausibility of assessing an extremely incompetent agent. Hence, the 10% success-rate

condition used in Study 1 was removed, while using the 50% success-rate as the lower success-rate condition. In this study, it is expected that higher success-rate (90%) will lead to higher intentionality inferences and more predictions of success than unknown success-rate conditions, which will lead to higher intentionality and more predictions of success than lower success-rate (50%). Finally, Study 2 was also designed to reduce the potential self-serving effects resulting from judging the observer's own employees in Study 1, thus presenting participants with a hiring scenario where they have to judge candidates for a position in their company.

Method

One-hundred and fifty-two participants (38% females, 60% male, 1% transgender, 0.5% preferred not to say their gender; M_{age} = 38.5 years; SD_{age} = 10.7) from amazon Mechanical Turk took part in Study 2. Sample size was determined before data analysis based on power analysis[2].

The method of Study 2 was similar to that of Study 1; however, sequences of alternated performances were added. While streaky sequences consist of performance sequences that end with three consecutive closed deals, alternated performances consist of performance sequences that alternate between successful and failed deals.

Further exploring the organizational settings where these judgments are relevant, in Study 2 participants were told that they were playing the role of a human-resource manager hiring new personnel for the sales department. As such, they were told to judge a series of candidates and to predict whether each candidate was going to have success (closing a deal) with a new client, after observing each candidate's 10 most recent negotiation performances (success or failure). Another difference from Study 1 was that participants were randomly assigned to one of three (rather than four) different conditions of success-rate: low (50%), high (90%), and unknown success-rate.

Participants observed a total of 6 sequences of local performances, each from a different candidate. All performance sequences presented 10 outcomes (5 successes and 5 failures). Half of the local performances followed a streaky pattern (sequences with a low probability of alternation (0.33) ending with a streak of at least 3 consecutive successes). The other half followed an alternated pattern (sequences with a high probability of alternation (0.78, 0.89 and 1) that ended with a failure followed by a success). All performance sequences were randomly presented.

Participants were then asked the same judgments of Study 1, in a 3 success-rate (90%, 50%, unknown) x 2 sequence-type [streak, alternated] between-subjects' design with repeated measures on the last factor.

Results

A mixed ANOVA to test the effect of 3 success-rate (90%, 50%, unknown) x 2 performance pattern [streaky, alternated], with repeated measures on the last factor, on the proportion of predictions of success (continuation of the last outcome of the sequence), revealed a main effect local performance pattern ($F(1,149) = 34.52$, $p < .001$, $\eta^2_{partial} = .19$) indicating a strong hot-hand effect, with participants predicting more continuations of the successful outcome for streaky performances ($M_{Streak} = 0.57$, $SE_{Streak} = 0.03$) than for alternated performances ($M_{Alt.} = 0.33$, $SE_{Alt.} = 0.03$). The main effect of global success-rate did not reach significant levels ($F(2, 149) = 2.86$, $p = .060$, $\eta^2_{partial} = .04$;). Nonetheless, planned comparisons show that predictions of continuation were higher for the 90% success-rate condition ($M_{90} = 0.51$, $SE_{90} = 0.04$) than for the 50% success-rate condition ($M_{50} = 0.39$, $SE_{50} = 0.04$, $t(111) = 2.22$, $p = .028$, $d = 0.42$). However, the unknown condition ($M_{Un} = 0.45$, $SE_{Un} = 0.04$) did not significantly differ from the 50% ($t(107) = 1.63$, $p = .107$, $d = 0.31$) or the 90% ($t(106) = 0.65$, $p = .515$, $d = 0.13$) global performance success-rate conditions. A significant interaction between local performance pattern and global

performance success-rate was also found ($F(2, 149) = 3.15$, $p = .046$, $\eta^2_{partial} = .04$). Planned comparisons show that participants in the unknown success-rate condition show hot-hand expectations, predicting significantly more continuations of success after a local streak than after an alternated local performance (t (51) = 5.68, $p < .001$, $d = .79$, CI [.47, 1.01]). This pattern was also significant for agents with high (90%) global performances (t (53) = 2.89, $p = .006$, $d = .39$, CI [.06, .35]), yet such tendency is less clear for agents with lower (50%) global performances (t (50) = 1.07, $p = .083$, $d = .25$, CI [-.02, .31]). Additionally, the extent to which participants predicted more continuations of the last outcome for streaks than for alternated performances (the hot-hand effect) was significantly larger for the unknown success-rate condition than for the low (t (93) = 2.42, $p = .017$, $d = 0.25$) or the high success-rate (t (99) = 1.99, $p = .050$, $d = 0.20$) conditions (Table 1, Figure 2). That is, global success-rate reduces inferences drawn from local performance patterns, reducing the hot-hand effect.

Insert Table 1 around here.

A mixed ANOVA to test the effect of 3 success-rate (90%, 50%, unknown) x 2 performance pattern [streaky, alternated], with repeated measures on the last factor, on intentionality attributions revealed a main effect of performance pattern ($F(1,149) = 17.16$, $p < .001$ $\eta^2_{partial} = .10$), indicating more attributions of intentionality for streaks of success ($M_{Streak} = 4.83$, $SE_{Streak} = 0.12$) than for alternated performances ($M_{Alt.} = 4.37$, $SE_{Alt.} = .12$). No effect of global success-rate information was found ($F(2, 149) = 0.68$, $p = .508$, $\eta^2_{partial} = .01$). The interaction between local performance patterns and global success-rate was also non-significant ($F(2, 149) = 2.82$, $p = .063$, $\eta^2_{partial} = .04$). Yet, planned comparisons provide a more direct test to the hypothesis. When participants lack global information (unknown condition), they seem to infer intentionality from the local performance pattern, attributing

more intentionality to streaks than to alternated performances ($t(46) = 2.31$, $p = .026$, $d = 0.34$). Similarly, for high success-rate agents, streaks of success are perceived as more intentional than alternated performances ($t(53) = 3.98$, $p < .001$, $d = 0.54$; [0.40, 1.23]). However, when the success-rate is low, participants do not attribute more intentionality to streaks than to alternated local performances ($t(50) = 1.07$, $p = .288$, $d = 0.15$; CI [-.18, .64]; Table 2, Figure 3).

Global success-rate thus shapes attributions of the observed performance to the agent's intentionality. Streaks of success are more strongly attributed to high success-rate agents than inconsistent performances, but low success-rate agents are not perceived as more responsible for their local successful streaks than for their alternated performances.

Insert Table 2 around here.

Discussion

Study 2 shows that the pattern of a local performance impacts intentionality inferences and performance predictions. Participants are more likely to predict agents' success after a local streak of success than after an alternated performance, indicating a hot-hand effect. Nonetheless, because global success-rate information represents performance stability, sensitivity to the pattern of local performances is reduced when participants know the agents' global success-rate. These findings are consistent with results from Study 1, showing that predictions of success continuation are impacted by global performance information. Nonetheless, Study 2 did not show a significant main effect of success-rate, and although predictions differ between 90% and 50% global performances, these were not significantly different from predictions when global performance was unknow. This may be explained by the presentation of the different performance patterns to the same participant,

which could have reduced the perceived importance of the success-rate information for the decision. It may also indicate that the 50% success-rate was treated as lack of knowledge, supporting the idea that judgments and predictions are more sensitive to extreme success-rates as suggested in Study 1 (even though predictions for the 90% success-rate did not significantly differ from the unknown condition in Study 2).

Consistent with the attributional account of the hot-hand, local streaks of success led to higher intentionality inferences, suggesting that these agents are more accountable for their performance than agents with alternated performances. Nonetheless, these dispositional attributions interacted with the success-rate of the agent. High success-rate agents are judged to be more accountable for streaks of success, but less accountable for alternated/inconsistent performances. Additionally, because lower success-rate agents do not have the ability or the effort to consistently achieve success, hence low intentionality, they are not perceived as more accountable for streaks of success than for alternated performances. Although this analysis may be speculative, Study 2 highlights how global success-rate information shape dispositional inferences drawn from different patterns of local performances.

Nonetheless, it is noteworthy that while the interaction between sequence pattern and success-rate was significant for predictions, this was not the case for judgments of intentionality. This difference may reflect a direct effect of success-rate on the prediction, regardless of the contribution of the inferred intentionality. In this case, performance predictions would show higher dependence of success-rate information than intentionality judgments. It may also result from the lower sensitivity of the measure of intentionality, as this construct may be perceived as more ambiguous and unclear than predicting a performance outcome, making intentionality judgments less sensitive to global performance information.

Although intentionality inferences presuppose a causal attribution of the performance to the agent, Studies 1 and 2 do not directly measure the extent to which the local performance is attributed to the agent. Moreover, although understanding how managers predict future performance is of ubiquitous importance for decision making, Studies 1 and 2 do not assess the impact of the dispositional inferences drawn from the agents' performance on managerial decisions. Study 3 meets these two gaps in the study design.

Study 3

Study 3 is aimed at directly testing causal attributions drawn from the global information on agents' success-rate, and from local performance, and thus replaces intentionality judgments by a direct measure of causal attribution – perceived responsibility (Weiner, 1995; Lagenhoff, et al., 2021). Study 3 also includes a managerial decision – hiring decision – as a dependent variable and manipulates success-rate within subjects (Fischhoff et al., 1979). Finally, Study 3 attempts to generalize the current findings to different success-rate values, which are extreme enough to increase sensitivity yet plausible for the real-life scenario under study.

Method

Ninety-five management students (45.3% female, 52.6% male, 1.1% transgender, 1.1% preferred not to say their gender; M_{age} = 23.34 years; SD_{age} = 1.91) participated in study 3. Sample size was determined before data analysis based on power analysis[2].

The procedure of Study 3 was similar to Study 2. To increase the generalizability of the findings to more plausible success-rate conditions, the high success-rate condition is 80% (instead of 90%) and the lower success-rate condition is 20% (instead of 10% or 50%). Moreover, to increase the ecological validity and applicability generalizability of the findings, participants were exposed to the different success-rate conditions in a within-subjects design.

Each participant judged a total of 6 candidates, with 20%, 80% or unknown success-rates, orthogonally paired with local performances with a streaky or alternated performance pattern.

Differently from Study 2, participants were asked to predict the likelihood of the sequence to continue with another successful outcome on a scale from 1- not likely at all to 7 – extremely likely. Moreover, participants rated how responsible (rather than how intentional) was the candidate for the observed performance (1 – not responsible at all, to 7 – extremely responsible). Finally, participants rated how likely they were to hire the agent, from 1– not likely at all, to 7 – extremely likely. Study 3 used a 3 success-rate x 2 performance pattern within-subjects design.

Results

A repeated measures ANOVA to test the effect of 3 success-rate condition [80%, 20%, unknown] x 2 performance pattern [streaky, alternated] on the judged likelihood of success of the following negotiation, revealed a main effect of performance pattern ($F(1, 94) = 24.96$, $p < .001$, $\eta^2_{partial} = .21$), indicating a strong hot-hand effect, with participants predicting more continuations of success for streaky ($M_{Streak} = 5.38$, $SE_{Streak} = 0.10$) than for alternated performances ($M_{Alt} = 4.80$, $SE_{Alt} = 0.10$). It also revealed sensitivity to success-rates ($F(2, 188) = 28.16$, $p < .001$, $\eta^2_{partial} = .23$; $M_{Un} = 5.18$, $SE_{Un} = 0.09$; $M_{20} = 4.47$, $SE_{20} = 0.15$; $M_{80} = 5.62$, $SE_{80} = 0.12$). Predictions of continuation were higher for the 80% success-rate than for the 20% success-rate ($t(94) = 5.85$, $p < .001$, $d = 0.60$). The unknown condition led to lower predictions of success than the 80% success-rate ($t(94) = 3.26$, $p = .002$, $d = 0.34$) but to more predictions of success than the 20% success-rate condition ($t(94) = 5.74$, $p < .001$, $d = 0.58$).

A significant interaction between performance pattern and success-rate was also found ($F(2, 188) = 5.22$, $p = .006$, $\eta^2_{partial} = .05$). The hot-hand effect is not stronger for unknown success-rate conditions than in the presence of global performance information (see Table 3).

However, predicting more successes after a streak of successful outcomes than after an alternated performance is more likely when the agent had a high rather than low success-rate ($F(1, 94) = 5.65$, $p = .019$, $\eta^2_{partial} = .06$).

Insert Table 3 here.

A repeated measures ANOVA to test the effect of 3 success-rate condition [80%, 20%, unknow] x 2 performance pattern [streaky, alternated] on responsibility judgments revealed a main effect of performance pattern ($F(1, 94) = 6.29$, $p = .014$, $\eta^2_{partial} = .06$), indicating more attributions of responsibility for streaks ($M_{Streak} = 4.38$, $SE_{Streak} = 0.09$) than for alternated performances ($M_{Alt.} = 4.17$, $SE_{Alt.} = .10$). No main-effect of global success-rate information was found ($F(2, 188) = 1.37$, $p = .256$, $\eta^2_{partial} = .01$). However, success-rate information significantly interacted with performance pattern ($F(2, 188) = 5.18$, $p = .006$, $\eta^2_{partial} = .05$). Specifically, participants inferred more responsibility from streaky performances than from alternated performances when the success-rate was high (t (94) = 4.10, $p < .001$, CI [- 0.26, 0.75]), but not when the success-rate was low (t (94) = 0.141, $p = .888$, CI [- 032, 0.27]). In the absence of global success-rate information, agents were more responsible for streaks than for alternated performances, although not significantly (t (94) = 1.37, $p = .175$, CI [- 0.07, 0.36]). This pattern of results replicates the intentionality judgments from Study 2 (Table 4).

Insert Table 4 around here.

Finally, a repeated measures ANOVA to test the effect of 3 global success-rate [80%, 20%, unknown] x 2 performance pattern [streaky, alternated] on the likelihood of hiring the

candidate, revealed a main effect of both performance pattern ($F(1, 94) = 29.96$, $p < .001$, $\eta^2_{partial} = .24$) and global success-rate information ($F(2, 188) = 51.24$, $p < .001$, $\eta^2_{partial} = .35$). This indicates a strong hot-hand effect, where streaky agents are more likely to be hired ($M_{Streak} = 4.25$, $SE_{Streak} = 0.08$) than agents with alternated local performances ($M_{Alt} = 3.73$, $SE_{Alt} = 0.8$). Yet, hiring decisions are also sensitive to the candidates' global success-rate ($M_{Un} = 3.98$, $SE_{Un} = 0.8$; $M_{20} = 3.43$, $SE_{20} = 0.11$; $M_{80} = 4.57$, $SE_{80} = 0.09$). Pairwise comparisons, indicated higher likelihood of hiring agents with high success-rate than agents with unknown success-rate (t (94) = 6.39, $p < .001$, $d = 0.65$, CI [-0.82, -0.37]), which in turn are more likely to be hired than the agents with low success-rate (t (94) = 5.44, $p < .001$, $d = 0.56$, CI [0.31, 0.80]). Higher success-rate agents were also more likely to be hired than low success-rate agents (t (94) = 8.21, $p < .001$, $d = 0.84$). A significant interaction between performance pattern and global success-rate information was also found ($F(2, 188) = 4.88$, $p = .009$, $\eta^2_{partial} = .49$). The higher likelihood of hiring the streaky over the alternated agent was particularly pronounced for high success-rate agents when compared to low success-rate agents ($F(1, 94) = 6.58$, $p = .012$, $\eta^2_{partial} = .065$) (Table 5, Figure 4).

Insert Table 5 around here.

Discussion

Study 3 shows that local performance streaks and information about global performance success-rates not only impact performance predictions but also influences managerial decisions in a hiring/selection process. Importantly, this study shows that streaky performances are more likely attributed to agents' responsibility than alternated

performances, and that global success-rate moderates such attributions. Alternated performances are less attributable to high success-rate agents than streaky performances, while low success-rate agents are not perceived as more responsible for their streaks of success than they are for their alternated performances. Consequently, using local performance information to predict more continuations for streaks of success than for alternated performances is less likely for low than for high success-rate agents.

General Discussion

The expectation that a successful performance will continue is robustly observed in contexts where one has to make predictions of others' future performance (e.g., Avugos et al., 2013; Bar-Eli et al., 2006; Gilovich et al., 1985). This phenomenon seems to underly an attributional process whereby the observed streak is attributed to the agent's intentionality (Braga et al., 2016; Caruso et al., 2010). In a managerial decision scenario, the present research provides direct evidence for the attributional nature of the hot-hand prediction by exploring how intentionality inferences drawn from the consistent success of the local performance are moderated by dispositional inferences drawn from the global success-rate of the agent. Across three studies, it was found that although local performances guide attributional inferences of intentionality to predict success, hot-hand beliefs are adjusted according to the dispositional intentionality inferred from the agents' global performance.

Future successful performances were particularly expected for agents with higher success-rates because these agents are perceived as more responsible for their local successful performances than agents with lower success-rates. Indeed, intentionality attributions were found to mediate the effect of success-rate information on predictions of future performance (Study 1). Moreover, while high success-rate agents are perceived as more responsible for their consistent local success, they are less so for their inconsistent performances that alternate between success and failure (Studies 2 and 3). This finding suggests that for

globally successful agents, an inconsistent local performance is unlikely to compromise their perceived competence, since inconsistent performances are not attributed to these agents. On the other hand, agents with a global poor performance are arguably perceived as less competent to consistently achieve success, showing low intentionality. Consequently, they were not perceived as more accountable for their streaks of success than for their inconsistent performances (Studies 2 and 3).

Theoretical Implications

The present research contributes to the hot-hand literature by showing incremental evidence of hot-hand predictions in organizational contexts (e.g., Bar-Eli et al., 2006); and by showing that global information reduced hot-hand predictions. That is, global performance information reduces the weight of local performance patterns in predictions of future performance outcomes. Importantly, this research adds to the understanding of the hot-hand phenomenon, by showing that hot-hand predictions underly a causal attribution process and that global performance information impacts predictions after local streaks through this mechanism. Agents with higher success-rates are not only seen as more likely to continue their streaks, as they are expected to do so because they are perceived as more responsible for their local success than their less successful counterparts. Also consistent with such an account, for high success-rate agents, causal attributions show higher accountability for consistently successful performances than for inconsistent performances, the same does not occur for low success-rate agents, who are considered less accountable for their local performances, regardless of its consistency.

This research also contributes to the literature on attributional processes and the adjustment of dispositional inferences by articulating it with the hot-hand literature to explore how global and local performance information interact to guide attributions and behavioral predictions. On the one hand, hot-hand tendencies (in the traditional paradigm where

performances end with a streak) show evidence of recency effects in attributions and predictions from local performances. To the extent that late streaks are cognitively salient and distinctive, hot-hand predictions seem to be consistent with the extant research on causal attributions (e.g., Kelley, 1967; Henne et al., 2021). This research shows, however, that global success-rates moderate such inferences. Global performance informs about an agents' behavior stability and their capacity to control the outcomes of their behavior. This behavioral information is thus used to guide causal attributions of local performances and seems to take precedent over local performances to determine attributional inferences and predictions (e.g., Jones et al., 1972).

Managerial implications

Playing the role of managers, participants predicted more success for the agents or for the candidates to a job position if their local performance displayed consistent success and made decisions in accordance with such predictions. This consideration of success-rates may suggest that in a real-world context managers show accuracy when making personnel decisions. However, this may be especially true for the case of highly successful agents, for whom accountability judgments seem to depend on the consistency of their performance. For agents with poorer global performance, there was no adjustment of the extent to which the performance is attributed to the agent as a function of the local consistency of their success. This tendency may translate into biased judgments and decisions since it may lead to disregard potential recent improvements in agents' competence or motivation or when determining additional training or incentives aiming to increase performance (Green & Mitchell, 1979; Ilgen & Knowlton, 1980). For example, previous research showed that when managers made dispositional attributions for poor performance they were more likely to administer punitive measures (Mitchell & Wood, 1980). The present research further adds to this line of work by suggesting in which conditions a poor local performance may lead, or

not, to negative dispositional inferences. For instance, if low success-rate agents have a sequence of repeated successful performances, their success might not be interpreted as their responsibility and be misattributed to external causes. Consequently, managers may miss the opportunity to, for example, reward or promote the agents, and might not update the success-rates of these agents, which will likely bring negative consequences for the agents' motivation and satisfaction, ultimately affecting their future performance.

Moreover, as proposed by Higgins and Winter (1993), dispositional inferences are adjusted based on the base-rates of the target population, at the interpersonal level. This is often the case in organizational reward and punishment decisions. Often the decision to promote one agent implies the comparison of all the team agents and the selection of the one with higher performance. However, when individual assessment occurs, for example to assess progress, the comparison with team members is irrelevant. Based on the present studies at the intrapersonal level, the global success-rate of the agent is used as a standard of comparison to interpret the pattern of success of the local performance.

Limitations and future research

In the three studies described, judgments and predictions showed sensitivity to different global performances, with very high successful global performances (90% or 80%) leading to predict more continuations of streaky performances than less successful global performances. Yet, judgments and predictions in the presence of global performance information did not consistently differ from those made in the absence of the agents' global information. This pattern of results was more evident for the case of a global performance of 50%, even though this success-rate was arguably a low global performance in the present context (Studies 1 and 2). It is plausible that the uncertainty of the 50% success-rates was treated as "lack of knowledge" about the agent, reducing the reliance on such information. It is noteworthy that in Study 2 the hot-hand effect (predicting more continuation of streaks

than of alternated local performances) was stronger for agents without information on their global performance than for the 50% success-rate agents, indicating some sensitivity to the 50% success-rate. Nonetheless, the reported findings seem to constrain the effects of global performance information to rather extreme success-rates, which could be interpreted as evidence of relatively low sensitivity to global success-rates, at least in the presence of local performance information.

In Studies 2 and 3, it was provided a direct contrast of predictions of success after streaky and alternated performances. While Study 2, using a between-subjects' design, showed a reduction in hot-hand predictions (predicting more continuation for streaks than for alternated sequences) when success-rates were known, the same pattern was not found in Study 3. It is speculated that in Study 3 the within-subjects design makes base-rates particularly salient, making predictions for candidates with unknown success-rates particularly uncertain when compared to candidates disclosing their success-rate. Increased uncertainty could thus reduce inferences from local performances, mitigating hot-hand predictions when success-rates were unknown.

Despite the present studies highlight how hot-hand predictions underly intentionality attributions of the local performance, they do not distinguish the independent contributions of perceived ability and perceived effort in intentionality attributions. Future research examining how global and local information impact these dimensions of intentionality could be particularly relevant in managerial contexts since failures attributed to the lack of ability often lead managers to use skill-based training techniques, while attributions to the lack of effort are associated with decisions to use motivational techniques (Ilgen & Knowlton, 1980).

The present set of studies does not consider that streaks of failures may also occur – "cold-hand". Previous research has shown that streaks of negative outcomes are judged to be less likely to continue than series of desirable outcomes (e.g., Boynton, 2003; Braga et al.,

2016). The perceived intentionality drawn from such negative local performance is expected to be low, which would be particularly incongruent for high success-rate agents and likely result in lower attribution of the performance to the agent. Future research could further explore the external accounts of such negative performances (uncontrollable like luck, or controllable like task difficulty) as these should play a crucial role on predictive judgments (see Kelley, 1973; Martinko et al, 2007).

The present findings are also limited to judgments about others' performance, however predicting one's future performance organizational settings is also important as it may determine whether to approach new challenges and opportunities (e.g., Ball., 2012; Harvey et al., 2014; Schneider et al., 2016). Judgments about others are more likely to consider global information (e.g., base-rates) than judgments about oneself (Epley & Dunning, 2000), suggesting that local performances can be particularly impactful in self-assessments as it may lead to hot-hand judgments about oneself. For example, previous research showed that internal attributions for desirable outcomes, such as attributing a job offer to one's own abilities, promote self-confidence and efficacy (Harvey & Martinko, 2009; Silver et al., 1995). Moreover, considering that experts or highly skilled people may underestimate their abilities (e.g., Kruger & Dunning, 1999) and that the continuous practice may lead to underconfidence (Koriat et al., 2002), it is unclear whether successful, or unsuccessful, agents would predict the continuation of their success after consecutive successful outcomes. Further research should test these hypotheses.

Finally, it is also important to highlight that the present studies use very simple organizational settings to test the present hypotheses. Such minimal scenarios enable high experimental control, however future research should explore a more immersive extension to organizational contexts, with more elaborate vignette story telling or a field study to extend the generalizability of the present findings.

Conclusion

The present work advances the understanding of how people make use of different sources of information about others' performance to make accountability judgments and predictions of future actions. Although determined by local patterns of performance, these judgments and predictions can integrate information about someone's global success. Research should continue to explore how beliefs about human performance are used to process information and predict others' future performance in organizational settings.

Author notes

The authors have no conflicts of interest to declare. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the studies 1 to 3. The requirement for approval was waived by the ethics committee since the study posited no risks for participants nor experimental deceiving. The data that support the findings of this study are available at https://figshare.com/s/bb667d1827e8e3b4cfc7. This research was not preregistered.

References

Alicke, M. D. (2000). Culpable control and the psychology of blame. Psychological Bulletin, 126(4), 556–574. https://doi.org/10.1037/0033-2909.126.4.556

Alter, A. L., & Oppenheimer, D. M. (2006). Predicting short-term stock fluctuations by using processing fluency. *Proceedings of the National Academy of Sciences*, 103(24), 9369–9372. https://doi.org/10.1073/pnas.0601071103

Avugos, S., Köppen, J., Czienskowski, U., Raab, M., & Bar-Eli, M. (2013). The "hot hand" reconsidered: A meta-analytic approach. *Psychology of Sport and Exercise*, 14(1), 21-27. https://doi.org/10.1016/j.psychsport.2012.07.005

Ayton, P., & Fischer, I. (2004). The hot hand fallacy and the gambler's fallacy: Two faces of subjective randomness? *Memory & Cognition*, 32, 1369–1378. https://doi.org/10.3758/BF03206327.

Ball, C. (2012). Not all streaks are the same: Individual differences in risk preferences during runs of gains and losses. *Judgment and Decision Making*, 7(4), 452-461. https://doi.org/10.1017/S1930297500002783

Bar-Eli, M., Avugos, S., & Raab, M. (2006). Twenty years of "hot hand" research: Review and critique. *Psychology of Sport and Exercise*, 7(6), 525-553. https://doi.org/10.1016/j.psychsport.2006.03.001.

Barber, B.M., Odean, T., Zheng, L., 2005. Out of sight, out of mind: the effects of expenses on mutual fund flows. *Journal of Business*, 78, 2095–2120. https://doi.org/10.1086/497042.

Boynton, D. M. (2003). Superstitious responding and frequency matching in the positive bias and gambler's fallacy effects. *Organizational Behaviour and Human Decision Processes*, 91, 119 – 127. https://doi.org/10.1016/S0749-5978(03)00064-5

Braga, J., Ferreira, M. B., Sherman, S. J., Mata, A., Jacinto, S., & Ferreira, M. (2018). What's Next? Disentangling Availability from Representativeness. *Journal of Experimental Social Psychology*, 76, 307-319. https://doi.org/1016/j.jesp.2018.03.006.

Braga, J., Mata, A., Ferreira, M. B., & Sherman, S. J. (2016). Motivated reasoning in the prediction of sports outcomes and the belief in the "hot hand". *Cognition & Emotion*. https://doi.org/10.1080/02699931.2016.1244045.

Burgoon, E. M., Henderson, M. D., & Wakslak, C. J. (2013). How do we want others to decide? Geographical distance influences evaluations of decision makers. *Personality and Social Psychology Bulletin, 39,* 826–838. https://doi.org/10.1177/0146167213481247.

Burns, B. D., & Corpus, B. (2004). Randomness and inductions from streaks: "Gambler's fallacy" versus "hot hand". *Psychonomic Bulletin and Review*, 11, 179–184. https://doi.org/10.3758/BF03206480.

Camerer, C. F. (1989). Does the Basketball Market Believe in the ''Hot Hand''?, *American Economic Review*, 79, 1257–1261.

Carlson, K. A., & Shu, S. B. (2007). The rule of three: How the third event signals the emergence of a streak. *Organizational Behaviour and Human Decision Processes*, 104, 113–121. https://doi.org/10.1016/j.obhdp.2007.03.004.

Caruso, E., Waytz, A., & Epley, N. (2010). The intentional mind and the hot hand: Perceiving intentions makes streaks seem likely to continue. *Cognition*, 116, 149–153. https://doi.org/10.1016/j.cognition.2010.04.006.

Custer, R. L., & Milt, H. (1985). *When luck runs out*. New York: Facts on File.

Dennett, D. C. (1987). *The intentional stance*. Cambridge, MA: MIT Press.

Dweck, C. S., Chiu, C. & Hong, Y. (1995). Implicit Theories and Their Role in Judgements and Reactions: A World From Two Perspectives. *Psychological Inquiry*, 6, 267-285. https://doi.org/10.1207/s15327965pli0604_1

Epley, N., & Dunning, D. (2000). Feeling" holier than thou": are self-serving assessments produced by errors in self-or social prediction?. *Journal of personality and social psychology*, 79, 861-875. https://doi.org/10.1037/0022-3514.79.6.861

Phillips, J.G. & Landon, J. (2016). Dynamic changes in the use of online advice in response to task success or failure, *Behaviour & Information Technology*, 35(10), 796-806, https://doi.org/10.1080/0144929X.2016.1186734

Fischhoff, B., Slovic, P., & Lichtenstein, S. (1979). Subjective sensitivity analysis. *Organizational Behaviour & Human Performance, 23*, 339-359. https://doi.org/10.1016/0030-5073(79)90002-3

Gawronski, B. (2004). Theory-based bias correction in dispositional inference: The fundamental attribution error is dead, long live the correspondence bias. *European Review of Social Psychology*, 15(1), 183–217. https://doi.org/10.1080/10463280440000026

Gigerenzer, G. (1991). How to make cognitive illusions disappear: Beyond “heuristics and biases.” *European Review of Social Psychology, 2,* 83–115. https://doi.org/10.1080/14792779143000033.

Gigerenzer, G., Hell, W., & Blank, H. (1988). Presentation and content: The use of base rates as a continuous variable. *Journal of Experimental Psychology: Human Perception and Performance, 14,* 513–525. https://doi.org/10.1037/0096-1523.14.3.513.

Gilbert, D. T., & Malone, P. S. (1995). The correspondence bias. Psychological Bulletin, 117(1), 21–38. https://doi.org/10.1037/0033-2909.117.1.21

Gilovich, T., Vallone, R., & Tversky, A. (1985). The hot hand in basketball: On the misperception of random sequences. *Cognitive Psychology*, 17, 295–314. https://doi.org/10.1016/0010-0285(85)90010-6

Ginosar, Z., & Trope, Y. (1980). The effects of base rates and individuating information on judgements about another person. *Journal of Experimental Social Psychology*, 16, 228-242. https://doi.org/10.1016/0022-1031(80)90066-9.

Goerke, M., Möller, J., Schulz-Hardt, S., Napiersky, U., & Frey, D. (2004). 'It's Not My Fault-But Only I Can Change It": Counterfactual and Prefactual Thoughts of Managers. *Journal of Applied Psychology*, 89(2), 279–292. https://doi.org/10.1037/0021-9010.89.2.279

Green, S. G., & Mitchell, T. R. (1979). Attributional processes of leaders in leader—Member interactions. *Organizational Behavior and Human Performance*, 23(3), 429–458. https://doi.org/10.1016/0030-5073(79)90008-4

Harvey, P., & Martinko, M. J. (2009). An empirical examination of the role of attributions in psychological entitlement and its outcomes. Journal of Organizational Behavior: *The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 30(4), 459–476. https://doi.org/10.1002/job.549

Harvey, P., Madison, K., Martinko, M., Crook, T. R., & Crook, T. A. (2014). Attribution theory in the organizational sciences: The road traveled and the path ahead. Academy of Management Perspectives, 28(2), 128–146. https://doi.org/10.5465/amp.2012.0175

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* Guilford Publications.

Heider, F. (1944). Social perception and phenomenal causality. *Psychological Review*, 51(6), 358–374. https://doi.org/10.1037/h0055425

Heider, F. (1958). Perceiving the other person. In F. Heider, *The psychology of interpersonal relations* (pp. 20–58). John Wiley & Sons Inc. https://doi.org/10.1037/10628-002

Henderson, M. D., Fujita, K., Trope, Y., & Liberman, N. (2006). Transcending the "here": The effect of spatial distance on social judgement. *Journal of Personality and Social Psychology, 91,* 845–856. https://doi.org/10.1037/0022-3514.91.5.845.

Henne, P., Kulesza, A., Perez, K., & Houcek, A. (2021). Counterfactual thinking and recency effects in causal judgment. *Cognition*, 212, 104708. https://doi.org/10.1016/j.cognition.2021.104708

Ilgen, D. R., & Knowlton Jr, W. A. (1980). Performance attributional effects on feedback from superiors. *Organizational Behavior and Human Performance*, 25(3), 441–456. https://doi.org/10.1016/0030-5073(80)90039-2

Jones, E. E., Goethals, G. R., Kennington, G. E., & Severance, L. J. (1972). Primacy and assimilation in the attribution process: The stable entity proposition 1. Journal of Personality, 40(2), 250-274. https://doi.org/10.1111/j.1467-6494.1972.tb01002.x

Jones, E. E., & Harris, V. A. (1967). The attribution of attitudes. *Journal of Experimental Social Psychology*, 3(1), 1–24. https://doi.org/10.1016/0022-1031(67)90034-0

Jones, E. E., Rock, L., Shaver, K. G., Goethals, G. R., & Ward, L. M. (1968). Pattern of performance and ability attribution: An unexpected primacy effect. *Journal of Personality and Social Psychology*, 10(4), 317–340. https://doi.org/10.1037/h0026818

Kelley, H. H. (1973). The processes of causal attribution. *American Psychologist*, 28(2), 107–128. https://doi.org/10.1037/h0034225

Köppen, J., & Raab, M. (2012). The hot and cold hand in volleyball: Individual expertise differences in a video-based playmaker decision test. *The Sport Psychologist*, 26(2), 167-185.

Koriat, A., Sheffer, L., & Ma'ayan, H. (2002). Comparing objective and subjective learning curves: Judgments of learning exhibit increased underconfidence with practice. *Journal of Experimental Psychology: General*, 131(2), 147–162. https://doi.org/10.1037/0096-3445.131.2.147

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of personality and social psychology*, 77(6), 1121. https://doi.org/10.1037/0022-3514.77.6.1121

Langenhoff, A. F., Wiegmann, A., Halpern, J. Y., Tenenbaum, J. B., & Gerstenberg, T. (2021). Predicting responsibility judgments from dispositional inferences and causal attributions. *Cognitive Psychology*, 129, 101412. https://doi.org/10.1016/j.cogpsych.2021.101412

Ledgerwood, A., Wakslak, C. J., & Wang, M. K. (2010). Differential information use for near and distant decisions. *Journal of Experimental Social Psychology, 46,* 638–642. https://doi.org/10.1016/j.jesp.2010.03.001.

Lewis, D. (1973). Counterfactuals and Comparative Possibility. In: Harper, W.L., Stalnaker, R., Pearce, G. (eds) IFS. The University of Western Ontario Series in Philosophy of Science, vol 15. Springer, Dordrecht. https://doi.org/10.1007/978-94-009-9117-0_3

MacMahon, C., Köppen, J., & Raab, M. (2014). The hot hand belief and framing effects. *Research quarterly for exercise and sport*, 85(3), 341-350. https://doi.org/10.1080/02701367.2014.930089

Malle, B. F., & Holbrook, J. (2012). Is there a hierarchy of social inferences? The likelihood and speed of inferring intentionality, mind, and personality. *Journal of Personality and Social Psychology*, 102(4), 661. https://doi.org/10.1037/a0026790

Malle, B., & Knobe, J. (1997). The folk concept of intentionality. *Journal of Experimental Social Psychology*, 33, 101–121. https://doi.org/10.1006/jesp.1996.1314.

March, J. (1991). How Decisions Happen in Organizations. *Human-Computer Interaction*, 6(2), 95–117. https://doi.org/10.1207/s15327051hci0602_1

Marmurek, H. H., Switzer, J., & D'Alvise, J. (2013). Impulsivity, Gambling Cognitions, and the Gambler's Fallacy in University Students. *Journal of Gambling Studies*, 31, 197-210. https://doi.org/10.1007/s10899-013–9421-6

Martinko, M. J., Douglas, S. C., & Harvey, P. (2006). Attribution Theory in Industrial and Organizational Psychology: A Review. In G. P. Hodgkinson & J. K. Ford (Eds.), International review of industrial and organizational psychology 2006 (pp. 127–187). Wiley Publishing. https://doi.org/10.1002/9780470696378.ch4

Martinko, M. J., Harvey, P., & Dasborough, M. T. (2011). Attribution theory in the organizational sciences: A case of unrealized potential. *Journal of Organizational Behavio*r, 32(1), 144–149. https://doi.org/10.1002/job.690

Martinko, M. J., Harvey, P., & Douglas, S. C. (2007). The role, function, and contribution of attribution theory to leadership: A review. *The Leadership Quarterly*, 18(6), 561–585.

Miller, J. B., & Sanjurjo, A. (2018). Surprised by the hot hand fallacy? A truth in the law of small numbers. *Econometrica,* 86, 2019–2047. https://doi.org/10.3982/ECTA14943.

Mitchell, T. R., & Wood, R. E. (1980). Supervisor's responses to subordinate poor performance: A test of an attributional model. *Organizational Behavior and Human Performance*, 25(1), 123-138. https://doi.org/10.1016/0030-5073(80)90029-X

Montoya, A. K., & Hayes, A. F. (2017). Two condition within-participant statistical mediation analysis: A path-analytic framework. *Psychological Methods*, 22(1), 6 - 27. https://doi.org/10.1037/met0000086

Morris, M. W., Sheldon, O. J., Ames, D. R., & Young, M. J. (2007). Metaphors and the market: Consequences and preconditions of agent and object metaphors in stock market commentary. *Organizational Behaviour and Human Decision Processes*, 102, 174–192. https://doi.org/10.1016/j.obhdp.2006.03.001.

Naquin, C. E., & Tynan, R. O. (2003). The team halo effect: Why teams are not blamed for their failures. *Journal of Applied Psychology*, 88(2), 332–340. https://doi.org/10.1037/0021-9010.88.2.332

Nickerson, R. S. (2002). The production and perception of randomness. *Psychological Review*, 109, 330–357. https://doi.org/10.1037/0033-295X.109.2.330

Offerman, T., & Sonnemans, J. (2004). What's Causing Overreaction? An Experimental Investigation of Recency and the Hot-hand Effect. *Scandinavian Journal of Economics*, 106, 533–553. https://doi.org/10.1111/j.1467-9442.2004.00377.x.

Oskarsson, A. T., Van Boven, L., McClelland, G. H., & Hastie, R. (2009). What's next? Judging sequences of binary events. *Psychological Bulletin*, 135, 262–285. https://doi.org/10.1037/a0014821.

Raab, M., & MacMahon, C. (2015). Does framing the hot hand belief change decision-making behaviour in volleyball?. *Research quarterly for exercise and sport*, 86(2), 152-162. https://doi.org/10.1080/02701367.2014.991437

Raab, M., Gula, B., & Gigerenzer, G. (2012). The Hot Hand Exists in Volleyball and Is Used for Allocation Decisions. *Journal of Experimental Psychology: Applied*, 18, 1, 81–94. https://doi.org/10.1037/a0025951.

Reeder, G. (2009). Mindreading: Judgments about intentionality and motives in dispositional inference. *Psychological Inquiry*, 20(1), 1–18. https://doi.org/10.1080/10478400802615744

Reeder, G. D., & Brewer, M. B. (1979). A schematic model of dispositional attribution in interpersonal perception. *Psychological Review*, 86(1), 61–79. https://doi.org/10.1037/0033-295X.86.1.61

Reeder, G. D., Hesson-McInnis, M., Krohse, J. O., & Scialabba, E. A. (2001). Inferences about effort and ability. *Personality and Social Psychology Bulletin*, 27(9), 1225–1235. https://doi.org/10.1177/014616720127901

Rosecrance, J. (1987). The social world of sports betting. *Arena Review*, 11(1), 15-24.

Silver, W. S., Mitchell, T. R., & Gist, M. E. (1995). Responses to successful and unsuccessful performance: The moderating effect of self-efficacy on the relationship between performance and attributions. *Organizational Behavior and Human Decision Processes*, 62(3), 286–299. https://doi.org/10.1006/obhd.1995.1051

Sirri, E. R., Tufano, P., (1998). Costly search and mutual fund flows. *Journal of Finance*, 53, 1589–1622. https://doi.org/10.1111/0022-1082.00066.

Phillips, J.G. & Landon, J. (2016). Dynamic changes in the use of online advice in response to task success or failure, *Behaviour & Information Technology*, 35(10), 796-806, https://doi.org/10.1080/0144929X.2016.1186734

Stöckl, T., Huber, J., Kirchler, M., & Lindner, F. (2015). Hot hand and gambler's fallacy in teams: Evidence from investment experiments. *Journal of Economic Behaviour & Organization*, 117, 327-339. https://doi.org/10.1016/j.jebo.2015.07.004.

Studer, B., Limbrick-Oldfield, E. H., & Clark, L. (2015). 'Put Your Money Where Your Mouth Is!': Effects of Streaks on Confidence and Betting in a Binary Choice Task. *Journal of Behavioral Decision Making*, 28(3), 239–249. https://doi.org/10.1002/bdm.1844

Sundali, J., & Croson, R. (2006). Biases in casino betting: The hot hand and the gambler's fallacy. *Judgement and Decision Making, 1,* 1–12.

Thaler, R. H., & Johnson, E. J. (1990). Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. *Management science*, 36(6), 643-660. https://doi.org/10.1287/mnsc.36.6.643

Trope, Y., & Higgins, E. T. (1993). The what, when, and how of dispositional inference: New answers and new questions. P*ersonality and Social Psychology Bulletin*, 19(5), 493-500. https://doi.org/10.1177/0146167293195002

Tversky, A., & Gilovich, T. (1989). The cold facts about the "hot hand" in basketball. *Chance, 2,* 16–21. https://doi.org/10.1080/09332480.1989.11882320.

Tversky, A., & Kahneman, D. (1974). Judgement under uncertainty: Heuristics and biases. *Science, 185,* 1124 –1131. https://doi.org/10.1126/science.185.4157.1124.

Tyszka, T., Zielonka, P., Dacey, R., & Sawicki, P. (2008). Perception of randomness and predicting uncertain events. *Thinking & Reasoning*, 14, 83–110. https://doi.org/10.1080/13546780701677669.

Uttich, K., & Lombrozo, T. (2010). Norms inform mental state ascriptions: A rational explanation for the side-effect effect. *Cognition*, 116(1), 87–100. https://doi.org/10.1016/j.cognition.2010.04.003

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review*, 92(4), 548-573. https://doi.org/10.1037/0033-295X.92.4.548

Weiner, B. (1995). Inferences of responsibility and social motivation. In Advances in experimental social psychology (Vol. 27, pp. 1-47). Academic Press. https://doi.org/10.1016/S0065-2601(08)60402-5

Weiner, B., & Kukla, A. (1970). An attributional analysis of achievement motivation. *Journal of Personality and Social Psychology*, 15(1), 1–20. https://doi.org/10.1037/h0029211

Weiner, B., Nierenberg, R., & Goldstein, M. (1976). Social learning (locus of control) versus attributional (causal stability) interpretations of expectancy of success. *Journal of Personality*. https://doi.org/10.1111/j.1467-6494.1976.tb00583.x

Footnotes

[1] Power analyses were conducted (with the program G*Power, Erdfelder, Faul, & Buchner, 1996) to determine the sample size needed to obtain statistical power at the recommended .80 level and $\alpha = .05$ (Cohen, 1988). Based on a medium effect size ($\eta^2_{partial} = .06$), the minimum required sample size is n = 159 (Cohen, 1988; Miles & Shevlin, 2001). Sensitivity power analysis at 80%, alpha = .05 and n = 198, estimates a minimum effect size of $\eta_{partial}^2 = .05$ for a repeated measures ANOVA with 3 measurements. To test the predicting role of intentionality judgments on outcome predictions, with power = 80% and alpha = .05, the minimum required sample size is n = 14. Moreover, sensitivity power analysis at power = 80%, alpha = .05, and n = 49, estimates a minimum effect size of $f^2 = .17$). For the mediation analysis, to test the predicting role of intentionality judgments on outcome predictions, with 2 predictors (90% and 50% conditions), with power = 80% and alpha = .05, the minimum required sample size is n = 17. Also, for the mediation analysis, sensitivity power analysis at power = 80%, alpha = .05, and n = 100, with two predictors, estimates a minimum effect size of $f^2 = .10$).

[2] Power analyses were conducted (with the program G*Power, Erdfelder, Faul, & Buchner, 1996) to determine the sample size needed to obtain statistical power at the recommended .80 level and $\alpha = .05$ (Cohen, 1988). Based on the size of the effect of success-rate on intentionality judgments observed in Study 1 ($\eta_{partial}^2 = .08$), the minimum required sample size is n = 141 (Cohen, 1988; Miles & Shevlin, 2001). For a 2x3 mixed ANOVA with repeated measures in the last factor, sensitivity power analysis at 80%, alpha = .05 and n = 152, estimates a minimum effect size of $\eta_{partial}^2 = .013$ for the within subject's effect, $\eta_{partial}^2 = .073$ for the between subject's effect and $\eta_{partial}^2 = .016$ for the interaction.

Figure 1. Standardized regression coefficients for the relationship between success-rate information and predictions of streak's continuation as mediated by judgments of

intentionality. Regression coefficient between success-rate and predictions of streak's controlling for judgments of intentionality in parentheses.

* 95% confidence intervals do not include zero.

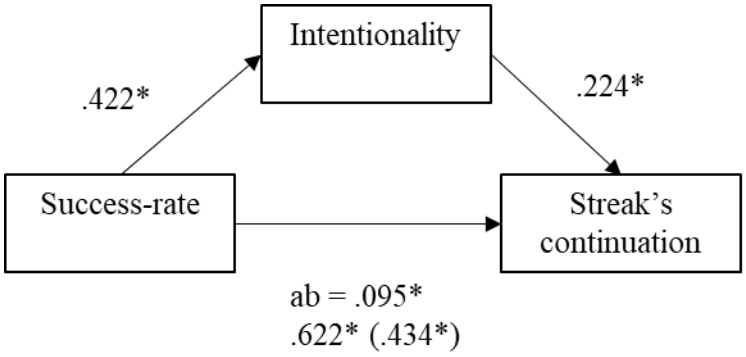
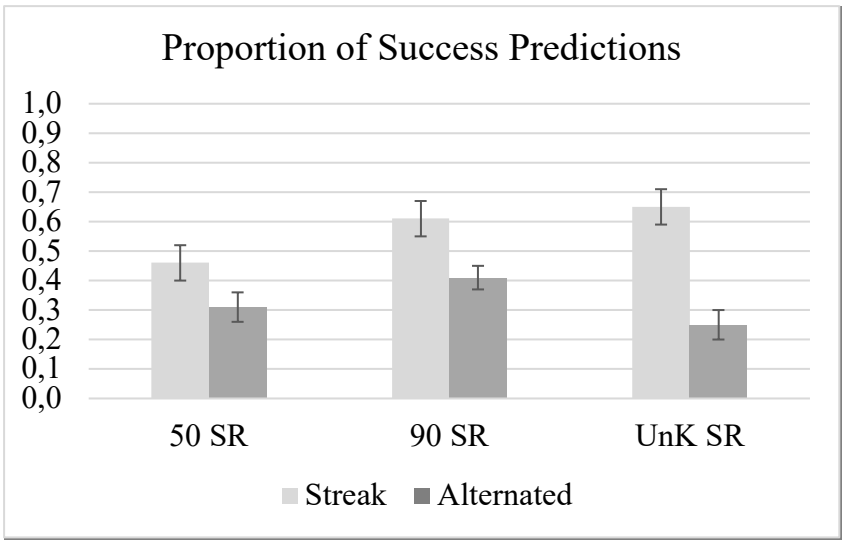
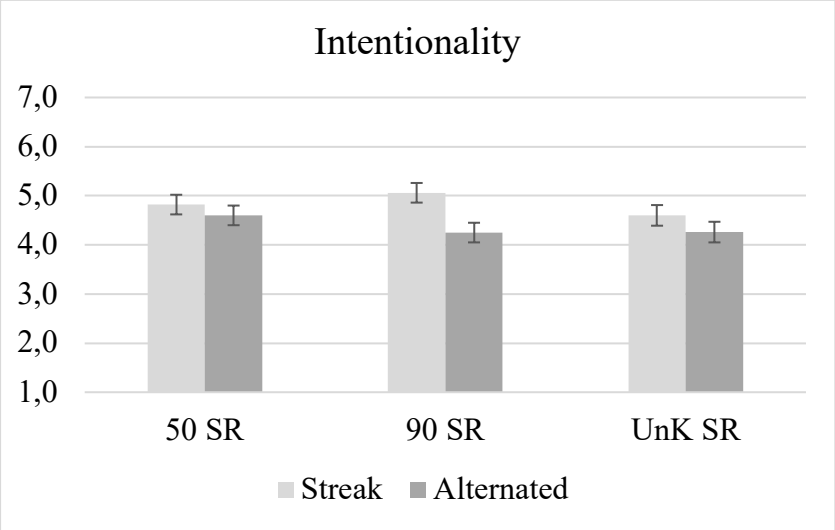


Figure 2. Proportion of predictions of success as a function of global success-rate for streak and alternated local performance pattern.



Note. 50 SR represents 50% success-rate condition, 90 SR represents 90% success-rate condition, and Unk SR represents the Unknown success-rate condition. Error bars show standard errors.

Figure 3. Ratings of intentionality judgments of the agents' performance as a function of global success-rate for streak and alternated local performance pattern.



Note. 50 SR represents 50% success-rate condition, 90 SR represents 90% success-rate condition, and Unk SR represents the Unknown success-rate condition. Error bars show standard errors.

Figure 4. Hiring likelihood as a function of global success-rate for streak and alternated local performance pattern.

Note. 20 SR represents 20% success-rate condition, 80 SR represents 80% success-rate condition, and Unk SR represents the Unknown success-rate condition. Error bars show standard errors.

Table 1. Proportion of predictions of success as a function of success-rate conditions for streaky and alternated local patterns of performance.

	Proportion of predictions of success	
Success-Rate	Streak	Alternated
	M (SE)	*M (SE)*
Unknown	0.65 (0.06)	0.25 (0.05)

50%	0.46 (0.06)	0.31 (0.05)
90%	0.61 (0.06)	0.41 (0.04)

Table 2. Perceived intentionality of the agents' performance as a function of global success-rate for streaky and alternated local patterns of performance.

	Intentionality judgments	
Success-Rate	Streak	Alternated
	M (SE)	*M (SE)*
Unknown	4.60 (.21)	4.26 (.21)
50%	4.82 (.20)	4.60 (.20)
90%	5.06 (.20)	4.25 (.19)

Table 3. Predictions of success (on a 7-point scale) as a function of global success-rate for streaky and alternated local performances.

	Predictions of Success	
Success-Rate	Streak	Alternated
	M (SE)	*M (SE)*
Unknown	5.37 (.11)	5.00 (.11)
20%	4.72 (.17)	4.22 (.17)
80%	6.06 (.13)	5.17 (.16)

Table 4. Perceived responsibility for the performance as a function of global success-rate for streaky and alternated local performances.

	Responsibility judgments	
Success-Rate	Streak	Alternated
	M (SE)	*M (SE)*
Unknown	4.36 (.10)	4.21 (.11)
20%	4.18 (.13)	4.20 (.13)
80%	4.60 (.11)	4.10 (.12)

Table 5. Likelihood of hiring the candidate (on a 7-point scale) as a function of global success-rate for streaky and alternated local performances.

	Hiring Likelihood	
Success-Rate	Streak	Alternated
	M (SE)	*M (SE)*
Unknown	4.17 (.10)	3.79 (.09)
20%	3.63 (.12)	3.22 (.12)
80%	4.96 (.11)	4.19 (.12)