Psychological Momentum: Intuitive Physics and Naive Beliefs

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Psychological Momentum: Intuitive Physics and Naive Beliefs

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The present research examines psychological momentum (PM), a perceived force that lay intuition suggests influences performance. PM theory is proposed to account for how momentum perceptions arise, and four studies demonstrate the influence of lay intuitions about PM on expectations regarding performance outcomes. Study 1 establishes that individuals share intuitions about the types of events that precipitate PM, and Study 2 finds that defeating a rival increases momentum perceptions. Study 3 provides evidence for the lay belief that as more PM accumulates during a prior task, there should be more residual momentum left to carry over to a subsequent task, and Study 4 finds that an individual whose PM is interrupted is expected to have greater difficulty completing a task than is an individual whose steady progress is interrupted. Discussion focuses on linkages between PM and related constructs.

Keywords: *momentum; lay intuitions; prediction; thought flow*

There is a common perception among individuals that a psychological force called momentum exists that can powerfully influence performance. In athletic contexts, the belief in psychological momentum (PM) is so pervasive that one can hardly read about or view a sporting event without being exposed to references from commentators, coaches, and players regarding how "turning points" and "momentum-shifting" plays influenced the progression and outcome of a game. In kind, the belief exists that winning a hard-fought and important contest against a strong opponent can help build momentum and thereby increase one's chances for success in a subsequent contest. It is important to note, however, that the PM concept extends beyond athletic domains. Individuals believe that they can experience momentum while they are designing a computer program, writing a paper, or cleaning an apartment, and political campaigns and celebrity careers are often described as gaining (or losing) momentum.[1] Moreover, the concept can be extended to attitude objects. Stock market analysts often advise their clients to invest in momentum stocks, and political and social issues (e.g., the effort to ban gay marriage, the nonsmoking movement) are often described as experiencing fluctuations in momentum.

Despite what appears to be widespread cultural acceptance of the existence and influence of PM, little research in the social–psychological or judgment and decision-making literatures has examined how individuals conceptualize PM or how beliefs about PM influence judgments. The goal of the present work is to fill this void and examine how people think about PM.

Does PM Exist?

Studies in the sport psychology literature have examined a more basic question: Does PM exist, and does it affect performance? One operational definition employed by sport psychologists is that PM is a sense of personal "psychological power" (Iso-Ahola & Mobily, 1980) that is acquired following initially successful outcomes. For instance, Iso-Ahola and Mobily (1980) operationalized PM as winning the first game in a best-of-three racquetball match. In an archival analysis, they found that players who won the first game of the match also won significantly more of the second games and significantly more of the matches overall than did players who lost the first game. Other researchers (e.g., Silva, Hardy, & Crace, 1988), however, have suggested that these findings

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are simply due to greater ability on the part of first-game winners. Several studies that controlled for ability did find evidence suggesting PM effects. For example, Ransom and Weinberg (1985) found that after restricting their sample to elite male and female tennis players (i.e., top 20 in the world), 61% of males and 63% of females who won the first set also went on to win the match. However, other studies that controlled for ability (e.g., Richardson, Adler, & Hankes, 1988) failed to find a relationship between initial success and future success.

Perhaps the biggest blow to those who sought evidence for the existence of PM was Gilovich, Vallone, and Tversky's (1985) investigation of the "hot-hand" fallacy. After conducting a statistical analysis of several basketball shooting performances, Gilovich et al. concluded that outcomes of successive shots were unrelated to prior outcomes. Rather, they argued, hot streaks in performance are likely due to random variation and that a general misconception of chance has led to pervasive beliefs in the hot-hand and momentum in sports performance more generally.

Although momentum, objectively, may not actually be acquired following initially successful outcomes, some evidence exists suggesting that perceptions of momentum can be associated with improved performance. For instance, Perreault, Vallerand, Montgomery, and Provencher (1998) used a bicycle-racing task to investigate this relationship. In their study, when participants in a positive-momentum condition fell behind, their perceptions of PM decreased, whereas when they came back and regained the lead, their perceptions of PM increased. Moreover, the results revealed a positive association between perceived PM and enhanced task performance.

Two models in the sports psychology literature have attempted to explain how perceptions of PM arise, as well as how such perceptions might affect performance. According to Vallerand, Colavecchio, and Pelletier's (1988) antecedents–consequences psychological momentum model (ACM), PM refers to the perception that an actor is progressing toward his or her goal, and the crucial psychological variable that determines whether PM is experienced is the degree of perceived control inherent in the situation, as well as the individual's personal need for control. Perceived PM then directly affects performance, but this relationship is moderated by an individual's skill level, as well as the presence of contextual variables such as crowd noise and game importance. Taylor and Demick's (1994) multidimensional model of momentum in sports (MMM), in contrast, focuses more on the PM–performance link than on the factors that give rise to PM, although it does note that positive and negative precipitating events elicit perceptions of PM. In addition, the MMM is primarily focused on the relationship between an actor's perceptions of PM and his or her subsequent performance. According to the model, perceived PM affects performance through changes in cognition, physiology, and behavior.

Psychological Momentum Theory (PMT)

The goal of this article is to develop and test a more general theory of PM that transcends sports contexts and recognizes that the lay concept of momentum is applied by individuals across a wide array of domains. In contrast to the ACM (Vallerand et al., 1988) and MMM (Taylor & Demick, 1994), we are less concerned with questions such as whether perceptions of PM actually affect an actor's performance. Rather, we have chosen to develop a theory that (a) describes the phenomenological experience of PM and how such feelings and perceptions of PM arise, and (b) explores individuals' naive beliefs regarding PM and how such beliefs influence judgments, decisions, and outcome predictions.

The phenomenology of PM. To account for the phenomenological experience of PM, PMT maps psychological analogues onto the variables of mass and velocity as described by basic Newtonian physics. In physical terms, momentum is described by the following equation:

$$\text{mass } (m) \times \text{velocity } (v) = \text{momentum } (p).$$

According to PMT, a precipitating event provides a target (e.g., an attitude object, person, or group of persons) with velocity, and additional precipitating events can increase velocity (cf. Taylor & Demick, 1994). Velocity is a vector quantity and thus is fully described by direction as well as magnitude. In PMT, the direction of the velocity vector can be positive (i.e., toward a goal) or negative (i.e., away from a goal). Mass, on the other hand, is determined by the strength of contextual variables that connote value, immediacy, and importance, and combines multiplicatively with velocity to imbue a target with momentum.

Research on visual cognition has discovered that if an observer views a target undergoing implied or apparent motion, that observer's memory for the final location of the target is often displaced forward slightly in the direction of target motion, a phenomenon referred to as *representational momentum* (e.g., Freyd & Finke, 1984; Hubbard, 1995; Thornton & Hubbard, 2002). Hubbard (2004) has suggested that observers draw causal inferences about the physical properties implied by the displays, even though the displayed stimuli are simple depictions that would not experience the same momentum, gravitational attraction, or friction as actual physical objects. The findings regarding representational

momentum are important to PMT because they indicate that after viewing a target that appears to be imbued with momentum, individuals quickly develop expectations regarding the eventual displacement of the target. In kind, PMT maintains that if a target is imbued with PM, individuals will quickly develop a set of expectations regarding the displacement of that target. Specifically, for positive momentum, expected displacement is successful goal attainment (e.g., completing a task within a discrete period), whereas for negative momentum, expected displacement is unsuccessful goal attainment (e.g., failure to complete a task within a discrete period).

The manner in which velocity and mass combine to engender perceptions of momentum can be illustrated by describing a sequence from a hypothetical basketball game played between Team Red and Team Blue. With the score tied 65-65 and 12 min left in the game, a player from Blue dribbles the ball past the half-court line. Suddenly, one of Red's guards steals the ball, dribbles quickly down the length of the court, and scores with a ferocious dunk. In this case, the steal of the ball—a dramatic and fairly infrequent occurrence—is a precipitating event. The increase in score is experienced by Red as positive velocity and by Blue as negative velocity. Moreover, the ferocity of the dunk and the subsequent roar of the crowd in response to the dunk are contextual aspects of the event that add mass, and the perceived quantity of mass that these event aspects provide combines with velocity to imbue Red with positive momentum and Blue with negative momentum. After preventing Blue from scoring on the next possession, Red's point guard sends a quick pass to Red's top shooter, who hits a 3-point shot from the corner. The contiguity between the dunk and the 3-point shot and the perceived difficulty of the shot further increase Red's positive velocity. Moreover, the fact that Red's top shooter has not hit a three-point shot during the entire game imbues this shot with greater importance, thereby increasing Red's mass. In turn, mass and velocity combine to strengthen the perception that Red has the momentum.

A critical difference between Vallerand et al.'s (1988) ACM and the present conceptualization is that whereas the ACM emphasizes the importance of the degree of perceived (i.e., internal) control inherent in the situation, as well as the individual's personal need for, and internal locus of, control, PMT posits that individuals often experience PM as an extrapersonal force (i.e., "the wind at your back") that one is imbued with until something causes one to lose it. Thus, although events that precipitate PM can originate from either within or outside the person, PM subsequently operates outside of one's conscious, internal control. Following a precipitating event, PM takes on a life of its own and snowballs, much like a boulder gathers momentum as it rolls down an incline, and builds in intensity over time if uninterrupted. As such, PM is posited to arise from an experiential conceptual system that operates primarily at the preconscious level. According to Epstein (1990), the direction of behavior by the experiential system is mediated by feelings or vibes (from past experiences), including vague feelings of which individuals are normally unaware as well as full-blown emotions of which they are usually aware. According to PMT, event aspects that connote mass and velocity provoke an emotional response (i.e., the phenomenological experience of momentum), and differential perceptions of momentum (i.e., heightened or lessened perceptions of positive or negative momentum) are experienced as fluctuations in emotional responses.

Naive beliefs. Heider (1958) proposed a commonsense psychology in which people's naive theories or beliefs—knowledge structures with an explanatory component (see also Kunda, 1987; Nisbett & Wilson, 1977)—are central to a scientific understanding of social phenomena. Heider's work foreshadowed several more recent commentaries on the naive beliefs that people hold, noting that although these beliefs might in many cases be erroneous, people nonetheless act on these naive beliefs about how the social world around them works (e.g., Anderson, Krull, & Weiner, 1996; Chiu, Hong, & Dweck, 1997; Wegener & Petty, 1997). According to our framework, naive beliefs regarding PM comprise expectations regarding how momentum is going to affect the eventual outcome, which develop out of a need to understand or predict future outcomes (cf. Ross, Lepper, & Hubbard, 1975). Moreover, these theories persevere because of individuals' fear of invalidity (Kruglanski, 1989). Thus, individuals who are unconcerned with the validity of their judgments rely on heuristic methods of assessment (e.g., interpreting a run of successful basketball shots as evidence for the hot hand) and prefer not to conduct an effortful evaluation of the available data (Anderson & Lindsay, 1998).

The present research attempts to provide empirical support for the existence of three naive premises regarding PM. According to PMT, contextual variables connoting greater or lower mass imbue targets with differential levels of momentum. Thus, the first naive premise to be tested is that goal attainment in a context that connotes greater mass should more likely enhance a target's perceived momentum and the likelihood of achieving a subsequent goal than should goal attainment in a context that connotes less mass.

The second naive premise draws on research that has examined what have been termed *naive impetus beliefs* (e.g., Kozhevnikov & Hegarty, 2001; McCloskey,

1983). According to this research, people hold the erroneous belief that the act of setting an object in motion imparts to the object an impetus that maintains the motion after the object has been released. In turn, if people believe that impetus or momentum tends to be maintained for some period, they may also believe that this residual momentum carries over to a subsequent task. Thus, the second naive premise to be tested is that the more momentum that accumulates during the completion of a task, the more residual momentum there should remain to carry over to a subsequent task.

According to PMT, PM is construed as an extrapersonal force that builds in intensity over time if uninterrupted. However, what are people's lay intuitions regarding the effects of an unwanted or unexpected interruption on PM? If, as previously described, momentum is perceived as an extrapersonal force with which one is imbued until something causes one to lose it, people may believe that it is difficult to regain momentum once it is lost. Previous research has shown that interruptions that occur when one is close to a goal elicit feelings of frustration (e.g., Harris, 1974). Thus, following an unwanted interruption, the perception may be that it is harder to regain a high level of positive momentum than to regain a lower level of positive momentum because the loss of a high level of positive momentum is experienced as particularly frustrating. Thus, the third naive premise to be tested is that targets that have positive momentum when they are interrupted should experience greater difficulty resuming goal progress than should targets that have less positive momentum when they are interrupted.

OVERVIEW OF THE STUDIES

Four studies were conducted to garner empirical evidence for the influence of naive beliefs about PM on expected performance. Study 1 was an exploratory investigation of how sports fans conceptualize PM and whether they share intuitions about the types of events that precipitate PM. Study 2 manipulated a variable connoting psychological mass (i.e., whether there exists a rivalry between two basketball teams) and examined whether mass influences perceived momentum and the expected likelihood that the team with momentum would win a future game. Study 3 then examined whether participants believe that PM accumulated during an initial task can carry over to a subsequent task, and Study 4 tested the hypothesis that an individual who was experiencing positive momentum but was then interrupted would have greater difficulty completing a task than would an individual whose steady progress was interrupted.

STUDY 1

Study 1 was a nonexperimental investigation conducted with three goals in mind: (a) to provide an empirical demonstration of the association between positive velocity and PM, (b) to examine whether individuals share intuitions about the types of events that precipitate PM, and (c) to examine how sports fans conceptualize PM. Participants viewed a videotaped segment of a college basketball game and were asked every minute to provide their perceptions of which team had momentum and which was going to win the game. Subsequently, participants selected the event that they believed was most influential in producing a shift in momentum and responded to several open-ended questions about their beliefs regarding PM.

Method

Participants. Twenty students ranging in age from 18 to 22 years at Ohio University who described themselves as "knowledgeable college basketball fans" participated for partial course credit.

Procedure. Participants were seated at computers running MediaLab software (Jarvis, 2004) and informed that the study was assessing perceptions of sports performance. After being provided with team rosters to use as a reference, participants viewed a 10-min videotaped segment (with the volume off) from an NCAA men's basketball game played in 1998 between the Duke University Blue Devils and the University of North Carolina (UNC) Tarheels. At the time of the game, Duke was ranked number 1 in the nation with a 20-1 record, and UNC was ranked number 2 with a 22-1 record. Although Duke trailed during the entire segment, they scored 15 unanswered points and cut UNC's lead from 73-54 at the beginning of the segment to 73-69 at the end of the segment (see Table 1). The final score was UNC 97, Duke 73.

The video segments were paused every minute so that participants could respond to two questions: "Which team has momentum right now?" and "Which team do you believe will win the game?" Although the pauses occurred once a minute in real time, each pause corresponded to game clock increments that ranged anywhere from 0 to 60 s because of clock stoppages that followed fouls and time-outs. The game score and time remaining at each of the 10 pause points are presented in Table 1.

Postsegment dependent measures. After viewing the video, participants were provided with a list of 11

TABLE 1: Perceptions of Momentum and Eventual Game Winner

	Pause Point									
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
	Time Remaining									
	10:08	*9:59*	*9:04*	*8:31*	*8:05*	*7:26*	*7:01*	*6:01*	*6:01*	*5:45*
Score										
Duke	54	55	58	60	60	63	63	63	66	69
UNC	73	73	73	73	73	73	73	73	73	73
Which team has momentum?										
Duke	0	15	90	55	10	90	80	60	90	95
UNC	100	60	5	0	5	5	0	5	0	5
Neither	0	25	5	45	85	5	20	35	10	0
Who is going to win?										
Duke	15	15	30	25	30	35	35	35	65	75
UNC	85	85	70	75	70	65	65	65	35	25

NOTE: Values correspond to the percentage of participants at each pause point who responded with one of the three possible choice options for the momentum question and one of the two possible choice options for the win question. UNC = University of North Carolina.

TABLE 2: Sample Responses to Posttask Questionnaire

Define "momentum" as it pertains to athletics:
"Momentum is the force that gives players the mindset of being successful."
"Momentum is the psychological pendulum that swings back and forth between competitors giving one competitor the edge, and is caused by big plays."
"Momentum is a force that is lost or gained that can have considerable positive or negative effect on the players and play of the game."
"The tendency of big plays to have a snowball effect, where clutch performance breeds success over extended periods of time."

events that had occurred during the game segment and were asked to select the event that was most influential in producing a shift in momentum. Next, participants were directed to "define momentum as it pertains to athletics." Finally, participants were asked if they were familiar with or remembered having seen the Duke–UNC game from 1998, and none reported any familiarity with it. Participants were then debriefed and thanked for their participation.

Results and Discussion

Participants' responses to the momentum and winner questions (see Table 1) revealed an apparent association between positive velocity and perceived (positive) momentum. Even though Duke trailed UNC by 4 points at the 5:45 mark, Duke's 15-point run-up appears to have elicited the perception in most of the participants that Duke had the momentum (95%), $\chi^2(1) = 16.20$, $p < .05$, and that Duke was eventually going to win (75%), $\chi^2(1) = 5.00$, $p < .05$.

When participants were provided with a list of 11 events that had occurred during the game segment and asked to select the event that was most influential in producing a momentum shift, most participants (70%) converged on one of two responses, $\chi^2(10) = 40.50$, $p < .05$. Specifically, 40% of the participants selected Mahktar Ndiaye's (UNC) foul and technical foul with 6:01 left to play in the game (imbuing UNC with negative momentum), and 30% of the participants selected Chris Carawell's (Duke) 3-point shot from the corner after his offensive rebound with 7:35 left to play in the game (imbuing Duke with positive momentum). The fact that the majority of participants selected one of two events suggests that sports fans share similar intuitions regarding the types of events that are most likely to precipitate PM.

Finally, participants were asked to define momentum as it pertains to athletics. Sample responses are provided in Table 2. We found responses such as "Momentum is the force that gives players the mindset of being successful" and "Momentum is a force that is lost or gained that can have considerable positive or negative effect on the players and play of the game" to be particularly interesting in that they provided anecdotal confirmation of our notion that PM is construed as an extrapersonal force that can operate outside of one's conscious control (cf. Vallerand et al., 1988). In addition, we independently coded the definitions of momentum that participants provided as relating to something either internal to the person (e.g., "your

emotional high," "a natural high of adrenaline") or external to the person (e.g., "a force that is lost or gained," "the hidden force that drives the game"). Interrater agreement on the coding of these definitions was 100%. Providing additional empirical support for the notion that PM is perceived as an extrapersonal force, 15 of the 20 definitions (75%) were coded as external to the person.

STUDY 2

The goal of Study 2 was to provide evidence for the existence of lay beliefs linking psychological mass to momentum perceptions and expected performance. According to the first naive premise, attaining a goal in a context that connotes greater mass should more likely enhance a target's perceived momentum and the likelihood of achieving a subsequent goal than should attaining that goal in a context that connotes less mass. According to PMT, psychological mass is determined by the strength of contextual variables that connote value, immediacy, and importance. In Study 2, the existence of a rivalry between two teams served as a proxy for value and importance. Holding all other variables constant, defeating a major rival should be perceived as more significant than defeating a nonrival.

In Study 2, participants read a description of a hypothetical basketball game. In one condition, a team (East Midland) played and defeated a major rival, whereas in another condition, East Midland played and defeated a team who was not a major rival. It was predicted that participants would perceive that East Midland had more momentum and would be more likely to win their next game if they had just defeated a rival than if they had just defeated a nonrival.

Method

Participants and design. Forty-six introductory psychology students ranging in age from 18 to 22 years at Ohio University participating in return for partial course credit were randomly assigned to a two-group (rivalry: rival vs. nonrival) between-subjects design.

Procedure. After being informed that the purpose of the study was to examine perceptions of athletic performance, participants read a paragraph-long description of a hypothetical basketball game. In both conditions, participants read about East Midland, a team tied for third place with their opponent in the division standings. Additionally, East Midland was described as fighting for second place because the top two teams in their division make the playoffs. In the rival condition, East Midland was described as preparing to play West Midland, a team from the other side of the city with whom they had an intense and long-standing (90-year) rivalry. In the nonrival condition, East Midland was simply described as preparing to play Millersville, another team in their division. Participants then read about how East Midland defeated their opponent by a 9-point margin in a hard-fought game. The paragraph concluded by noting that East Midland would next be playing Connor—the second-place team in their division—and that East Midland was now only one game behind Connor in the division standings.

Dependent measures. Participants were then asked how much momentum East Midland now had going into their game against Connor (1 = *none at all,* 7 = *a lot*) and how likely it was that East Midland would defeat Connor in next week's game (1 = *not at all,* 7 = *very*). In addition, participants were asked, "What is the likely outcome of next week's game against Connor?" and were instructed to circle one of two possible responses: "East Midland will lose" or "East Midland will win." Following the completion of these measures, participants were debriefed and thanked for their participation.

Results and Discussion

Consistent with predictions, a team that had just defeated a major rival was perceived as having more momentum going into their next game ($M = 6.42$, $SD = .72$) than was a team that had just defeated a nonrival ($M = 5.82$, $SD = .85$), $t(44) = 2.58$, $p = .01$, $d = .76$. A winning likelihood index was then computed by converting responses to the "likely" measure and the dummy-coded "What is the likely outcome of next week's game?" measure (0 = *"East Midland will lose,"* 1 = *"East Midland will win"*) into z scores and then combining the two measures ($r = .48$, $p = .001$). In support of PMT, participants in the rival condition believed that it was more likely that East Midland would defeat Connor ($M = .14$, $SD = .60$) than did participants in the nonrival condition ($M = -.15$, $SD = .35$), $t(44) = 2.00$, $p = .05$, $d = .59$. In all, the results provide evidence for the existence of a lay theory that attaining a goal in a context that connotes greater mass will enhance a target's perceived momentum and the likelihood of achieving a goal to a greater extent than will attaining a goal in a context that connotes less mass.

STUDY 3

Study 3 examined the second naive premise that as more momentum accumulates during the completion of a

task, more residual momentum should remain to carry over to a subsequent task. Such a momentum carryover effect would provide further evidence that PM is construed as an extrapersonal force that is either lost or gained. To paraphrase one of our participant's responses from Study 1, PM is a force that, once gained, allows an individual to accomplish more than one would be capable of without it. Thus, if momentum is a force that operates like the "wind at one's back," one likely believes that one "has it" until something causes one to "lose it." In addition, the notion of a momentum carryover effect can be derived from research examining naive impetus beliefs (e.g., Kozhevnikov & Hegarty, 2001; McCloskey, 1983), which has demonstrated how people believe that the act of setting an object in motion imparts to the object an impetus that maintains the motion after the object has been released. In the present study, if people believe that impetus or momentum tends to be maintained for some time, they may also believe that this residual momentum may carry over to a subsequent task.

Participants read a scenario about an individual (Jane) who was attempting to complete two tasks by a self-imposed deadline. Because we felt that the demonstration of a momentum carryover effect would be particularly compelling if momentum was perceived to have carried over from an easier task to a more difficult task, a pilot test was conducted to ensure that the second task (writing a paper) was perceived to be more difficult than the first task (cleaning an apartment). Jane was described as either experiencing momentum while completing the first task or making steady progress while completing the first task. We predicted that having experienced positive momentum on a prior task would be expected to facilitate performance on a subsequent task to a greater extent than would having made steady progress on a prior task.

Method

Participants and design. Thirty-four introductory psychology students ranging in age from 18 to 22 years at Ohio University participated in return for partial course credit. Participants were randomly assigned to a two-group (progress: momentum vs. steady) between-subjects design and were placed in classrooms in groups no larger than 10.

Pilot test. In a separate pilot test, 51 participants were asked to provide difficulty ratings for a variety of tasks on 1 (*not at all difficult*) to 7 (*very difficult*) scales. Participants perceived writing a 10-page paper to be more difficult ($M = 4.65$, $SD = 1.32$) than cleaning an apartment ($M = 3.90$, $SD = 1.33$), $t(50) = 3.21$, $p = .002$, $d = .56$.

Procedure. Participants were seated at computers running MediaLab software (Jarvis, 2004) and informed that the purpose of the experiment was to assess people's perceptions of goal setting and achievement. Participants then read a scenario in which the protagonist (Jane) was attempting to complete two tasks by a self-imposed deadline. Beginning at 1:00 p.m. on a Sunday and hoping to finish by 9:00 p.m. that evening, Jane's first task was to clean her apartment, and her second task was to write a 10-page research paper.

In the momentum condition, Jane was described as beginning the first task at a moderate pace before "getting on a cleaning roll" as she "zips through the living room" and "almost effortlessly works her way through a pile of dirty dishes" (see Appendix A for the scenarios employed in the momentum and steady conditions).[2] In the steady condition, on the other hand, Jane was described as working continuously at a steady pace. In both scenarios, Jane finished cleaning her apartment at 4:30 p.m. Thus, whereas objective progress toward goal attainment was held constant (i.e., in both conditions, she finished the first task at 4:30 p.m.), the phenomenology of her experience differed between the momentum and steady conditions.[3] Subsequently, participants read that as soon as Jane had finished cleaning her apartment, she immediately moved on to the second task.

Dependent measures. Participants were asked to indicate how much momentum Jane had going into the second task, how much they thought Jane's momentum from the first task would help her complete the second task (1 = *not at all,* 7 = *very much*), and how likely they thought it was that Jane would finish the second task by 9:00 p.m. Following completion of these measures, participants were debriefed and thanked for their participation.

Results and Discussion

Analyses conducted on the momentum measure revealed that participants in the momentum condition perceived that Jane had more momentum going into the second task ($M = 5.18$, $SD = 1.02$) than did participants in the steady condition ($M = 4.24$, $SD = 1.30$), $t(32) = 2.35$, $p = .025$, $d = .80$. In addition, participants in the momentum condition perceived that Jane's momentum would help her more going into the second task ($M = 4.76$, $SD = 1.15$) than did participants in the steady condition ($M = 3.76$, $SD = 1.20$), $t(32) = 2.48$, $p = .02$, $d = .85$.

Participants in the momentum condition also believed that it was more likely that Jane would complete the second task on time ($M = 4.65$, $SD = 1.27$) than did participants in the steady condition ($M = 3.18$,

SD = 1.33), $t(32) = 3.29$, $p = .002$, $d = 1.13$, thereby providing evidence for the existence of a lay belief that as more momentum accumulates during the completion of a task, more residual momentum remains that can carry over to a subsequent task. To lend further support to this argument, we conducted a regression analysis to determine whether participants' perceptions that Jane's momentum would help her on the subsequent task (momentum help) mediated the effect of progress on expected likelihood (Kenny, Kashy, & Bolger, 1998). The results indicated that progress (dummy coded as 0 = *steady,* 1 = *momentum*) predicted momentum help, $t(32) = 2.48$, $\beta = .40$, $p = .02$; progress predicted expected likelihood, $t(32) = 3.29$, $\beta = .50$, $p = .002$; and momentum help predicted expected likelihood, $t(32) = 4.19$, $\beta = .60$, $p < .001$. However, when progress and momentum help were allowed to simultaneously predict expected likelihood, the relationship between progress and expected likelihood remained significant, $t(32) = 2.14$, $\beta = .31$, $p = .04$, but the beta coefficient associated with this relationship decreased from .50 to .31. Moreover, according to the results of a Sobel (1982) test, this decrease was significant ($Z = 1.96$, $p = .05$). Thus, the relationship between momentum perceptions and expected likelihood appears to have been partially mediated by participants' beliefs that momentum accumulated during the first task could help Jane perform the second task.

It should be noted that the steady and momentum scenarios differ in the fact that Jane is described as being less satisfied by her performance in the steady scenario (i.e., "never having gotten on the roll that she had hoped to") than in the momentum scenario, and it could be argued that perceptions of differences in performance satisfaction could account for the reported carryover effects on likelihood judgments, independent of any effects of PM. As we have described, however, differences in the magnitude of perceived PM are experienced, phenomenologically, as emotional responses, and thus it may be that one's experience of positive momentum gives rise to feelings of satisfaction, whereas one's experience of less positive momentum gives rise to feelings of dissatisfaction (see also Hsee & Abelson, 1991). In other words, more (less) positive momentum is experienced as greater satisfaction (dissatisfaction), and it is the belief that this affective state can carry over to subsequent tasks that accounts for expected likelihood judgments. To address this quetion, it will be important in future research to: (a) examine the independent effects of PM and perceived satisfaction on likelihood judgments, and (b) employ scenarios that manipulate progress (i.e., momentum vs. steady) without explicit reference to emotional responses.

STUDY 4

The purpose of Study 4 was to provide empirical evidence for the third naive premise: Targets that have positive momentum when they are interrupted should experience greater difficulty resuming goal progress than should targets that have less positive momentum when they are interrupted. According to PMT, PM is construed as an extrapersonal force that builds in intensity over time if uninterrupted. As previously described, however, people may also believe that it is difficult to regain momentum once it is lost. In light of research demonstrating that interruptions that occur when one is close to a goal elicit feelings of frustration (e.g., Harris, 1974), we hypothesized that people would perceive that it is harder to achieve a goal following an unwanted interruption of a higher degree of positive momentum than it is to achieve a goal following an interruption of a lower degree of positive momentum.

In Study 4, participants read about an individual (Jane) who was writing a paper and had completed half of it with 2 hr to go before a deadline. In one condition, Jane was described as experiencing momentum while writing the paper; in the other condition, she was described as making steady progress on the paper. In addition, Jane was described as being interrupted while either experiencing momentum or making steady progress. We predicted that participants would believe that it would be more difficult for Jane to finish her paper following the interruption if she had been experiencing momentum than if she had been making steady progress.

Method

Participants and design. Forty introductory psychology students ranging in age from 18 to 22 years at Ohio University participated in return for partial course credit. Participants were randomly assigned to a two-group (progress: momentum vs. steady) between-subjects design and were placed in groups ranging from 1 to 10 members.

Procedure. After being informed that the purpose of the study was to assess perceptions of goal setting and goal achievement, participants read a paragraph about an individual (Jane) who was attempting to complete a 20-page research paper by a given deadline. After having worked for 2.5 hr with 2 hr remaining until the deadline, Jane was described as having completed half of the paper (i.e., 10 pages). However, in the momentum condition, Jane was described as being "focused" and "on a roll," whereas in the steady condition, Jane was described as making "steady progress." At the end of both descriptions, Jane was then described as being

interrupted unexpectedly by a phone call from her mother (see Appendix B).

Dependent measures. After reading the scenario, participants indicated how difficult they believed it would be for Jane to finish her paper by the deadline (1 = *not at all,* 7 = *very*). Participants were then debriefed and thanked for their participation.

Results and Discussion

Consistent with predictions, participants in the momentum condition believed that it would be significantly more difficult for Jane to finish her paper following the interruption ($M = 5.25$, $SD = 1.16$) than did participants in the steady condition ($M = 4.10$, $SD = 1.29$), $t(38) = 2.96$, $p = .005$, $d = .93$, indicating that the resumption of goal pursuit is expected to be more difficult if one's positive momentum is interrupted than if one's steady progress is interrupted. Apparently, then, although PM may be hard to lose once it is gained, it may also be that much harder to regain once it is lost.

GENERAL DISCUSSION

The purpose of the present research was to investigate people's naive beliefs about momentum and to examine how these naive beliefs influence performance expectations. To this end, four studies were conducted to provide empirical evidence for the influence of psychological mass on perceived momentum and expected performance, and the influence of naive beliefs about PM on expected performance.

Studies 1 and 2 examined PM in an athletic context. Study 1 found that sports fans tend to share intuitions about the types of events that precipitate PM. Study 2 then manipulated a variable connoting psychological mass—whether a rivalry exists between two teams—and examined whether mass influenced perceived momentum and performance expectations. Consistent with the first naive premise, a team described as having just defeated a major rival was perceived as having more momentum and being more likely to win the next game than was a team described as having just defeated a team that was not a major rival. Studies 3 and 4 then examined PM in a nonathletic performance context. Providing support for the second naive premise, participants in Study 3 were found to believe that if more momentum accumulates during the completion of a task, more residual momentum should carry over to a subsequent task, and this effect was found to be partially mediated by perceptions that momentum would facilitate performance on a subsequent task. Finally, Study 4 examined participants' assumptions regarding the consequences of interrupting momentum. Consistent with the third naive premise, an individual who had positive momentum while performing a task but was then interrupted was expected to have greater difficulty completing the task than was an individual who was making steady progress before the interruption.

Relationship to Other Theories and Constructs

Comparisons with Vallerand et al.'s (1988) ACM and Taylor and Demick's (1994) MMM. It is important to reiterate the differences between existing models of PM and the model we have described here. The distinction between Taylor and Demick's MMM and PMT is largely a matter of focus. Whereas the MMM is more concerned with the link between actors' PM and subsequent performance and less concerned with describing how PM arises, PMT is more concerned with establishing the relationship between a perceiver's lay intuitions regarding PM and how these intuitions guide subsequent judgments, decisions, and outcome predictions. In contrast, Vallerand et al.'s ACM does focus more on the factors that give rise to PM. However, whereas the ACM emphasizes internal factors such as control perceptions, PMT posits that PM is often construed as an extrapersonal force that operates outside of conscious control. In turn, PMT emphasizes how the combination of mass (i.e., contextual variables) and velocity gives rise to the phenomenological experience of PM. Although the ACM describes how contextual variables play a role in moderating the relationship between PM and performance, contextual variables in that model are not ascribed a prominent role in how perceptions of PM arise in the first place. More generally, both the ACM and MMM were developed to account for behavior in a specific domain—sports and athletic performance. PMT, on the other hand, is a broader theory that not only attempts to account for judgments in performance contexts, but also provides explanations for disparate psychological phenomena such as the spreading of ideas and fluctuating perceptions of attitude objects. As such, PMT focuses more on the experience of the social perceiver than does the ACM or MMM. Finally, and importantly, neither the ACM nor the MMM focuses on the relationship between lay intuitions/naive premises and subsequent judgments.

Affect theory and control process theory. According to affect theory (Hsee & Abelson, 1991), satisfaction is related not only to the actual value of an outcome but also to the velocity at which an outcome changes over

time: Individuals respond more positively to outcomes with more positive velocities and more negatively to outcomes with more negative velocities. Furthermore, the quasi-acceleration (QA) function (Hsee, Salovey, & Abelson, 1994) maintains that satisfaction with a desired outcome also depends on the direction and degree to which the velocity of an outcome value changes from one point in time to another: The more (less) positive the change in velocity, the greater (less) the satisfaction. The QA relation resembles a similar notion in Carver and Scheier's (1990) control process theory. According to this theory, affect depends on the velocity with which one moves toward a goal, and changes in velocity indicate acceleration. If the change is positive, affect moves toward the positive direction and elicits "exhilaration" (p. 24). Conversely, if the change is negative, affect shifts toward the negative direction and elicits "de-exhilaration."

Affect theory and control process theory have important implications for PMT, as changes in velocity undoubtedly provoke the types of emotional responses that characterize the phenomenological experience of PM. Moreover, the QA relation posited by Hsee et al. (1994) can explain why basketball fans will be excited if the team they support is losing in the first half but then gradually catches up. According to our framework, a precipitating event that provokes a sudden change in velocity (QA) can subsequently elicit momentum perceptions. However, both affect theory and control process theory are silent with regard to the role of psychological mass and how mass and velocity determine the amount of perceived momentum. Future work directed toward integrating affect theory, control process theory, and PMT might prove fruitful.

Flow. Flow is a subjective state that is reported when people are completely involved in an activity to the point where they forget about time, fatigue, and everything else but the activity itself (e.g., Csikszentmihalyi, Abuhamdeh, & Nakamura, 2005). According to Csikszentmihalyi et al. (2005), "The defining feature of flow is intense experiential involvement in moment-to-moment activity. Attention is fully invested in the task at hand, and the person functions at his or her fullest capacity" (p. 600). The flow concept is perhaps most useful for explaining why people engage in intrinsically motivated behavior—the reward for engaging in such behavior is derived from the experience of absorption and interest that characterizes flow.

In our view, flow is an important contributor to the phenomenological experience of PM. To the extent that individuals perceive "being on a roll," they are probably completely absorbed by the activity and lose track of time and their own fatigue. However, a critical feature of the PM experience that is not captured by flow is the notion that a force is exerting an effect on one's ability to attain desired outcomes. Moreover, momentum can be experienced whether one is intrinsically or extrinsically motivated. In turn, because flow is typically experienced during the performance of a single task, it is unclear whether it can accumulate and transfer to the performance of a second task (see Study 3). Finally, and perhaps most important, the flow concept is meant to describe the phenomenology of personal experience and thus cannot account for how individuals perceive momentum in the behavior of other individuals (e.g., athletes, politicians, celebrities) or attitude objects (e.g., social and political issues).

Propensity. Roese, Fessel, Summerville, Kruger, and Dilich (2006) recently conducted a study in which participants were exposed to computer animations of traffic situations. Participants in an outcome condition saw a driver error followed by an actual collision, whereas participants in a near no-outcome condition saw the driver error after which the animation was terminated before they could see the actual collision. Participants were then asked to provide likelihood estimates that a serious accident would occur following the driver error (outcome participants were told to discount the actual outcome). The results revealed a propensity effect: Likelihood estimates were higher in the near no-outcome condition than in the outcome condition. According to the authors, "Seeing a stream of events in which there is a clear trajectory, or progression toward a target outcome that has yet to happen . . . might evoke a feeling of knowing that elevates likelihood estimates even higher than when the outcome is actually known" (p. 306). Judgments of propensity appear to invoke the same mental models of intuitive physics as do perceptions of PM. In our view, PM naturally gives rise to perceptions of propensity, and such perceptions may be a factor that contributes to the effects of the progress manipulations employed in the present work.

Limitations and Future Directions

A limitation of the scenario paradigms employed in Studies 3 and 4 is that they attempted to manipulate momentum perceptions by employing terms such as "on a roll," "focused," and "like water from a faucet" to describe an individual's progress rather than manipulate velocity and mass directly. Thus, future work should more precisely manipulate mass and velocity to quantify their effects on PM. This might be accomplished through the use of computer simulations (cf. Roese et al., 2006) that allow one to vary velocity (e.g., a change in the score of a basketball game) and mass (e.g.,

the magnitude of the crowd's response) as they fluctuate within an event sequence.

Another direction for future research would be to examine the phenomenon whereby certain beliefs and attitudes (e.g., regarding stocks, fashions, political issues) can suddenly take hold and receive widespread endorsement within a given population. In such cases, social contagion (e.g., Festinger, Schachter, & Back, 1950) may give rise to the perception that an attitude object has momentum. The notion of social contagion has been used to explain events in which widespread masses of people rapidly and nearly unanimously adopt patterns of behavior (cf. Blumer, 1939). The basic assumption of contagion models is that social behavior is contagious and spreads through peer influence (e.g., Crandall, 1988), and that there is a critical mass or threshold of incidence within a population. If the incidence of the behavior stays below this threshold, the frequency or prevalence of the behavior tends to gravitate toward some relatively low-level state of equilibrium. However, if the incidence reaches a critical threshold, the process of spread will reach a "tipping point" (e.g., Crane, 1991; see also Gladwell, 2000). When this tipping point is surpassed, an epidemic occurs, raising the incidence of the behavior to a higher level state of equilibrium. In our framework, the tipping point would serve as a precipitating event that imbues the attitude object with PM, and the subsequent epidemic of behavior that ensues is directly analogous to the snowballing notion suggested by PMT. An interesting avenue for future research would be to identify the separate (or synergistic) roles of informational social influence and perceived momentum in accounting for rapid, large-scale changes in attitudes and behavior.

The naive beliefs demonstrated in the present studies could also be directly tested through observation of performance. According to the results of Study 4, individuals possess the lay intuition that the resumption of goal pursuit will be more difficult if one's positive momentum is interrupted than if one's steady progress is interrupted. A significant body of empirical evidence has indicated that unfulfilled goals enhance the accessibility of goal-related constructs. Indeed, persistence of accessibility from unfulfilled goals is theorized to underlie ruminative thinking (Martin & Tesser, 1996), unresolved current concerns are thought to underlie the occurrence of concepts related to these concerns in dreams (e.g., Klinger, 1996), and recent research suggests that the activation of goal-related constructs remains until the individual either reaches the goal or disengages from it (Förster, Liberman, & Higgins, 2005; see also Lewin, 1951). With regard to the present work, if PM enhances the feeling that one is closer to achieving a goal, future research might be directed toward examining: (a) whether perceived PM enhances the accessibility of goal-related constructs, and (b) whether the interruption of perceived PM enhances the accessibility of goal-related constructs more than when perceived PM is not interrupted. In turn, it would also be useful to examine the potential mediating role of frustration (e.g., Harris, 1974).

The present research examined lay perceptions of PM—a topic that remains largely unexplored from a social–psychological or judgment and decision-making perspective. In our view, the reported studies represent an initial step toward clarifying what people think PM is and how they believe it affects them, and we hope these studies stimulate further attempts to understand and investigate this fascinating psychological phenomenon.

APPENDIX A

Momentum Scenario

It was 1:00 p.m. . . .

Jane decided to clean her apartment first. She started with her bedroom and began cleaning at a steady pace. She wasn't entirely enthused about cleaning her disaster of an apartment, but she kept chipping away nonetheless. After a while, Jane finished her bedroom and moved on to the living room, working steadily because she still had the kitchen and bathroom to clean after the living room. Jane began to worry that the cleaning process was going to take much longer than she initially expected. *But then suddenly, as if a bolt of lightning struck, Jane got on a cleaning roll. She began to zip through the living room, efficiently vacuuming each piece of furniture and dusting every shelf on the wall. Her roll continued as she scrubbed the bathroom walls, floor, and sink before moving on to the kitchen, where Jane almost effortlessly worked her way through the pile of dirty dishes.* By 4:30 p.m., Jane was finished cleaning the entire apartment.

As soon as the cleaning was finished, Jane decided to start working on her paper. Jane then began to work on her paper.

Steady Scenario

It was 1:00 p.m. on Sunday afternoon and Jane had a lot to do before the day ended. First, her apartment was in need of a good cleaning. It was a complete mess and although Jane had been intending to clean it for quite some time, she had simply never gotten around to it. Second, Jane was assigned to write a 10-page research paper on the life of Emily Dickinson for her English class. Although Jane had done all the necessary research in preparation for composing the paper, she hadn't actually started writing it yet, and she very much wanted to finish writing it by Sunday night. With both tasks lying ahead of her, Jane knew that she had a lot of work to do. But she also knew that she didn't want it to be another one of "those" Sunday nights where she was up until the late hours trying to finish everything she needed to do. So, Jane made a promise to herself—that she

would clean her apartment and finish her paper by 9:00 PM and then spend the rest of the evening relaxing.

Jane decided to clean her apartment first. She started with her bedroom and began cleaning at a steady pace. She wasn't entirely enthused about cleaning her disaster of an apartment, but she kept chipping away nonetheless. After a while, Jane finished her bedroom and moved on to the living room, working steadily because she still had the kitchen and bathroom to clean after the living room. Jane began to worry that the cleaning process was going to take much longer than she initially expected. She moved through the living room, vacuuming each piece of furniture and dusting every shelf on the wall. Next she moved to the bathroom, scrubbing the walls, floor, and sink. When she got to the kitchen, she worked her way through the pile of dirty dishes, never having gotten on the roll that she had hoped to. By 4:30 p.m., Jane was finished cleaning the entire apartment.

As soon as the cleaning was finished, Jane decided to start working on her paper. Jane then began to work on her paper. penalty for not meeting the deadline was a downgrade of ½ letter grade, so although the penalty was not severe, Jane still wanted to complete the paper on time. She began working at a moderate, steady pace. She worked hard to figure out where to start, what to include, and in what order the vast amounts of information should be presented. Although Jane was not working as rapidly as she had liked, she was still working at a steady enough pace to make efficient progress. For two and a half hours, Jane continued to work until she had finished half of the assignment—10 pages were complete.

Then, unexpectedly, the phone rang. Her mother was calling, and Jane knew what happened when her mother called—a quick "hello" always turned into a 45-minute conversation, whether Jane had work to do or not. It was 1:45 p.m. and although she didn't want to, Jane picked up the phone, knowing that the call was an unwanted interruption to the progress she had hoped to make.

APPENDIX B

Momentum Scenario

Jane was assigned to write a 20-page research paper on the life of Emily Dickinson for her introductory English class. She sat down to begin the assignment at 11:15 a.m., and the deadline for its completion was 5:00 p.m. that afternoon. The penalty for not meeting the deadline was a downgrade of ½ letter grade, so although the penalty was not severe, Jane still wanted to complete the paper on time. She began working at a moderate, steady pace. She worked hard to figure out where to start, what to include, and in what order the vast amounts of information should be presented. Although Jane was not working as rapidly as she had liked, she was still working at a steady enough pace to make efficient progress. *But then suddenly, as if a bolt of lightning had struck, everything made sense. All of the information about Dickinson she had been working hard to put together suddenly seemed to just fall into place, and Jane found herself on a roll. Her writing took off as words poured onto the computer screen like water from a faucet. For two and a half hours, Jane cruised along, making excellent progress on her paper until she had finished half of the assignment—10 pages were complete. She felt extremely focused.*

Then, unexpectedly, the phone rang. Her mother was calling, and Jane knew what happened when her mother called—a quick "hello" always turned into a 45-minute conversation, whether Jane had work to do or not. It was 1:45 p.m. and although she didn't want to, Jane picked up the phone, knowing that the call was an unwanted interruption to the progress she had hoped to make.

Steady Scenario

Jane was assigned to write a 20-page research paper on the life of Emily Dickinson for her introductory English class. She sat down to begin the assignment at 11:15 a.m., and the deadline for its completion was 5:00 p.m. that afternoon. The

NOTES

1. Buoyed by a rise in a CNN/USA Today/Gallup poll 2 days before the New Hampshire primary in January 2004, Senator Joseph Lieberman told CNN's Wolf Blitzer that his campaign was picking up, as he put it, "Joementum" (CNN, 2004).

2. It may be difficult for some to envision "getting on a roll" in the context of cleaning an apartment because, unlike playing a basketball game or writing a paper, cleaning involves a routine set of tasks where one might expect little variability in rate of progress. However, one may perceive a change in rate of progress independent of any objective change. Thus, just as individuals have been shown to experience flow—the process of optimal experience—on mundane tasks such as typing, filing, and sorting (Csikszentmihalyi & LeFevre, 1989), individuals may perceive changes in progress rate on mundane tasks such as apartment cleaning as giving rise to momentum perceptions.

3. Some might object to our attempt to manipulate what we have described as momentum versus steady progress because in the physical domain there is no difference between these two states of being: Momentum refers to mass in motion, which is true in both conditions. However, what we have attempted to manipulate is the perceived magnitude of psychological momentum (PM). Thus, "steady progress" is not meant to represent the absence of PM but rather the relative difference between more and less positive PM.

REFERENCES

Anderson, C. A., Krull, D. S., & Weiner, B. (1996). Explanations: Processes and consequences. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic mechanisms* (pp. 271-296). New York: Guilford.

Anderson, C. A., & Lindsay, C. A. (1998). The development, perseverance, and change of naïve theories. *Social Cognition, 16,* 8-30.

Blumer, H. (1939). Collective behavior. In R. E. Park (Ed.), *An outline of the principles of sociology.* New York: Barnes & Noble.

Carver, C. S., & Scheier, M. F. (1990). Origins and functions of positive and negative affect: A control-process view. *Psychological Review, 97,* 19-35.

Chiu, C., Hong, Y., & Dweck, C. S. (1997). Lay dispositionalism and implicit theories of personality. *Journal of Personality and Social Psychology, 73,* 19-30.

CNN. (2004, January 26). Lieberman says he's got the "Joementum." Retrieved July 1, 2006, from http://www.cnn.com/2004/ALLPOLITICS/01/25/elec04.prez.lieberman/

Crandall, C. S. (1988). Social contagion of binge eating. *Journal of Personality and Social Psychology, 55,* 588-598.

Crane, J. (1991). The epidemic theory of ghettos and neighborhood effects on dropping out and teenage childbearing. *American Journal of Sociology, 96,* 1226-1229.
Csikszentmihalyi, M., Abuhamdeh, S., & Nakamura, J. (2005). Flow. In A. Elliot & C. Dweck (Eds.), *Handbook of competence and motivation* (pp. 598-608). New York: Guilford.
Csikszentmihalyi, M., & LeFevre, J. (1989). Optimal experience in work and leisure. *Journal of Personality and Social Psychology, 56,* 815-822.
Epstein, S. (1990). Cognitive-experiential self-theory. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 165-192). New York: Guilford.
Festinger, L., Schachter, S., & Back, K. W. (1950). *Social pressures in informal groups.* New York: Harper.
Förster, J., Liberman, N., & Higgins, E. T. (2005). Accessibility from active and fulfilled goals. *Journal of Experimental Social Psychology, 41,* 220-239.
Freyd, J. J., & Finke, R. A. (1984). Representational momentum. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 10,* 126-132.
Gilovich, T., Vallone, R., & Tversky, A. (1985). The hot hand in basketball: On the misperception of random sequences. *Cognitive Psychology, 17,* 295-314.
Gladwell, M. (2000). *The tipping point.* New York: Back Bay Books.
Harris, M. B. (1974). Mediators between frustration and aggression in a field experiment. *Journal of Experimental Social Psychology, 10,* 561-571.
Heider, F. (1958). The psychology of interpersonal relations. New York: Wiley.
Hsee, C. K., & Abelson, R. P. (1991). Velocity relation: Satisfaction as the first derivative of outcome over time. *Journal of Personality and Social Psychology, 60,* 341-347.
Hsee, C. K., Salovey, P., & Abelson, R. P. (1994). The quasi-acceleration relation: Satisfaction as a function of the change of velocity of outcome over time. *Journal of Experimental Social Psychology, 30,* 96-111.
Hubbard, T. L. (1995). Environmental invariants in the representation of motion: Implied dynamics and representational momentum, gravity, friction, and centripetal force. *Psychonomic Bulletin and Review, 2,* 322-338.
Hubbard, T. L. (2004). The perception of causality: Insights from Michotte's launching effect, naïve impetus theory, and representational momentum. In A. M. Oliveira, M. P. Teixera, G .F. Borges, & M. J. Ferro (Eds.), *Fechner Day 2004* (pp. 116-121). Coimbra, Portugal: International Society for Psychophysics.
Iso-Ahola, S. E., & Mobily, K. (1980). Psychological momentum: A phenomenon and an empirical (unobtrusive) validation of its influence in a competitive sports tournament. *Psychological Reports, 46,* 391-401.
Jarvis, W. B. G. (2004). MediaLab [Computer software]. Columbus, OH: Empirisoft.
Kenny, D. A., Kashy, D. A., & Bolger, N. (1998). Data analysis in social psychology. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (Vol. 1, 4th ed., pp. 233-265). New York: McGraw-Hill.
Klinger, E. (1996). Emotional influences on cognitive processing, with implications for theories of both. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 197-218). New York: Guilford.
Kozhevnikov, M., & Hegarty, M. (2001). Impetus beliefs as default heuristics: Dissociation between explicit and implicit knowledge about motion. *Psychonomic Bulletin & Review, 8,* 439-453.
Kruglanski, A. W. (1989). *Lay epistemics and human knowledge: Cognitive and motivational bases.* New York: Plenum.
Kunda, Z. (1987). Motivated inference: Self-serving generation and evaluation of causal theories. *Journal of Personality and Social Psychology, 53,* 636-647.
Lewin, K. (1951). *Field theory in social psychology.* New York: Harper.
Martin, L. L., & Tesser, A. (1996). Some ruminative thoughts. In R. S. Wyer Jr. (Ed.), *Advances in social cognition* (Vol. 9, pp. 1-47). Mahwah, NJ: Lawrence Erlbaum.
McCloskey, M. (1983). Naïve theories of motion. In D. Gentner & A. Stevens (Eds.), *Mental models* (pp. 229-324). Hillsdale, NJ: Lawrence Erlbaum.
Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review, 84,* 231-259.
Perreault, S., Vallerand, R. J., Montgomery, D., & Provencher, P. (1998). Coming from behind: On the effect of psychological momentum on sport performance. *Journal of Sport and Exercise Psychology, 20,* 421-436.
Ransom, K., & Weinberg, R. S. (1985). The effect of situation criticality on performance of elite male and female tennis players. *Journal of Sport Behavior, 8,* 44-49.
Richardson, P. A., Adler, W., & Hankes, D. (1988). Game, set, match: Psychological momentum in tennis. *The Sport Psychologist, 2,* 69-76.
Roese, N. J., Fessel, F., Summerville, A., Kruger, J., & Dilich, M. A. (2006). The propensity effect: When foresight trumps hindsight. *Psychological Science, 17,* 305-310.
Ross, L., Lepper, M. R., & Hubbard, M. (1975). Perseverance in self-perception: Biased attributional processes in the debriefing paradigm. *Journal of Personality and Social Psychology, 32,* 880-892.
Silva, J. M., Hardy, C. J., & Crace, R. K. (1988). Analysis of psychological momentum in intercollegiate tennis. *Journal of Sport and Exercise Psychology, 10,* 346-354.
Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhart (Ed.), *Sociological methodology* (pp. 290-312). Washington, DC: American Sociological Association.
Taylor, J., & Demick, A. (1994). A multidimensional model of momentum in sports. *Journal of Applied Sports Psychology, 6,* 51-70.
Thornton, I. M., & Hubbard, T. L. (Eds.). (2002). *Representational momentum: New findings, new directions.* New York: Psychology Press.
Vallerand, R. J., Colavecchio, P. G., & Pelletier, L. G. (1988). Psychological momentum and performance inferences: A preliminary test of the antecedents-consequences psychological momentum model. *Journal of Sport and Exercise Psychology, 10,* 92-108.
Wegener, D. T., & Petty, R. E. (1997). The flexible correction model: The role of naïve theories in bias correction. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 141-208). New York: Academic Press.

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