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# Psychological momentum: The phenomenology of goal pursuit

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**Abstract**

Psychological momentum (PM) is thought to be a force that influences judgment, emotion, and performance. Based on a review of the extant literature, we elucidate two distinct approaches that researchers have adopted in their study of PM: the *input-centered approach* and the *output-centered approach*. Consistent with the input-centered approach, we conceptualize PM as a process whereby temporal and contextual PM-like stimuli (i.e., perceptual velocity, perceptual mass, perceptual historicity, and perceptually interconnected timescales)—initially perceived as an impetus—are extrapolated to imagined future outcomes through mental simulation. In turn, and consistent with the output-centered approach, we posit that mental simulation elicits experiential (e.g., perceptual, cognitive, emotional) and behavioral states that govern goal pursuit, and that the pursuit of goals further influences perceptions of self, environment, and action quality. In all, we suggest that PM is *interdependently* linked to perceptions and behaviors in the sense that PM both *influences* and is *influenced by* changes in self-perceptions, environmental perceptions, and behavior, and we conclude by linking the PM construct to recent work on prospection.

## 1 | INTRODUCTION

A common lay perception held by many is that a psychological force called "momentum" can powerfully influence performance (e.g., Ayton & Fischer, 2004; Gilovich, Vallone, & Tversky, 1985; Oskarsson, Van Boven, McClelland, & Hastie, 2009). Recently, Gernigon, Briki, and Eykens (2010) described psychological momentum (PM) as "… a positive or negative dynamic of cognitive, affective, motivational, physiological, and behavioral responses (and their couplings) to the perception of movement toward or away from either an appetitive or aversive outcome" (p. 397). Stated differently, the term "PM" is meant to refer to cognitive, emotional, physiological, and behavioral responses

  
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to perceptions of progress moving either toward or away from a goal state. In essence, *PM is the phenomenological experience of goal pursuit*. Structurally, it bridges the gap between the perception of an impetus (i.e., input) and behavioral responses to that impetus (i.e., output) during the process of goal pursuit (e.g., Hubbard, 2017a, 2017b). The PM experience begins when a precipitating event (or a series of events)—perceived as an impetus—evokes a mental simulation of a future outcome in which an attitude object (e.g., a person, a group of persons, an abstraction such as a social movement) appears to be on a trajectory toward a specific end-state (e.g., Adler, 1981; Hubbard, 2015; Markman & Guenther, 2007). In turn, the mental simulation cascades into psychological, physiological, and behavioral responses that further contribute to and escalate the PM experience.

In the present article, we elucidate factors that give rise to the experiential state of PM and link these to a broader framework that characterizes PM as a mental projection of selves (i.e., oneself and others) toward some future state (see also Oyserman & James, 2009). Moreover, we conceptualize PM as a phenomenological construct that can influence goal pursuit and affect the change rate of psychological, social, and behavioral experiences. Based on our review of the literature, we identify two distinct approaches that researchers have adopted in their study of the PM construct: the *input-centered approach* and the *output-centered approach*. The input-centered approach refers to a set of theoretical models and empirical investigations that has attempted to examine PM-like stimuli as *the* object of study in an attempt to further our understanding of PM. As we describe in the next section, this approach has revealed how the experience of PM depends upon readily identifiable temporal and contextual stimuli (e.g., Gernigon et al., 2010; Hubbard, 2015, 2017a, 2017b; Markman & Guenther, 2007; Pettit, Sivanathan, Gladstone, & Marr, 2013; Vallerand, Colavecchio, & Pelletier, 1988). The output-centered approach, on the other hand, refers to recent work that construes PM as part of a more global process of goal achievement (Briki, 2017; Iso-Ahola & Dotson, 2014, 2016, 2017). As opposed to focusing on PM *perceptions* as the unit of analysis, this approach describes how PM operates as a "key to continued success" (Iso-Ahola & Dotson, 2016, p. 1) by *mediating* the relationship between performance at Time 1 and performance at Time 2.

## 2 | THE INPUT-CENTERED APPROACH: INVESTIGATING PM-LIKE STIMULI

Although earlier models of PM described it as a serial (Adler, 1981; Taylor & Demick, 1994; Vallerand et al., 1988), self-regulated (Cornelius, Silva, Conroy, & Peterson, 1997), and transient phenomenon (Adler, 1981; Gernigon et al., 2010), the bulk of the literature suggests that PM involves temporal and contextual PM-like stimuli, such as perceptual velocity, perceptual mass, perceptual historicity, and perceptually interconnected timescales.

### 2.1 | Perceptual velocity

It has been argued that the most important characteristic of the perceptual system is its sensitivity to contrast and change because the human brain requires comparison systems to make sense of the world. The theory of direct perception (i.e., "ecological" theory; Gibson, 1979) emphasizes the critical link between movement—characterized by changes in optic flow—and visual perception. Gestalt theory (e.g., Humphrey, 1924), moreover, hypothesizes that the recognition of visual objects is drawn from a set of contrastive, unrelated elements. In a similar vein, prospect theory (e.g., Kahneman & Tversky, 1984) assumes that individuals are more likely to perceive changes in relative rather than absolute levels of stimulation.

Of particular relevance for the notion of *perceptual velocity* are models of cybernetic control (e.g., Carver & Scheier, 1998; Powers, 1973) that specify negative feedback loops which include a current value (*input:* perception of the current situation), a reference value (goal set), a comparison, and a corrective function (*output:* affective or behavioral adjustment). According to these models, detections of discrepancies between a reference value (such as the *expected* velocity of moving toward a goal) and perceptions of the current situation (such as the *perceived* velocity of moving toward a goal) elicit emotions that signal the need to reduce these discrepancies. Focusing on control processes, Cornelius et al. (1997) suggested that individuals generate a range of expectations about their capacities to reach desired goals on the basis of their prior performances, referred to as *mean zone performance*. When perceptions of current performance exceed (or are exceeded by) mean zone performance, positive (or negative) PM is experienced. Consistent with the concept of homeostatic balance, Cornelius et al. (1997) also posited that motivational systems work to down-regulate PM intensity. Thus, positive PM elicits *positive inhibition*, characterized by a decrease in effort (i.e., coasting; see Carver, 2003) following successful performance, whereas negative PM elicits *negative facilitation*, characterized by an increase in effort in response to negative performance feedback (Silva, Hardy, & Crace, 1988; see also Schwarz & Clore, 1983).

PM models posit that events follow trajectories toward some (desired or undesired) end-state and that the perceived speed of movement toward reaching those end-states is experienced as *perceptual velocity* (e.g., Adler, 1981; Gernigon et al., 2010; Hubbard, 2017a; Markman & Guenther, 2007; Vallerand et al., 1988). Stated differently, perceptual velocity refers to a rate of change (or reinforcement), and it is assumed that "… a faster rate of change is associated with a larger momentum-like effect" (Hubbard, 2017b, p. 57). Multiple studies have in fact demonstrated that perceptual velocity—induced by exposure to hypothetical performance scenarios in which successful and unsuccessful outcomes repeat over time—directly influence PM perceptions (e.g., Markman & Guenther, 2007; Pettit, Sivanathan, Gladstone, & Carson Marr, 2013; Vallerand et al., 1988).

## 2.2 | Perceptual mass

In the seventeenth century, René Descartes described *physical momentum* as a quantity of movement that results from a combination of weight and velocity. Later, Isaac Newton clarified the distinction between weight (i.e., force) and mass (i.e., quantity of matter) and re-conceptualized physical momentum as the multiplicative combination of mass and velocity. Drawing an analogy to Newtonian physics, Markman and Guenther (2007) proposed a velocity ($v$) × mass ($m$) formulation ($v \times m$) that was an attempt to account for the experience of PM (see also Hubbard, 2015). According to $v \times m$, successes and failures shape and reinforce movement toward or away from desired end-states (i.e., velocity), and, in turn, perceptual velocity combines multiplicatively with perceptual *mass* to give rise to the intensity and duration of PM experiences.

Consistent with the work of Nevin and colleagues on behavioral momentum (e.g., Nevin & Grace, 2000; Nevin, Mandell, & Atak, 1983), perceptual mass in the $v \times m$ formulation refers to *resistance to change*. To illustrate, imagine that three individuals are hiking in the mountains and come across a large boulder perched at the edge of a cliff. The hikers decide that it would be an interesting challenge to push the boulder off the cliff and watch it roll down the mountain. Clearly, the greater the mass of the boulder, the harder it is going to be to push off the cliff. In other words, *a boulder of greater mass is going to be more resistant to change than will be a boulder of lesser mass*. Critically, however, if the hikers do manage to push it off the cliff (and recognizing that the slope of the cliff will determine its velocity), the boulder is going to gather more momentum as it rolls to the extent that it is of greater mass. Psychologically, then, to the extent that individuals perceive that they are succeeding in spite of inhibiting factors such as obstacles, stumbling blocks, or difficult circumstances—all of which convey greater mass—they will experience greater PM intensity as well.

In a study designed to examine the influence of perceptual mass on PM, Markman and Guenther (2007, Study 2) instructed participants to read either a scenario about a team that had just defeated a major rival (i.e., that had overcome a relatively larger obstacle) or a scenario about a team that had just defeated a non-rival (i.e., that had overcome a relatively smaller obstacle). Even though the description and outcome of the game in both scenarios were the same, participants in the rival condition perceived that the winning team had more PM going into the next game and was therefore more likely to win than did participants in the non-rival condition. Similarly, Miller and Weinberg (1991) showed that PM is more intensely perceived in critical situations (e.g., close to the end of a competition) than in non-critical situations (e.g., far from the end of a competition). In a different type of investigation, Briki, Markman, Coudevylle, Sinnapah, and Hue (2015) recruited participants (i.e., supporters) to be in a study that took place in a lecture hall that was kept at either a comfortable temperature (i.e., low perceptual mass) or an uncomfortably high temperature (i.e., high perceptual mass) and compared the intensity of PM perceptions participants reported while viewing a scenario in which a cyclist came from behind in a race (participants were told that the cyclists in the scenario had performed the race under the same environmental conditions that presently existed in the lecture hall). In line with Adler and Adler's (1978) supposition that "… a seemingly innocuous element like weather may be decisive to momentum" (p. 169), Briki et al. (2015) found that participants' PM perceptions were higher in the uncomfortable climate condition than in the comfortable climate condition. According to the authors, this effect is explained by causal augmenting (i.e., succeeding in spite of an obstacle; Kelley, 1972): Participants in the uncomfortable climate condition experienced higher levels of PM because they perceived that their supported athlete was performing well *in spite* of the discomfort he was feeling during the race.

### 2.2.1 | Inertial properties of PM

The $v \times m$ formulation also assumes that individuals possess lay theories (e.g., Plaks, Levy, & Dweck, 2009) about the inertial properties of PM. To examine this idea, Markman and Guenther (2007, Study 4) asked participants to read a scenario in which the protagonist was described as making either steady progress or momentous progress (i.e., starting off slow but then getting on a roll) on a class writing assignment that had a strict deadline. When the protagonist was described as having been interrupted unexpectedly, participants who had read the momentous progress version of the scenario subsequently indicated that they believed it would be more difficult for the protagonist to complete the paper before the deadline than did participants who had read the steady progress version of the scenario. These results are consistent with the notion that people possess a lay theory that PM is difficult to regain once it has been interrupted and overlap nicely with findings in the judgment and decision-making literature that when individuals feel that an opportunity to take a positive action has passed, they become less likely over time to take that action (e.g., to return an overdue library book; *inaction inertia*, Tykocinski, Pittman, & Tuttle, 1995).

Markman and Guenther's (2007) proposition that PM is often perceived as developing outside of one's control also received empirical support in a study conducted by Smisson, Burke, Joyner, Munkasy, and Blom (2007) who found that levels of perceived external control positively predicted reported levels of PM intensity. In all, the $v \times m$ formulation posits that PM (1) is often perceived as an extra-personal force that builds in intensity over time, (2) carries over to subsequent tasks if uninterrupted, and (3) is context-dependent. This conceptualization extends previous models by imputing the role that individuals' lay theories about PM (cf. Freyd & Finke, 1984) play in shaping subsequent judgments and perceptions.

## 2.3 | Perceptual historicity

Control systems also specify how reference points influence emotional reactions. For example, Hsee, Salovey, and Abelson (1994) demonstrated how a change in velocity toward or away from a goal (i.e., "quasi-acceleration") impacts current feelings and self-evaluations (e.g., perceived positive changes in velocity elicit positive affect). Thus, when Hsee et al. (1994) asked participants to observe two distinct performance outcome curves that unfolded over time from the same start-point to the same end-point, participants experienced more positive affect as quasi-acceleration increased. In a similar vein, Heyman, Mellers, Tishcenko, and Schwartz (2004) demonstrated how satisfaction with gambling outcomes varies as a function of background reference points. In their study, participants who experienced "ascending–descending" trajectories felt worse about $1 wins and $1 losses than did those who experienced "descending–ascending" trajectories (see also Maglio & Polman, 2016; Markman, Elizaga, Ratcliff, & McMullen, 2007). In sum, Hsee et al. (1994) and Heyman et al. (2004) found that participants reported different emotional experiences in response to the trajectory of outcome feedback they received.

In a recent and compelling example of dynamic, history-dependent decision making, Pettit et al. (2013) demonstrated how inter-temporal changes in rank influence status judgments. Their findings indicated that when final rank was held constant, participants judged people, products, and institutions as being higher in status when they had arrived at this position by ascending rather than descending in the rank hierarchy. In turn, status judgments affected subsequent pricing recommendations, reported willingness to pay for products, and amount of perceived influence over others. Notably, and consistent with a mental simulation account of how PM affects subsequent perceptions, the reported impact of rank history on status judgments was mediated by participants' expectations regarding the future status of the target of judgment. In a similar vein, Maglio and Polman (2016) found across a variety of contexts (e.g., weather, sports, wine) that upward changes to event-probabilities (e.g., increasing from 20% to 30%) caused events to feel less remote and more probable in the future than did downward changes (e.g., decreasing from 40% to 30%), despite the fact that the revised event-probabilities wound up being objectively the same (i.e., 30%). In general, then, it appears that one of the main determinants of PM at any given moment in time is the recent history of inter-temporal changes in evaluative information, where those changes can be in the form of rankings (e.g., Reh, Tröster, & van Quaquebeke, 2018; Zell & Alicke, 2010), position orders (e.g., Markman & Guenther, 2007), and outcome feedback (e.g., Aronson & Linder, 1965; Markman, Elizaga, Ratcliff, & McMullen, 2007; Zell & Alicke, 2009).

Recognizing that evaluative judgments such as rank and perceptions of goal progress fluctuate across time and are rarely static, recent work examining history effects in PM has employed a dynamical systems approach (e.g., Briki, Den Hartigh, Markman, & Gernigon, 2014; Briki, Den Hartigh, Markman, Micallef, & Gernigon, 2013; Gernigon et al., 2010). Generically, a dynamical system refers to "… systems of elements that change over time" (Thelen & Smith, 2006, p. 258). A dynamical system displays recursive causality, meaning that the same variable can be both a cause and a consequence at different moments in time. Applying this nonlinear perspective, recent work has examined PM dynamics by experimentally manipulating positive and negative momentum sequences while participants empathize with an athlete who is (ostensibly) competing in an important contest (Briki et al., 2014; Gernigon et al., 2010). The results of these studies demonstrate an early shift of PM in response to ascending and descending variations of the control parameter, reflecting a dynamical pattern called "negative hysteresis" (Kelso, 1995; see Figure 1a). Moreover, the observed patterns are asymmetrical in shape: PM tends to change earlier during positive momentum sequences than during negative momentum sequences, suggesting, perhaps, that positive PM is triggered more easily than is negative PM.

Notably, however, participants in the aforementioned studies merely *imagined* being involved in a competition and/or played the role of observers and were thus not directly involved. Briki et al. (2013) addressed this shortcoming by examining PM dynamics among actual cyclists competing against each other on home trainers. Each cyclist was represented on a projection screen by an avatar, and the movement of each avatar provided the cyclists with (bogus) performance feedback. Feedback was manipulated in such a way that one cyclist experienced a positive momentum sequence while the other cyclist experienced a negative momentum sequence. Participants periodically responded to

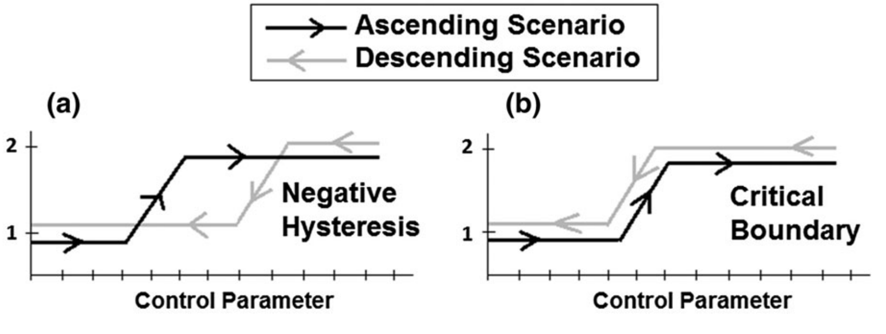


**FIGURE 1** Schematic representation of the dynamical patterns of (a) negative hysteresis and (b) critical boundary. The ascending scenario corresponds to a scenario in which the control parameter changes in an ascending way (i.e., from low values to high values), whereas the descending scenario corresponds to a scenario in which the control parameter varies in a descending way (i.e., from high values to low values). On the *y*-axis, the numbers 1 and 2 represent possible states of a system

questions about their PM perceptions by pressing keys located on the handlebars of each bicycle. Like the studies just described, the reported PM perceptions exhibited a dynamical pattern that was asymmetrical in shape, but in this case, reported PM perceptions during the negative momentum sequence exhibited a relatively abrupt decrease whereas reported PM perceptions during the positive momentum sequence exhibited a relatively delayed increase. In addition, the resulting dynamical pattern reflected a "critical boundary" (Kelso, 1995; see Figure 1b) in that the shift in PM perceptions in both momentum sequences remained fixed despite changes in the direction of the variation of the control parameter.

Clearly, the asymmetrical pattern reported by Briki et al. (2013) did not correspond to those patterns found by Briki et al. (2014) and Gernigon et al. (2010), eliciting speculation that the virtual situations employed by the latter may have induced a supporter-oriented (i.e., observer-related) PM experience rather than an athlete-oriented (i.e., actor-related) PM experience. Consistent with Deutsch's (1960) concept of the *pathetic fallacy*, defined as observers' tendency to assume that actors are experiencing more intense feelings than the actors self-report, Briki et al. (2014) reasoned that the PM perceptions of supporters might be more subject to self-serving biases (e.g., Campbell & Sedikides, 1999; Pettit et al., 2013) than would the PM perceptions of athletes themselves. Consistent with this speculation, when Briki et al. (2015) exposed supporters to either positive or negative momentum sequences, reported PM levels were found to be higher in the positive momentum condition than in the negative momentum condition.

## 2.4 | Perceptually interconnected timescales

Another type of stimuli that we propose can affect the experience of PM is *perceptually interconnected timescales*. Indeed, this idea corresponds to the view that PM is embedded in a larger complex temporal process that is shaped over time (e.g., Kelso, 1995; Nowak & Vallacher, 1998). Den Hartigh, Van Geert, Van Yperen, Cox, and Gernigon (2016) sought to examine the sensitivity of PM to interconnected timescales, and to do so, they asked athletes to take part in a rowing-ergometer tournament comprising three races. The races were manipulated to create *long-term* PM (induced by the manipulation of a series of two successful [long-term positive PM] or unsuccessful [long-term negative PM] races) and *short-term* PM (induced by the manipulation of ascending [short-term positive PM] or descending [short-term negative PM] time gaps within a race). According to the results, athletes who had developed long-term positive PM after two successful races were less sensitive to experiencing a negative PM manipulation in the third race (i.e., their PM and self-efficacy perceptions decreased less rapidly and their exertion of effort increased) compared to athletes who had developed long-term negative PM after two unsuccessful races. More generally, PM sensitivity to interconnected timescales is compatible with the view that goals are not single-steps that form a long sequential chain but rather are hierarchically arranged, complex structures (e.g., Carver & Scheier, 1998, 2002), reflecting a functional cognitive organization that may extend along a time-based scale (i.e., from long-term to short-term goals and vice versa; Locke & Latham, 1990). Thus, perceiving movement toward short-term goals might contribute to the development of long-term PM, while long-term PM might elicit multiple experiences of short-term PM.

In all, the literature suggests that the experience of PM emerges in response to perceived (psychological) changes taking place within salient temporal and contextual frameworks. PM is experienced as a trajectory bookended by a starting point and an ending point and is contextualized within a meaningful history of events (e.g., Adler, 1981; Adler & Adler, 1978; Gernigon et al., 2010; Hubbard, 2017a; Markman & Guenther, 2007). Moreover, the extant work emphasizes the view that experienced trajectories conveying temporal and dynamic information have the potential for eliciting the experiential state of PM (e.g., Briki, 2017; Hubbard, 2017b; Markman & Guenther, 2007). Indeed, Hubbard (e.g., Hubbard, 2015, 2017a, 2017b) argues that momentum-like effects rely on *dynamic (temporal) mental representations*; that is, a PM impetus (as experienced through perceptual velocity) represents the product of the effect of *momentum-like stimuli*, such as directionality (e.g., a given outcome), coherence (e.g., similar events), and continuity (e.g., repeated actions over time). In turn, and in line with the $v \times m$ formulation (Markman & Guenther, 2007), perceptual mass is expected to moderate the strength of the PM impetus (e.g., Hubbard, 2015).

# 3 | THE OUTPUT-CENTERED APPROACH: SITUATING THE PM EXPERIENCE WITHIN THE BROADER ACHIEVEMENT PROCESS

The PM experience is characterized by positive or negative shifts along affective, cognitive, perceptive, physiological, and behavioral dimensions (Gernigon et al., 2010; Taylor & Demick, 1994; Vallerand et al., 1988) and is assumed to be catalyzed by an *impetus* that evokes the mental simulation of movement trajectories either toward or away from a desired goal.

## 3.1 | From PM impetus to PM experience

In the representational momentum literature, the act of setting an object into motion (i.e., an event cue) is believed to impart a force or "impetus" to the object, and the strength of this impetus is thought to dissipate with subsequent target motion (i.e., "naïve impetus theory"; Hubbard, Blessum, & Ruppel, 2001; Kozhevnikov & Hegarty, 2001; McCloskey & Kohl, 1983). In turn, the impetus establishes in the perceiver's mind what judgment and decision-making researchers have termed a *propensity* (Fessell & Roese, 2011; Kahneman & Varey, 1990; Roese, Fessel, Summerville, Kruger, & Dilich, 2006). An illustrative example would be how a spectator at a baseball game "knows" that a ball hit with enough force and trajectory "is going to be a home run" long before it clears the outfield wall and leaves the field of play. Directly linking the notion of propensities to the concept of momentum, Kahneman and Varey (1990) noted that

> *Event cues reveal the causal system in action. They indicate advance toward the focal outcome, or regression away from it. They suggest changes in the momentary state of the causal system—changes that may be real or illusory, as when a player is seen to have a "hot hand" … (p. 1105).*

Figure 2 depicts the prototypical PM action sequence. In Step 1, a precipitating event or series of events (i.e., *event cues* such as a batted ball, the recognition that two vehicles are approaching one another, task feedback, etc.) elicit an initial PM impetus. In Step 2, the impetus *catalyzes* the PM experience by eliciting mentally simulated actions or behaviors that have a propensity to result in either desired or undesired outcomes (e.g., Kappes & Morewedge, 2016; Markman, Klein, & Suhr, 2009). The experiential (i.e., emotional, physical) states that arise from these simulated outcomes characterize the phenomenology of PM (see also Roese & Epstude, 2017; Oettingen, Pak, & Schnetter, 2001; Strack, Schwarz, & Gschneidinger, 1985). Finally, in Step 3, the PM experience cascades into multiple psychological, physiological, and behavioral responses that increase in quantity and intensity until the momentum sequence is interrupted. Hubbard (2017a, 2017b) employs the term "extrapolation" to describe the catalyzing effect of the PM impetus and posits that extrapolation can structurally take the form of either a *non-changing continuation* (i.e., a learned skill or behavior that continues to appear despite the absence of reinforcement) or a *change* (i.e., an imagined ascending or descending evolution).

## 3.2 | Interdependence of PM

It has been argued that PM is a critical factor in the achievement process (e.g., Iso-Ahola & Dotson, 2016). To illustrate, imagine that a fitness instructor exposes a novice exerciser to trajectory feedback that indicates progress on physical measures (e.g., weight, body composition, strength, cardiovascular capacity) over a 10-week intensive

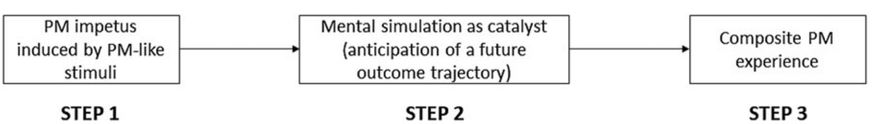


**FIGURE 2** Schematic representation of the catalyzation of a PM impetus to a PM experience via mental simulation

exercise program. It is likely that such dynamical feedback will elicit positive psychological responses (e.g., heightened self-confidence, enhanced self-image, greater persistence) that encourage the exerciser to pour additional resources into self-development (e.g., participating in exercise-related workshops, embracing a healthier lifestyle). In this example, achievement is accounted for by PM in what we refer to as the "output-centered approach," and an important assumption of this approach is that the PM experience is *interdependent* in nature.

### 3.2.1 | Cognitive aspects of interdependence

Cognitive aspects of interdependence of PM are illustrated by a qualitative study that revealed how the accessibility of failure expectations precipitated the experience of negative PM, which in turn served to reinforce failure expectations and further intensified the negative PM experience (Briki, Den Hartigh, Hauw, & Gernigon, 2012).

### 3.2.2 | Motivational and behavioral aspects of interdependence

Motivational and behavioral aspects are exemplified through the related phenomena of *shopping momentum* and *auction fever*. Shopping momentum reflects how an initial purchase is likely to be followed by a second, unrelated purchase because of the manifestation of a psychological impulse (Dhar, Huber, & Khan, 2007). According to Dhar et al. (2007), such an impulse—subsequent to the first purchase—reflects a shift from browsing (i.e., weighing the pros and cons of pursuing a specific action) to deciding that increases the likelihood of making a second purchase. Dhar et al.'s account relies heavily upon Gollwitzer's (1990) work on mind-sets, in that when one is in a "deliberative mind-set," one is thought to be weighing the pros and cons of action commitment (i.e., browsing), whereas when one is in an "implementation mind-set," one is thought to be focusing on the temporal organization of goal-oriented actions (i.e., deciding). Auction fever has been described as frantic and emotionally charged behavior that leads people to overbid on items (Ku, Malhotra, & Murnighan, 2005). Loewenstein and Issacharoff (1994) advanced an explanation for auction fever that involves seriation: More successful bidders perceive the value of given items to be higher, which thereby increases bidders' willingness to buy those items.

### 3.2.3 | Self-change-related aspects of interdependence

The notion of PM interdependence also reflects aspects of self-change: PM can influence self-perceptions that, in turn, can shape projected life trajectories (i.e., possible selves; Oyserman & James, 2009). Moreover, self-perceptions are particularly likely to change to the extent that the domain in question (e.g., achievement, physical attractiveness, creativity) is a *contingency of self-worth*. Contingencies of self-worth are "… a domain or category of outcomes on which a person has staked his or her self-esteem, so that a person's view of his or her value or worth depends on perceived successes or failures or adherence to self-standards in that domain" (Crocker & Wolfe, 2001, p. 594). Contingencies of self-worth are inherently malleable because they are sensitive to repeated life experiences. Thus, a series of successful outcomes in a valued domain would lead to an increase in the perceived importance of that domain, whereas a series of unsuccessful outcomes in a valued domain would lead to a decrease in the perceived importance of that domain (Crocker, Major, & Steele, 1998). This supposition is consistent with the example of the novice exerciser who desires more beneficial self-change after experiencing PM within an exercise setting (see also Shen & Hsee, 2017).

Numerous examples of simulation-derived perceptions of self-change exist in the literature. For instance, a study conducted by Markman et al. (2007) found that participants who received feedback at six different intervals that their performance on a test of verbal intelligence (i.e., anagrams) were improving subsequently rated themselves as higher in verbal intelligence than did participants who received feedback indicating that they were performing worse (see also Butler, 2000). Furthermore, within the context of *status momentum*, Pettit et al. (2013) found that participants who were exposed to an ascending rank scenario subsequently developed enhanced perceptions of feelings of acceptance from others than did those who were exposed to a descending rank scenario, even though the final rank itself was held constant. Similarly, Roberts and Friend (1998) demonstrated empirically that women who reported having higher *career momentum* (a) viewed their work as more important to themselves and (b) reported higher levels of self-acceptance, independence, effective functioning, and perceived physical health than did women who reported experiencing decreasing career momentum or no momentum at all.

These examples illustrate how the PM experience embeds individuals within powerful spirals that follow from extrapolations of future self-change. Moreover, interdependence can reflect social aspects to the extent that extrapolations are influenced by the attitudes and behaviors of others. For instance, within the context of a phenomenon he termed *media momentum*, Shen (2008) observed that candidacy survival duration was strongly correlated with media coverage frequency, fund-raising performance, and number of votes received. Reflecting interdependence, Shen also found that media coverage frequency positively predicted candidacy survival duration, and that the amount of prior campaign news coverage positively predicted candidacy survival duration, a relationship that was mediated by media coverage frequency. In a similar vein, Kenney and Rice's (1994) study of *political momentum* revealed that one of the significant factors that encouraged people to vote for a candidate was the attractiveness of the candidate who was perceived as having momentum. In our view, *internal* extrapolations of self-change result from mental simulation, whereas PM perceptions that derive from *external* events (e.g., media coverage frequency) are influenced by the availability heuristic (Tversky & Kahneman, 1973; the ease with which particular events can be brought to mind) and behavioral contagion (Burt, 1987; the propensity for certain behaviors exhibited by one or more actors to be mimicked by others who have been exposed to media coverage describing the behavior of the original actor or actors).

### 3.3 | Mediational perspective on PM

Conceptualizing PM as "… a psychological force in which several factors or qualities converge in a synergistic way to enable one to perform at a level not ordinarily possible" (Iso-Ahola & Dotson, 2014, p. 20), Iso-Ahola and Dotson (2014, 2016) posit that PM *mediates* the relationship between early and subsequent success, and that the capacity for PM to promote subsequent outcomes depends upon the synergetic and mutual effects of three types of PM effects: *frequency* (i.e., greater occurrences of PM sequences during performance are more likely to elicit successful performance outcomes than are fewer of such occurrences), *intensity* (i.e., momentum sequences of higher intensity or velocity are more likely to elicit successful performance outcomes than are sequences of lower intensity or velocity), and *duration* (momentum sequences that last longer are more likely to elicit successful performance outcomes than are sequences of shorter duration). Based on an analysis of tournament outcomes collected from consecutive Professional Golfers' Association (PGA) seasons, Iso-Ahola and Dotson (2017) recently provided preliminary evidence that the PM properties of frequency, intensity, and duration can at least partially account for consecutive performance successes. It is important to note, however, that these findings are correlational in nature and thus do not qualify as evidence for the direct *causal* effect of (perceived) PM on subsequent improvement and success. Indeed, the critical challenge for PM researchers in the future will be to employ experimental designs that allow one to more directly examine causal relationships between PM and human performance levels.

## 4 | CONCLUSION

The present review was organized into what we have identified in the literature as two distinct approaches to the study of PM: the input-centered approach, by which PM-like stimuli (e.g., perceptual velocity, perceptual mass, perceptual historicity, perceptually interconnected timescales) have been examined as *the* object of study, and the output-centered approach, by which PM has been construed as part of the more global process of goal achievement. With regard to the former, we characterized the extant conceptual and empirical work as focusing on how various PM-like stimuli combine temporal, dynamical, and contextual information to trigger a PM impetus (i.e., the initial perception of movement toward or away from a given goal state) and catalyze the PM experience, whereas with regard to the latter, we described the recursive, interdependent nature of PM and how it may mediate the relationship between prior and subsequent performance levels. In so doing, our review demonstrates how PM "… has been mainly investigated in the field of sport psychology, probably because the sport setting constitutes a kind of natural laboratory that lends itself readily to the study of PM because of the brevity and intensity of certain sport experiences" (Briki, Den Hartigh, & Gernigon, 2016, p. 292). Nevertheless, we believe that PM can be experienced in all life domains (e.g., education, work, relationships), not only because it reflects core properties of mental representation (e.g., Hubbard, 2017a, 2017b), but also because it may operate as a significant motivational component of the achievement process (e.g., Iso-Ahola & Dotson, 2016). In all, we believe that investigating PM within a diversity of achievement contexts will only serve to further our understanding of the phenomenon.

Throughout this review, we have characterized PM as the set of feelings that accompany perceptions of goal progress. Such perceptions are triggered by an initiating event (i.e., an impetus) that elicits a mental simulation of some outcome trajectory. Conceptualized in this manner, we believe that the hot hand fallacy (Gilovich et al., 1985; the belief that a series of gains are likely to give rise to subsequent gains) should simply be characterized as an instance of the broader phenomenon of PM (e.g., it seems appropriate to characterize a social movement as "gaining momentum," whereas it seems less appropriate to characterize a social movement as "having the hot-hand"). Indeed, we assume that hot hand perceptions are sensitive to time-based PM-like stimuli (e.g., perceptual velocity, perceptual historicity), are initiated by an impetus, and involve mental simulation. On the other hand, it is unclear whether such perceptions are influenced by perceptual mass; they do not seem to have a negative momentum analogue; and we do not know whether they elicit the cascade of emotional, motivational, and physiological responses that appear to characterize the PM experience.

In our conceptualization, the PM experience appears to contain elements of the process of *prospection*. As Gilbert and Wilson (2007) note, "… prospection refers to our ability to 'pre-experience' the future by simulating it in our minds" (p. 1352; see also Seligman, Railton, Baumeister, & Sripada, 2013; Szpunar, Spreng, & Schachter, 2014) and, in turn, "Simulations allow people to 'preview' events and to 'prefeel' the pleasures and pains those events will produce" (p. 1352). In the case of PM, it seems likely that individuals use their immediate hedonic reactions to mental simulations as input into their judgments and predictions about the future. In some cases, the mental simulations that underlie PM perceptions may lead to accurate predictions, such as when a team that appears to be coming from behind ultimately does gain the upper hand and prevails, whereas in other cases, mental simulations of this type may lead to exaggerated judgments, such as when the perception that one is "on a roll" in a game of chance leads to overly optimistic betting and risky decision making (for a recent example, see Guenther & Kokotajlo, 2017). In all, delineating antecedents to the PM experience and examining their downstream consequences for human perception, cognition, emotion, and behavior would appear to be important avenues for future research.

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