Imagination and Behavioral Control

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Take a moment to imagine watching yourself ride on the back of a dinosaur across a Martian terrain in the year 3025. Although utterly implausible, chances are a mental depiction of this scenario is easily generated in your mind's eye, prompting a raft of vibrant images such as porous red landscapes, giant green creatures and surreal architectures. While admittedly outlandish, the ability to simulate such a novel and unfamiliar scene highlights a fundamental capacity of the human mind — with virtually no effort we can mentally transcend the present reality and visit distant times, far-off places and even adopt an impossible visual perspective while doing so. Not only are we capable of projecting ourselves through time and space, but we tend do so quite frequently, spending up to half of our waking lives mentally detached from the here and now (Giambra, 1995; Kane, Brown, McVay, Silvia, Myin-Germeys et al. 2007; Killingsworth & Gilbert, 2010; Schooler, Reichle, & Halpern, 2005; Smallwood, Obonsawin, Heim, 2003; Smallwood, O'Connor, Sudberry, Haskell & Ballantyne, 2004; Smallwood & Schooler, 2006). But with so much time spent engrossed in imaginary worlds an important question arises, what are we doing there?

Common aphorisms (e.g. "watch your thoughts... for they become your actions") and philosophical musings, (e.g. "my thinking is first, last and always for my doing") suggest that mental journeys (i.e., simulations) are functional, playing an integral role in controlling our behavior (James, 1890). The content of the wandering mind substantiates the conjecture that thought is for action, revealing that (despite limitless possibilities) ruminations rarely stray far from the people, places and situations that are regularly encountered in everyday life. While seemingly banal, foregoing unrealistic fantasies and fruitless entertainment in order to imagine content that is all too familiar is actually

highly functional. By imagining the world as it is likely to be experienced, with all of the same characters, settings, and features, we provide the most realistic training grounds to plan, prepare and predict for the future.

Spending such a great deal of our time thinking about situations outside of the present moment in anticipation of upcoming events illuminates the fundamental belief that we have jurisdiction over our own actions. In short, we contemplate the future because we believe we have (at least some) control over what it will entail. For example, we may ponder the best things to do and say to prevent a breakup, or simulate what actions to take in order to be promoted at work because we believe that we have the potential to influence outcomes. To optimize this control, we draft imaginary plans and preview their potential consequences in order to determine what needs to be done (or indeed not done) in order to achieve desired results (Gilbert & Wilson, 2007; 2009; Golub, Gilbert, & Wilson, 2009; Suddendorf & Corballis, 2007).

However, despite the advantages of prospection, at times even our best efforts to harness this valuable tool fail to result in optimal behavior — gorging on birthday cake instead of broccoli, watching movies instead of walking the dog or flying off the handle instead of biting our tongue. These goal-incongruent actions expose inadequate self-regulation and motivation strategies, suggesting that simply simulating the future is not always enough to control our behaviors or generate optimal performance. Whether conceptualized as a resource to be depleted, a muscle to be exercised or a genetic lottery prize to be won — we are ultimately faced with the challenge of fine-tuning the control that lies within us. As it is in the mental world that efforts to regulate behaviors are often initiated, might renovating the way that future events are imagined enhance self-control?

A number of factors influence the efficacy of prospection, such as accuracy of information, the quality of past experience, and the extent to which imagery preserves fundamental characteristics of the world (Bar-Anan, Wilson, & Gilbert, 2009; Gilbert & Wilson, 2007, 2009; Wilson & Gilbert, 2003). In order to achieve realistic simulations when imagining an event, the mind recruits the same neural architecture that supports perception and action. For example, the areas of the brain that respond to imagining simple items (e.g., a tree) are also active when seeing the object (Ganis, Thompson, & Kosslyn, 2004). Not only does this neural overlap between imagination and perception facilitate a faithful replication of the structural properties of the environment, but in so doing often elicits similar physiological and emotional responses. Thus, fantasizing about a tasty treat is likely to induce salivation while imagining a giant spider may increase heart rate and induce anxiety (Kosslyn 1973; 1994; Rouw, Kosslyn, & Hamell, 1997).

While the physiological effects that can accompany mental imagery emphasize the relationship between thinking and doing (Fiske, 1992; James 1890), real time responses are not always beneficial. For example, mentally initiated reactions may preempt undesirable behaviors, such as devouring an entire cheesecake or running scared at the first sight of an eight-legged creature. Given that the more realistic a simulation is, the more likely it is to induce outcomes akin to those that would be observed in everyday life, might we be able to exploit the limitlessness of the mental world in order to control the extent to which a simulation is realistic and action-orientated?

In this chapter, we discuss how manipulating characteristics of the mental world can alter the action orientation of an imagined scenario, influencing the information that a simulation contains and the consequences it elicits. Put simply, we can we trick the mind

into simulating appropriate amounts of detail to maximize the possibility of a desired outcome. The less a mental simulation models everyday life (where we act), the more likely it is to be conceptualized as unactionable. Thus, simulations that furnish an unrealistic perspective or are characterized by being outside of the here and now are more often construed in terms of broad abstract meanings rather than immediate responses and action sequences. Specifically, we will focus on how using a third-person perspective (vs. first-person perspective) when imagining an event alters the type of information that the simulation will entail. In this way, intentionally adopting a specific visual vantage point may influence activities often believed to be beyond our control, such as emotional appraisals, impression formation and the initial action sequences that underlie approach and avoidance behavior. Additionally, we will briefly discuss analogous outcomes that result from integrating spatial and temporal distance into prospective thought.

Visual Perspective

While there are a number of ways that mental simulations can stray from real world experience, one of the most common is through the use of alternate visual perspectives. Thirty years ago, Nigro and Neisser (1983) explicated two points of view that characterize the visual imagery that accompanies recollection; a first-person perspective and a third-person perspective. Similar to the way that the world is experienced in everyday life, a first-person or actor-perspective entails imagining only what would realistically lie within one's own visual field. Alternatively, a third-person or observer-perspective affords a fictitious view of the world, where the self is observed from the vantage point of an outsider.

Despite accounts of “seeing oneself” from a third-person perspective being a rare occurrence in everyday life (often associated with near death or out-of-body experiences), recent research has revealed that most people can and do, at least occasionally, utilize both visual perspectives when engaging in imagery. However, the use of disparate points of view is not generally an overt decision, but rather seems to be manifest spontaneously with systematic levels of content and construal being strongly associated with each point of view. As an action-oriented perspective, a first-person view is often characterized by a bottom-up approach, focusing on the concrete details of an event. Alternatively, a third-person perspective is associated with top-down processing, which tends to be more abstract and highlights the broader meaning of an event (Libby & Eibach, 2011).

The levels of information linked to each visual perspective reflect the subordinate and superordinate conceptualization of goals identified by Vallacher and Wegner (1985). When represented at a subordinate level, actions are construed in terms of their sub-components, the low-level behaviors that are a means to an end (congruent with first-person simulations) as opposed to superordinate conceptualizations which deemphasize the steps required to achieve a goal and focus instead on the end state (congruent with third-person simulations). In short, first-person simulations are largely experiential and action oriented whereas the constructions of third-person imagery trade in action-oriented thinking for a more broad and observational approach. As a result of these differences in content and processing style, visual perspective becomes a powerful tool for shaping the way that we feel, think and act.

Emotion

Even though mental imagery focuses on events outside the here and now, it can contaminate how we feel in the present. A particularly salient instance of this is when simulating events with a strong emotional component. For example, we may find ourselves becoming enraged when mentally rehashing last night's argument or overwhelmed with a sense of calm when envisioning the sunset on a quiet beach. Depending on the content of the simulation and the desired affective state, the emotional contagion of these imaginary scenes can be either beneficial or problematic. While it would be nice if we could exploit this overflow of emotion by always thinking happy thoughts, the mind quite regularly wanders to dark and troubled times and places— a necessary evil in order to be able to problem solve and plan effectively. How then might we buffer ourselves from negative emotional residue without sacrificing the benefits of previewing potential future obstacles and unpleasant experiences?

Visual perspective may provide one such solution. The implications for this emotional control mechanism are evident in cases of intrusive memories, such as those that are characteristic of PTSD or the obsessive simulations associated with anxiety disorders. By intentionally simulating these infectious thoughts from a third-person perspective, their intensity and negative affect can be subdued. Interestingly however, these effects are contingent upon the visual perspective naturally utilized during simulation. For example, only when a traumatic memory is most commonly replayed from a first-person perspective can a third-person perspective decrease the extent to which the emotions contaminate the current state. This one-way effect suggests that the

experienced emotional intensity of a simulation is subject to its corresponding point of view (Williams & Moulds, 2008).

This is illustrated in less extreme circumstances where memories that are naturally recalled from a third-person perspective are often rated as less emotional than those recalled from a first-person perspective (Robinson & Swanson, 1993). One possible explanation for these effects is that different types of information that are naturally accessed from each vantage point. That is, just like looking at a photo of oneself, the largely visual experience that ensues when utilizing a third-person perspective provides contextual details, but does not directly supply the interoceptive information that would be available during the actual experience (Berntsen & Rubin, 2006; McIssac & Eich, 2004; Nigro & Neisser, 1983)

In line with this explanation, instructing participants to retrieve memories from a particular perspective can influence the amount of experiential content that is recalled as opposed to the amount of contextual details that are remembered. While the modulation of content makes visual perspective a powerful tool for de-emphasizing the affect associated with a mental simulation, recent evidence has suggested this may be dependent upon the inherent meaning or weight of the situation itself. That is, if an event has broad implications for an over arching life goal, then its emotionality may be more salient from a third-person perspective as compared to an event that has simply has short-term (immediate) or relatively insignificant consequences (Libby & Eibach, 2011). For example, it might be more negative to imagine being fired from a third person perspective as it highlights the broad implications on your career trajectory. Alternatively, an event without life changing repercussions such as breaking an arm while cross-country

skiing is likely to be more negative from a first-person perspective as it provides greater access to the phenomenological aspects of the experience.

Similarly, disparate cognitive approaches (e.g., big picture vs. narrow focus) seem to interact with and influence other emotions, such as the feeling of remorse. Previous research has elucidated that reflections upon past behavior show a systematic relationship between active decisions and regret. Specifically, actions seem to be regretted more immediately as a result of the experiential consequences whereas inactions are more commonly regretted after some time has passed, as we look back on the bigger picture and see missed opportunities or wonder what would have happened if we had done something differently (Gilovich, 1994).

The types of information we rely on to make judgments of regret is reflected in the level of meaning most readily associated with the two visual perspectives utilized during recollection and prospection. For example, when college students were asked to reflect upon two past events — one they regretted for what they did do and another one they regretted because of what they didn't do — regret for actions were increased with first-person simulations relative to third-person simulations whereas the opposite was true of remorse over inactions (Valenti, Libby, & Eibach, 2011). This suggests that because mental simulations are often the key medium for action appraisals, the chosen vantage point will influence how we believe we would feel if we did or didn't do something (e.g., I'll be more upset if I don't try vs. it isn't worth the risk). Thus, decisions about whether or not to act in any given scenario are likely to be guided by the perspective from which an event is mentally viewed. As such, we may be able to select a particular perspective to

alter the amount of regret we feel about a past situation or to manipulate the amount of regret we might feel about something in the future.

Taken together, it seems that emotional responses, whether it is the trauma of a past memory contaminating the present moment or the appraisal of regret, are not simply a result of what material (content) is being played in the theater of the mind, but also which vantage point the information is conveyed through. To this end, visual perspective can alter the mental content that is utilized to inform how we feel about the past, present and future.

Social Judgments

One of the reasons that controlling our own emotions is so important is because they often sway our judgments and behaviors. When happy the whole world seems a bit brighter - we are less skeptical of the intentions of others (Forgas & East, 2008), rely more on heuristics to make judgments (Sinclair & Mark, 1992), and rate our own life satisfaction as higher (Schwarz & Clore, 1983) than when in a negative mood. However, our current demeanor is not the only extraneous variable that biases judgment. Seemingly arbitrary aspects of the world such as whether it is sunny or rainy outside can influence how we think about and act towards others (Cunningham, 1979; Forgas, Bower & Krantz, 1984). Similar effects extend into the realm of social judgments. One classic study investigated whether or not the experience of physical temperature could contaminate impression formation. It was hypothesized that the experience of warmth or coldness would be embodied and then misattributed to the psychological dimension of a warm or cold personality type. Indeed, results showed that holding an iced beverage resulted in

construing an unfamiliar other to have an icy demeanor, whereas holding a warm beverage resulted in perceptions of greater psychological warmth (Williams & Bargh, 2008).

As mental imagery reactivates the same neural networks involved in an actual experience (Ganis, Thompson, & Kosslyn, 2004), these findings raise an interesting question — might the time we spend mentally simulating the world contaminate our judgments in a similar way? We suspect that it does, at least under conditions in which experiential information is represented in a simulation. As visual perspective has been reliably shown to alter the type of information that is available and the extent to which it is emphasized, it follows that point of view will modulate access to phenomenological information, therefore influencing judgments. Given this observation, we hypothesized that because first-person simulations are privy to the sensations associated with an experience — they are more likely to be influenced (albeit unknowingly) by irrelevant experiential information (e.g., temperature). Alternatively, third-person simulations may buffer us from misattributions by de-emphasizing (omitting) the confounding phenomenological information.

In order to test whether third-person perspective can help to temper the overflow of phenomenological experience on current judgments, we investigated the extent to which simulations of physical temperature influence person perception. Specifically, we sought to explore if mentally simulated temperature could influence ratings of psychological warmth. If a first-person perspective provides greater access to experiential information than a third-person perspective, we would expect to see person judgments after first-person simulations to be impacted by imaginary temperatures, but not third-

person perspective simulations. Indeed, results revealed that mental simulations of holding a hot or iced beverage influenced subsequent impressions of a hypothetical stranger only when the simulation was carried out from a first-person perspective. In other words, visual perspective is a boundary condition of offline embodiment (Macrae, Sunder Raj, Best, Christian & Miles, 2012).

Not only can the contents of the mind inadvertently influence impression formation, but we often intentionally call upon mental simulations to help us make judgments about the world and its inhabitants (ourselves included). Being able to transcend the present reality facilitates comparisons with other times, locations and even alternate versions of our selves (Gilbert & Wilson, 2007, Libby & Eibach, 2011). Specifically, visual perspective has been shown to interact with goals of seeing change or stability between past and future selves, influencing the way that the self is perceived. To illustrate, Valenti, Libby, and Eibach (2007) found that using a third-person perspective aids the achievement of recognizing goal-congruent self-change. That is, when college students were asked to identify similarities to their high school selves, third-person perspectives lead to the perception of less change, whereas people motivated to see self improvements (such as those in counseling) perceived greater self-change from a third-person perspective.

The goal-congruent conclusions of third-person perspective simulations may be a result of inflated meaning attributed to the information recalled from this point of view. Along these lines, self assessments made from a third person perspective are more likely to attribute behaviors to dispositional characteristics whereas judgments from a first person perspective emphasize the situational aspects of an outcome. For instance, to

imagine missing a game-winning goal from a third person perspective is more likely to generate conclusions that you are a horrible athlete, whereas a first person perspective may elicit explanations of torrential rains and sub-par field conditions. The apparent stability of information retrieved from a third person perspective may lead us to weight this information more heavily whereas examples of change generated from a first person simulation maybe written off as situational and more readily discarded. These disparate attributions may have positive and negative effects depending upon whether the behavior in question exhibits success or failure.

Interestingly, these overgeneralizations may contribute to findings that a third-person perspective may often highlight how an individual does not live up to an "idealized self" (Kuyken & Howell, 2006). As such, it seems that we may asses our third-person selves more like we would an 'other.' This possibility is consistent with feelings of similarity and dissimilarity that promote the utilization of alternate visual perspectives. Specifically, when reflecting on a version of self that seems inconsistent with the current self, third-person simulations are more common whereas a strong continuity of self over time is more likely to elicit a first person simulation (Libby & Eibach, 2002). Further, similar variations of psychological distance (more like me = first person simulations, less like me = third person simulations) have been associated with relying on different types of information for judgments, such that psychologically close targets are assessed with more experiential information and psychologically distant (less familiar) assessments rely more on content information (Caruso, 2008).

Taken together, it seems that the use of experiential information, whether it is a cheery disposition or the temperature of an imagined beverage, is more likely to be

incorporated into first-person than third-person simulations. Therefore, when simulating the world or trying to objectively assess self-change, visual perspective can be used as a tool to control the content and type of information that is incorporated (with or without awareness) into social judgments.

Actions

Ultimately, the time spent in the mental world is an attempt to control behavior. To this end, imagery can influence actions both indirectly (through emotions and judgments) and directly by eliciting motor responses. For example, the negative affect that accompanies simulating a traumatic experience (i.e., a plane crash) may culminate in an unwillingness to fly. Additionally, drawing the conclusion that we are less fit than a past version of ourselves can lead to healthy food choices, a behavior motivated by a desire to remedy or repair poor decisions that have lead to an inferior version of a past self.

Irrespective of temporal self-judgments, evidence from our laboratory has suggested that visual perspective can alter the way that desirable objects are mentally represented. Specifically, imagining taking a bite of a doughnut or picking up a ten-pound note from a first-person perspective resulted in larger post-imagery drawings of the items than after imagining the same items from a third-person perspective. Although speculative, the underlying representations of objects such as these are likely to influence the behaviors that are guided by a mental simulation. For instance, if a first-person simulation causes a doughnut to loom large in our mind's eye, it may seem bigger and more delicious motivating us to run down to the baker for an afternoon treat.

Alternatively, if a third-person simulation diminishes the size of a mentally construed ten-pound note, we may under-represent its value and consequently be willing to wait less time or do less work in order to earn one.

Elsewhere, the mental simulation of actions has been shown to impact subsequent behavior (Janssen & Sheikh, 1994). For example, imagining simple motor actions such as finger and elbow flexion increase strength over a training period (Ranganathan, Siemionow, Liu, Sahgal, & Yue, 2003; Yue & Cole, 1992). Mentally rehearsing complex actions has also revealed practice effects and shown that the muscle patterns of imagined movement (e.g., downhill skiing, rowing) reflect the same patterns as those detected when actually performing the task (Bird, 1984; Suinn, 1980). In a more social domain, imagining a funny scenario produces EMG activity in the zygomaticus major (active during smiling), whereas unpleasant imagery reveals activity in the corrugator supercilii (active during frowning) (Tassinary, Cacioppo, 1992). Interestingly, the manifestation of emotions extends to full body movements, such as the bouncy gait that accompanies positive thoughts or the vivacious stomp indicative of anger (Montepare, Goldstein, & Clausen, 1987).

Not only does this embodiment provide a sneak peak into the contents of the mind, but it is also believed to be a vital medium for social communication (Andrew, 1965; Fridlund, 1991). Particularly, when trying to make inferences about the state and intentions of other minds (e.g., is he happy or sad?) we rely on externally visible cues that are often not intentionally transmitted, but rather “leak” information about internal states. This information is often utilized in order to help us decide whether or not we want to approach or avoid a given individual. Complimentarily, our desire to interact (or not)

with another person is also exuded physiologically in our facial expressions and body movements. Previous research has illustrated this embodiment of approach and avoidance behavior during social interactions. Specifically, participants exuded systematic anterior (i.e., forward) movements while viewing an approaching positive face and posterior (i.e., backward) movement upon glimpsing an angry face drawing nearer (Miles, 2009).

Might imaginary social interactions elicit similar real time behaviors as the simulation unfolds? If so, are the motor responses an inevitable consequence of mental imagery, or might they be dependent upon the vantage point that is adopted? We suspected that approach and avoidance behaviors would only emerge when simulating positive and negative interactions from a first-person perspective. In order to test this hypothesis we measured implicit postural sway during a guided mental imagery task. Critically, participants imagined a positive (i.e., friend approaching with a smile) or a negative (i.e., stranger approaching with a frown) social interaction from either a first or a third-person perspective.

As hypothesized, results revealed that participants who engaged in first-person simulations of the social encounters showed systematic forward sway during the positive and backward sway during the negative imaginary interactions. In contrast, third-person simulations did not elicit systematic movement in either direction regardless of the valence (positive or negative) of the imagery. These results suggest that removing ourselves to the position of an observer makes for less action-oriented simulations, and suggests visual perspective as a mechanism to control embodied action. Importantly, this does not necessarily imply that first-person simulations are always optimal. For instance, when needing to engage in a necessary, albeit unpleasant, interaction (e.g., a trip to the

dentist), it may be best to simulate this scenario from a third-person perspective in order to minimize the manifestation of avoidance behavior.

On a broader level, the simulation of actions from a third-person versus first-person perspective can elicit unique responses based on the way an action is conceptualized. According the Vallacher and Wegner's (1985) action-identification theory, all goals can be conceptualized at either a subordinate (the concrete steps) or superordinate level. For example, the act of voting can be conceptualized in its low-level action components (e.g., driving to the polls, casting a ballot) or its more abstract, high-level constructions (e.g., influencing the election, fulfilling a civic duty). Importantly, these unique conceptualizations may influence how or even if a behavior is executed.

To explore the impact point of view on actions, researchers investigated how using different visual perspectives (associated with these disparate processing styles) when imagining voting in an upcoming election influenced actual voting behavior. Interestingly, results revealed that participants who simulated voting from a third-person perspective were more likely to vote come election day than those who simulated voting from a first-person perspective. Thus, it might be beneficial to use a third-person perspective when the meaning of an action is desirable in relation to ideas of self (e.g., I am an active citizen). Specifically, by using a simulation technique that decreases embodiment or emphasizes the importance of an event in the "broad scheme of things," can alter what action sequences are initiated and whether or not we will follow through with behaviors that are consistent with desired self-concepts (Libby, Shaeffer, Eibach, & Slemmer, 2007).

Other Cognitive Tools

While extant evidence illustrates that visual perspective is an effective tool when it comes to implementing control over emotion, judgments and behavior, it is not the only instrument that we have in our cognitive toolbox. Mental imagery can also be altered along a number of other dimensions such as when in time and where in space we imagine an event to occur. Increased distance along these dimensions has been shown to influence the construal level and action-identification of simulated behaviors. Specifically, spatially and temporally distal events are often conceptualized as superordinate and abstract whereas proximal ones are simulated in more concrete, subordinate ways (Vallacher & Wegner, 1985, Trope & Liberman, 2010). Thus, we would assume that events removed in time and space will elicit similar effects on emotion, judgment and action as the ones that emerge from using a third-person perspective, whereas the outcomes that follow temporally and spatially proximal events reflect those seen after adopting a first person perspective.

Temporal Distance

The component of temporal distance is often a bi-product of a mental simulation, with how far back or forward in time we go being dictated by the event we are imagining. While this temporal information helps to organize and prioritize events, it also inadvertently alters the type of information that a given simulation contains. Analogous to the representations of events represented from a third-person perspective, temporally

distant events contain fewer concrete details than temporally proximal ones (Trope & Liberman, 2010). This lack of detail is portrayed in descriptions and assessments of future tasks. Not only do we describe the future in less detail, but we also underestimate how busy it will be and the amount of effort an upcoming task will require (Akerlof, 1991; Trope; Zauberman & Lynch, 2005). These inaccurate judgments are commonly manifest in a tendency to over-commit our time and to predict that the future will be more manageable than the present (Gilovich, Kerr, & Medvec, 1993; Shepperd et al., 1996; Taylor & Shepperd, 1998).

As a result of our action-based nature, we suspected that less ornate representations of temporally distant events might be goal-specific. In order to test this, we asked participants to mentally time travel to a pyramid in Egypt either next week or in 10 years time with the intention of completing one of two tasks: climbing or photographing the pyramid. After the mental imagery, participants were asked to draw the pyramid they imagined. Interestingly, concrete, goal-relevant details (size for climbing, scenic detail for picture taking) were increased in pictures drawn by participants who had been in the near future time travel condition, but not participants who had been in the distant time travel condition. Thus, by incorporating temporal distance into our mental construals, we can alter the way that goal-related aspects of future events are conceptualized and represented.

Taken together, when failing to imagine the future in all of its complexity, we tend to make decisions biased by the amount of information a simulation contains and fall prey to a number of cognitive biases. This evidence suggests that we can control the accuracy of our judgments about past and future events by altering its temporal distance.

For instance, when trying to make a decision about whether or not we want to present at a conference next year, we may simulate the amount of effort that would be involved in putting together a talk as if it were next week and use that assessment of expended effort to help us make better informed decisions (Gilbert & Wilson, 2007; 2009; Golub, Gilbert, & Wilson, 2009).

While imagining an event as temporally near can lead to more realistic judgments it may come at a cost. Specifically, getting bogged down in the details of a task may make it less desirable, relegating our motivation to work towards a goal. To this end, the lack of detail in the distant future may be beneficial, generating enthusiasm that would likely be dampened by the less glorious aspects of a future task (Pennington & Roese, 2003). In much the same way that third-person simulations can shift our conceptualization of an event to consider it in terms of its "broader meaning," temporally distant representations may attenuate worries about the 'how' and promote contemplations of 'why,' helping us to focus on the goals that are important to us even when the steps to successes are complicated and cumbersome. Knowing the positive and negative effects that emerge as a result of temporal distance allows us to adjust the time stamp on our mental simulations in accordance with our goals (Gilbert, Gill, & Wilson, 2002). Thus, controlling the type of information included in the simulations that guide our emotions, judgments and behaviors.

Spatial Distance

A final component of mental simulation that often varies and can be easily controlled is the spatial location of an imagined event. For example, we may fantasize

about an upcoming destination wedding or contemplate the tragedies that are occurring in a third world country. Interestingly, recent research has revealed that this component of distance is not unlike time or visual perspective in that it reduces our ability to act directly and it effects the way an event is mentally represented. Namely, when removed in space, events are described with more abstract language and are conceptualized more as ends rather than means as compared to spatially proximal events (Fujita, Henderson, Eng, Trope, & Liberman, 2006). As such, it is proposed that similar effects would emerge when events are construed as spatially distant as those that are illustrated to occur when events are simulated as temporally distant.

Behavioral discrepancies span spatial distances revealing unique conceptualizations of an event that is happening far away compared to one that hits 'close to home'. Not only can the guise of a remote geographical location influence the intensity of an emotional reaction to seeing another experience pain (farther away = less distressing), but it can also influence the amount of money people are willing to donate during tragedies such as a natural disaster. These behaviors are in line with evidence suggesting that spatially distant social events are described with more abstract language and more readily conceptualized in a super-ordinate manner than events that are close-by (Fujita, Henderson, Eng, Trope, & Liberman, 2006; Semin & Fiedler, 1988). As such, spatially distant simulations may be less likely to evoke action steps than a spatially proximal construal.

Elsewhere, coping strategies reflect a decreased likelihood of implementing actions at increased spatial distances. Specifically, self-control is enhanced when desirable objects are placed at a distance. Not only do strategies for weight loss promote

reducing the accessibility of unhealthy items, but simply increasing the distance of an unhealthy snack (from 20cm to 50cm) can decrease consumption (Maas, de Ridder, de Vet, & de Wit, 2012). While it has yet to be explored in the mental world, we suspect that related effects such as the decreased desirability and thus enhanced self-control are likely to occur when imagining a temptation to be in a temporally distant location. This effect would likely be the result of a less desirable construal of an item — much like the reduced size representation of a doughnut simulated from a third-person perspective or the reduced pyramid size at a temporally distant location. Future work will be essential to investigate these and other effects of spatial distance on the behaviors that transpire as a result of mental simulations.

Conclusions

The current chapter reviews a myriad of evidence explicating the role of imagination in optimizing self-control. Specifically, we illustrated how adjusting key elements of a simulation can shape the identification of goal-relevant actions and the construction of mental events. As such, through the strategic manipulation of visual perspective and other characteristics of imaginary experiences (e.g., temporal and spatial distances), we can transform aspects of cognition and behavior.

One possible explanation for these effects is rooted in the extent to which a mental simulation mimics the properties of the physical world. If in our minds, it isn't me, it isn't here or it isn't now, the consequences of the simulation are less likely to reflect those that naturally transpire in the real world. As mental simulations rely upon the same underlying neural mechanisms that support veridical interaction, any imaginary events

that diverge from the ways they would actually be experienced are likely to feel unrealistic and be less action oriented. As disparate properties have unique consequences, they can be exploited to modulate thoughts and behaviors that are often believed to be out of reach, such as the real time responses to a mental simulation or even the extent to which contents of the mind contaminate social judgments.

As the mental world provides a platform to initiate self-control, its structure has the potential to permeate all aspects of cognition and behavior. However, there is no one ideal blueprint or design for prospective thoughts. It is only when equipped with the knowledge of how the properties of the mental world impact our thoughts and actions, that we are able to construct the most optimal mental simulation to guide future behavior. So while visualizing yourself riding on the back of a dinosaur across a Martian terrain in the year 3025 is unlikely to ever be functional, the capacity to alter visual, spatial and temporal properties of the mental world is a highly adaptive means of controlling emotions, thoughts and actions.

Akerlof, G. A. (1991). Procrastination and obedience. American Economic Review, 8(2), 1-19.
Andrew, R. J. (1965). The origins of facial expressions. Scientific American, 213, 88-94.
Bar-Anan, Y., Wilson, T. D., & Gilbert, D. T. (2009). The feeling of uncertainty intensifies affective reactions. Emotion, 9, 123-127.
Bargh, J. A., & Shalev, I. (2012). The substitutability of physical and social warmth in daily life. Emotion, 12, 154-162.
Bird, E. (1984). EMG Quantification of Mental Rehersal. Perceptual and Motor Skills, 59, 889-906.
Berntsen, D. & Rubin, D. C. (2006). Emotion and vantage point in autobiographical memory. Cognition and Emotion, 20(8), 1193-1215.
Caruso, E. M. (2008). Use of experienced retrieval ease in self and social judgments. Journal of *Experimental Social Psychology*, *44*, 148-155.
Cunningham, M. R. (1979). Weather, mood, and helping behavior: Quasi experiments with the sunshine Samaritan. Journal of Personality and Social Psychology, 37(11) 1947-1956.
Fiske, S. T. (1992). Thinking is for doing: Portraits of social cognition from Daguerreotype to laser photo. Journal of Personality and Social Psychology, 63(6), 877-889.
Forgas, J. P., Bower, G. H., & Krantz, S. E. (1984). The influence of mood on perceptions of social interactions. Journal of Experimental Social Psychology, 20, 497-513.
Forgas, J. P., & East, R. (2008). On being happy and gullible: Mood effects on skepticism and the detection of deception. Journal of Experimental Social Psychology, 44, 1362-1367.
Fridlund, A. J. (1991). Sociality and solitary smiling: Potentiation by an implicit audience. Journal of Personality and Social Psychology, 60, 229-240.
Fujita, K., Henderson, M. D., Eng, J., Trope, Y., & Liberman, N. (2006). Spatial distance and mental construal of social events. Psychological Science, 17, 278-282.
Ganis, G., Thompson, W. L., & Kosslyn, S. M. (2004). Brain areas underlying visual mental imagery and visual perception: an fMRI study. Cognitive Brain Research, 20, 226-241.
Giambra, L. M. (1995). A laboratory method for investigating influences on switching attention to task-unrelated imagery and thought. Consciousness and Cognition, 4(1), 1-21.
Gilbert, D. T., Gill, M. J., & Wilson, T. D. (2002). The future is now: Temporal correction in affective forecasting. Organizational Behavior and Human Decision Processes, 88(1), 430- 444.
Gilbert, D. T., & Wilson, T. D. (2007). Prospection: Experiencing the future. Science, 317(5843), 1351-1354.
Gilbert, D. T., & Wilson, T. D. (2009). Why the brain talks to itself: Sources of error in emotional prediction. Philosophical Transactions of the Royal Society B, 364(1521)
Gilovich, T. (1994). The temporal patter to the experience of regret. *Journal of Personality and Social Psychology*, *67*(3), 357-365.
Golub, S. A. Gilbert, D. T., & Wilson, T. D. (2009). Anticipating one's troubles: The costs and benefits of negative expectations. Emotion, 9, 277-281.
Gilovich, T., Kerr, M., & Medvec, V. H. (1993). Effect of temporal perspective on subjective confidence. Journal of Personality and Social Psychology, 64(4) 552-560.
James, W. (1890). The principles of psychology. Cambridge: Harvard University Press.

Janssen, J. J, & Sheikh, A. A. (1994). Enhancing athletic performance through imagery: an overview. In: A. A. Sheikh & E. R. Korn (Eds.). Imagery in sports and physical performance (pp. 1-22). Amityville, NY: Baywood Publishers.

Kane, M. J., Brown, L.H., McVay, J.C., Silvia, P.J., Myin-Germeys, I., & Kwapil, T.R. (2007). For whom the mind wanders, and when: An experience-sampling study of working memory and executive control in daily life. Psychological Science, 18, 614–621.

Killingsworth, M. A., & Gilbert, D. T. (2010). A wandering mind is an unhappy mind. Science, 330(6006), 932. doi: 10.1126/science.1192439;

Kosslyn, S. M., Ganis, G., & Thompson, W. L. (2001). Neural Foundations of Imagery. Nature Reviews Neuroscience, 2, 635-642.

Kosslyn, S. M. (1994). Image and brain: The resolution of the imagery debate. Cambridge, MA: MIT Press.

Kosslyn, S. M. (1973). Scanning visual images: some structural implications. Perception and Psychophysics, 14(1), 90-94.

Kuyken, W., & Howell, R. (2006). Facets of autobiographical memory in adolescents with major depressive disorder and never-depressed controls. Cognition and Emotion, 20 (3-4), 466-487.

Libby, L. K., & Eibach, R. P. (2011). Visual perspective in mental imagery: A representational tool that functions in judgment, emotion, and self-insight. Advances in Experimental Social Psychology, 44, 185-245.

Libby, L. K., & Eibach, R. P. (2002). Looking back in time: Self-concept change affects visual perspective in autobiographical memory. *Journal of Personality and Social Psychology, 82*, 167-179.

Libby, L. K., Shaeffer, E. M., Eibach, R. P., & Slemmer, J. A. (2007). Picture yourself at the polls visual perspective in mental imagery affects self-perception and behavior. *Psychological Science, 18*(3), 199-203.

Maas, J., de Ridder, D. T. D., de Vet, E., & de Wit, J. B. F. (2012). Do distant foods decrease intake? The effect of food accessibility on consumption, Psychology & Health, 27(2), 59-73.

Nigro, G., & Neisser, U. (1983). Point of view in personal memories. Cognitive Psychology, 15(4), 467-482.

McIssac, H. K. & Eich, E. (2004). Vantage point in traumatic memory. Psychological Science, 15(4), 467-482.

Montepare, J. M., Goldstein, S. B., & Clausen, A. (1987). The identification of emotions from gait information. Journal of Nonverbal Behavior, 11(1), 33-42.

Pennington, G. L., & Roese, N. J. (2003). Regulatory focus and temporal distance. Journal of Experimental Social Psychology, 39(6) 563-576.

Ranganathan, V. K., Siemionow, V., Liu, J. Z., Sahgal, V., & Yue, G. H. (2003). From mental power to muscle power – gaining strength by using the mind. Neuropsychologia, 42 (7) 944-956.

Robinson, J. A. & Swanson, K. L. (1993). Field and observer modes of remembering. Memory, 1(3), 169-184.

Rouw, R., Kosslyn, S. M., & Hamel, R. (1997). Detecting high-level and low-level properties in visual images and visual percepts. Cognition, 63, 209-226.

Schooler, J. W., Reichle, E. D., & Halpern, D. V. (2005). Zoning-out during reading: Evidence for dissociations between experience and meta-consciousness. In D. T. Levin (Ed.),

Thinking and seeing: Visual metacognition in adults and children (pp. 204–226). Cambridge, MA: MIT Press.
Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. Journal of Personality and Social Psychology, 45, 513-523.
Semin, G. R., & Fiedler, K. (1988). The cognitive functions of linguistic categories in describing persons: Social cognition and language. Journal of Personality and Social Psychology, 54(4), 558-568.
Shepperd, J. A., Ouellette, J. A., & Fernandez, J. K. (1996). Abandoning unrealistic optimism: Performance estimates and the temporal proximity of self-relevant feedback. Journal of Personality and Social Psychology, 70(4), 844-855.
Sinclair, R. C., & Mark, M. M. (1992). The influence of mood state on judgment and action: Effects of persuasion, categorization, social justice, person perception and judgmental accuracy. In L. L. Martin & A. Tesser (Eds.), The Construction of Social Judgments Hillsdale (pp. 165-193). New Jersey: Lawrence Erlbaum Associates, Inc.
Smallwood, J., Obonsawin, M. C., & Heim, S. D. (2003). Task-unrelated- thought: The role of distributed processing. Consciousness and Cognition, 12, 169–189
Smallwood, J., O'Connor, R. C., Sudberry, M. V., & Ballantyre, C. (2004). The consequences of encoding information on the maintenance of internally generated images and thoughts: The role of meaning complexes. Consciousness and Cognition, 4, 789–820.
Smallwood, J. & Schooler, J. W. (2006). The restless mind. Psychological Bulletin, 132(6), 946-958.
Suddendorf, T., & Corballis, M. C. (2007). The evolution of foresight: What is mental time travel and is it unique to humans? Behavioral and Brain Sciences, 30, 299-351.
Suinn, R. M. (1980). Body thinking: psychology for Olympic champions. In R.M. Suinn (Ed.), Psychology in Sports: Methods and Applications (pp. 306-315). Burges, Minneapolis.
Tassinary, L. G. & Cacioppo, J. T. (1992). Unobservable facial actions and emotion. Psychological Science, 3(1) 28-33.
Trope, Y., & Liberman, N. (2010). Construal level theory of psychological distance. Psychological Review, 117(2), 440-463
Taylor, K. M., & Shepperd, J. A. (1998). Bracing for the worst: Severity, testing and feedback as moderators of the optimistic bias. Personality and Social Psychology Bulletin, 24(9), 915-926.
Valenti, G Libby, L. K., & Eibach. (2011). Looking back with regret: Visual perspective in memory images differentially affects regret for actions and inactions. Journal of Experimental Social Psychology, 47(4), 730-737.
Vallacher, R. R., & Wegner, D. M. (1985). A theory of action identification. Hillsdale, NJ: Erlbaum.
Wegner, D. M., & Vallacher, R. R. (1986). Action identification. In R. M. Sorrentino & E. L. Higgins (Eds.), Handbook of motivation and cognition: Foundations of social behavior (pp.550-582). New York: Guilford.
Williams, L.E., & Bargh, J.A. (2008). Experiencing physical warmth promotes interpersonal warmth. Science, 322, 606-607.
Williams, A. D. & Moulds, M. L. (2008). Manipulating recall vantage perspective of intrusive memories in dysphoria. Memory, 16(7), 742-750.

Wilson, T. D. & Gilbert, D, T., (2003). Affective forecasting. In M. P. Zanna (Ed.), Advances in experimental social psychology (Vol. 35, pp. 345–411). San Diego, CA: Academic Press.

Yue, G. & Cole, K. J. (1992). Strength increases from the motor program: comparison of training with maximal voluntary and imagined muscle contractions. Journal of Neurophysiology, 67(5) 1114-1123.

Zauberman, G. & Lynch Jr., J.G, (2005). Resource slack and propensity to discount delayed investments of time versus money. Journal of Experimental Psychology: General, 134(1) 23-37.