THE SYDNEY SYMPOSIUM OF SOCIAL PSYCHOLOGY

Motivation and Its Regulation

The Control Within

Edited by
JOSEPH P. FORGAS
AND
EDDIE HARMON-JONES

Psychology Press

Motivation and Its Regulation

It is motivation that drives all our daily endeavors, and it is motivation, or the lack of it, that accounts for most of our successes and failures. Motivation, however, needs to be carefully controlled and regulated to be effective.

This book surveys the most recent psychological research on how motivational processes are regulated in daily life to achieve desired outcomes. Contributors are all leading international investigators, and they explore such exciting questions as: What is the relationship between motivation and self-control? What is the role of affect and cognition in regulating motivation? How do conscious and unconscious motivational processes interact? What role do physiological processes play in controlling motivation? How can we regulate aggressive impulses? How do affective states control motivation? Can motivation distort perception and attention? What are the social, cultural, and interpersonal effects of motivational control?

Understanding human motivation is not only of theoretical interest, but is also fundamental to applied fields such as counseling and clinical, educational, organizational, marketing, and industrial psychology. The book is also suitable as an advanced textbook in courses in motivational sciences, and is recommended to students, teachers, researchers and applied professionals as well as laypersons interested in the psychology of human motivation and self-control.

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Motivation and its Control

Introduction and Overview

EDDIE HARMON-JONES
AND
JOSEPH P. FORGAS

INTRODUCTION

Motivation is what makes the world go round. As even a cursory visit to any bookshop will confirm, there is an insatiable need for motivational books, motivational gurus are in high demand everywhere, and motivational theories are eagerly sought both by organizations and individuals. Our own daily experience confirms the importance of motivation in everyday life. Ability is important, but more often than not it is motivation that makes our students succeed, and it is lack of motivation that condemns them to failure. Motivation can also lead to negative consequences, as occurs when an individual's desire causes over-eating, an over-indulgence in drugs, or sexual misadventures. Questions concerning the nature of human motivation—where does it come from, why do some people have it in spades, and others lack it, and how can it be managed and controlled—have long fascinated philosophers and writers. As Maslow (1954) noted, motivation pervades our lives; it is ". . . constant, never ending, fluctuating, and complex, and . . . it is an almost universal characteristic of practically every organismic state of affairs" (p. 69).

However, motivation also needs to be controlled and managed to be effective. In other words, there is a complex and interdependent relationship between the psychological mechanisms of motivation and the mechanisms of self-control. Motivation and the control of motivational urges underlie most behaviors, particularly social behaviors. The consideration of the subtle dance

between motivational impulses and self-control dates back at least to Freud (1920, 1923) and remains of growing interest to psychology researchers and practitioners alike. The objective of this book is to review and integrate some of the most recent developments in research and theories on social motivation and its control and management.

These chapters will examine a variety of exciting questions such as: What is the relationship between motivation and self-control? What is the role of affective and cognitive processes in linking the two? How do conscious and unconscious motivational processes interact in producing social behaviors? What role do physiological processes play in controlling motivation? How does imagining an event influence motivated strategies? How can we control aggressive impulses? How do affective states regulate motivation? How does motivation impact perception and attention? What are the social, cultural, and interpersonal effects of motivational control?

In order to discuss these issues, we divided this volume into four parts. The first part considers some of the basic issues and theories about the genesis and control of human motivation (chapters by Higgins; Bargh & Huang; Carver, Johnson & Joorman; Macrae, Christian & Miles; and Koole et al.). In part two, the interaction between affective states and motivational mechanisms is considered (chapters by Inzlicht & Legault; Schmeichel & Tang; Most; Forgas; and Denson). The third part of the book focuses on the management of approach and avoidance processes, perhaps the basic dichotomy in motivational research (chapters by Harmon-Jones, Price, & Harmon-Jones; Elliot et al.; Scholer; and Balcetis & Cole). Finally, in the fourth part of the book we consider the interpersonal, social and cultural implications of recent research on motivation and its control (chapters by Maner & Leo; Napier; Kitayama, Tompson, & Chua; Halberstadt & Jong; and Zadro, Godwin, & Gonsalkorale). We will begin, however, with a brief theoretical and historical review of ideas about motivation and self-control in psychology.

MOTIVATION AND SELF-CONTROL

The scientific study of both motivation and self-control has received growing attention in recent years with several books (e.g., Elliot, 2008; Higgins & Kruglanski, 2000; Vohs & Baumeister, 2011) and special issues of leading journals devoted to each of these topics (e.g., in *Emotion Review, Motivation and Emotion*). However, these contributions have typically considered motivation and self-control *separately* even though these psychological processes intimately influence each other. For example, although much research has suggested that exercising self-control depletes one's resources and leads to future failures at self-control (Baumeister, Vohs, & Tice, 2007), more recent work has revealed that exercising self-control can also increase one's approach motivation or desire for rewards (Schmeichel, Harmon-Jones, & Harmon-Jones, 2010).

Rather than viewing humans as analogous to computers, psychologists who study motivation conceive of persons as active, hot, embodied agents with needs,

desires, and fears. We may use the metaphor of the automobile to illustrate this view, a system driven by the complex interaction of fuel, air, electricity, spark plugs, timing belts, coolants, oil, grease, and other materials and mechanics that move various parts of the engine to ultimately set the automobile in motion. Like automobiles, humans *move*, and motivation can be thought of as the motor and fuel that impel action. However, automobiles also must be equipped with devices that ensure that they slow down, stop and even reverse when required. Similarly, the human's motivational engine is equipped with various regulatory processes that ensure it slows down, stops and retreats when needed. Exploring how basic motivational forces are managed, controlled, and adjusted in the service of adaptive behavior is the main focus of this volume.

HISTORICAL BACKGROUND

The term motivation first appeared in psychological jargon in the early 1880s. Prior to that date, the more amorphous concept of the "will" was used by philosophers and social theorists when discussing the antecedents of effortful, directed human behavior. Early functionalist philosophers used the term motivation to describe voluntary action—behaviors that show direction (Bindra & Stewart, 1966). However, by the early twentieth century motivation became increasingly linked to instinct explanations, reducing interest in the psychology of conscious deliberations. Theorists such as Darwin (1872), Freud (1920) and McDougall (1908) all considered instincts, or innate and unconscious motivational forces, as the prime movers of all directed behavior.

The beginning of behaviorism had a negative influence on the study of motivation. Early behaviorists' doctrinaire refusal to consider internal psychological processes eliminated motivation as a construct of serious concern. When motivation was considered at all, it was in terms of the rise and fall in the intensity of fundamental drive states, such as hunger or thirst, usually investigated in animals other than humans. In these very restrictive terms, motivation could be readily manipulated by subjecting animals to various degrees of deprivation to produce motivational changes, but such studies bore little relevance to understanding the complex motivational processes of humans, as there was simply no room for intentional goal pursuit in this simple-minded stimulus-response (S-R) framework. However, the basic dichotomy between conscious and unconscious motivation survived. Even S-R explanations were deeply influenced by ideas such as Thorndike's concept of habit (Bargh & Ferguson, 2000), analogous to an unconscious social motive. As the inadequacy of S-R explanations of motivation became clear, neo-behaviorists like Hull (1943), Miller (1959), Spence (1956), and Tolman (1932) realized that any sensible account of human social behavior required a consideration of the complex motivated nature of action. These neo-behaviorists infused psychological theorizing with many advances in understanding motivation.

Other theorists always took a more cognitive approach to purposive behavior, also conceiving of conscious, directed volition as a key motivational force

(James, 1890/1950). In the light of contemporary debates about the nature and epistemological status of rational, directed human action (Wegner & Gilbert, 2001), it is interesting that social psychologists have always maintained an interest in both unconscious and conscious motivational forces. Influential thinkers like Heider (1958), Lewin (1951), and Festinger (1957) all developed theories of social behavior that had clear motivational components. Their contributions represent an enduring influence on contemporary thinking about motivation and self-control. As historians of our field note, it is largely thanks to them that even in the darkest days of orthodox behaviorism, cognition and motivation remained meaningful topics in social psychology, sparing the discipline from some of the more damaging consequences of the behaviorist orthodoxy that afflicted other fields (Allport, 1968).

By the 1970s and 80s behaviorism was on the wane, and "cold" social cognition became the dominant approach to the study of social behavior and judgment. Many social cognitive theorists initially tried to explain away motivational accounts of behavior in terms of cognitive, information processing mechanisms (see Forgas, 1981, 1983 for an early critique of such social cognitive approaches). For researchers like Bem (1967), Nisbett and Ross (1980), and others, what were previously considered motivational explanations of judgments and behavior became re-conceptualized as cognitive errors due to faulty information processing. Many examples of social behavior, such as attitude change, self-serving biases, achievement motivations and the like were increasingly explained in terms of cold information-processing mechanisms (Nisbett & Ross, 1980; Trope, 1975). During this time, the study of social motivation was once again relegated to a secondary role in explanations of social behavior. Fortunately, by the 1990s, there was renewed interest in motivation and the use of biological methods to study motivational processes. Several chapters in this volume illustrate the benefits of taking a neuroscience approach for understanding human motivation (e.g., Harmon-Jones et al., this volume; Kitayama et al., this volume; Maner, this volume).

MOTIVATIONAL MECHANISMS

Motivation is defined by standard dictionaries as the desire to do, or as interest or drive. Psychologists define motivation as the process that arouses, sustains, and regulates behavior. Motivation is a mechanism that directs and energizes action (Young, 1961). With this definition, social psychologists often regard action or behavior as including both the processing of information as well as overt, more molar behavior (Pittman, 1998). It is also important to note that while motivation directs and energizes the organism, it may not always result in overt molar behavior. For example, one might be motivated to attack the boss after receiving a demeaning comment but such impulses rarely result in actual behavior (see also Denson, this volume).

Motivation involves basic psychophysiological processes, and research of the last decade has made important discoveries regarding the effects of biological

variables that influence motivation and self-control (see chapters in the current volume by Carver et al.; Denson; Harmon-Jones et al.; Inzlicht & Legault). Motivation also prepares the organism for action and bodily experiences in turn can influence motivation (Harmon-Jones et al., this volume). Motivation can even influence basic perceptual processes (Balcetis & Cole; Maner & Leo; Most, this volume), judgments of value (Higgins, this volume), and social attitudes (Kitayama et al.; and Napier, this volume).

As we have seen, motivations can range from basic, unconscious, automatic impulses to deliberate, conscious, controlled goal pursuit. Motivations can also be in conflict with one another, as when one is oriented toward fleeing a threat versus aggressively approaching it. Regulatory processes often resolve such conflicts. Motivation can also be characterized by its *intensity* and *direction*. *Motivational intensity* can range from zero, as when one responds to a stimulus that is not associated with any rewards or punishments, to extremely high, as when one responds to a stimulus that signals the possibility of sudden and imminent death.

Motivational direction depends on whether the organism is approaching rewards or positive stimuli (attraction toward them) or avoiding punishments or negative stimuli (repulsion from them; Konorski, 1967; Lewin, 1951; Schneirla, 1959; see also chapters in Part III of this volume). However, there are occasions when organisms show evidence of approach motivation without a stimulus (see review by Harmon-Jones, Harmon-Jones & Price, 2013). An example of this is when an individual may be approach motivated because of a temperament or mood (see also Forgas, 2013; also, Forgas, this volume). Moreover, there are also occasions when negative stimuli are the cause of approach motivation (see review by Harmon-Jones, Harmon-Jones & Price, 2013). For example, anger may evoke approach motivation (e.g., aggressive behaviors) toward the source that evoked the anger (see also Denson, this volume). In cases of road rage, the motivation to pursue and verbally attack the driver is a clear case of approach rather than avoidance motivation.

MOTIVATIONAL DOMAINS

In addition to the broad motivational characteristics of *intensity* and *direction*, motivations can also be classified in terms of specific *domains*, directed toward achieving distinct "goals" or end states. Early theories of motivation influenced by Darwin's (1859, 1872) evolutionary ideas in the late 1800s and early 1900s (James, 1890; McDougall, 1908) explored the nature and functions of motivations primarily associated with the domains of sexual reproduction and care for offspring (e.g., Maner & Leo, this volume; Panksepp, 1998). In these evolutionary models affect and motivation are integrally linked. Affective states may influence motivation and regulation by providing signals of how to respond to different situations, an idea that continues to stimulate interesting research (Bless & Fiedler, 2006). Some positive affective states may signal that the environment is safe and consequently cognitive processing can rely on pre-existing

knowledge (see Forgas, this volume). Other affective states, such as distress, may inspire greater self-control (Inzlicht & Legault, this volume) and greater focus on the external environment (see Forgas, this volume).

In the 1950s and 1960s, researchers in social-personality psychology converged on the idea that the needs for *power, achievement,* and *affiliation* were vitally important in human motivation (see review by McClelland, 1988; Baumeister & Leary, 1995). By the 1970s, additional domains of social needs such as the needs for competence, autonomy, and relatedness were proposed (Deci & Ryan, 1985), and these motivational theories continue to generate research today (e.g., Halvari, et al., 2012; Quirin et al., 2013; Schultheiss & Schiepe-Tiska, 2013; Zadro et al., this volume).

Social psychology also produced other theories focusing on specific motivations, such as the motivation to make sense out of or understand the world, the motivation to act upon the world, and the motivation to maintain, protect, and extend our self-conceptions (Pittman, 1998), ideas that emerged from the phenomenological orientation of Heider, Lewin, and Festinger. Heider in his balance theory was among the first to highlight the fundamental human need for coherent, meaningful mental representations as motivating social thinking and behavior. His phenomenological account of the search for causal explanations led to the contemporary focus on causality in accounting for interpersonal actions. Motivational theories focusing on the *need to understand* and predict the world gave rise to attribution theories (Gilbert, 1998), predicting that individuals make attributions or inferences about the social world in order to render the world more predictable and controllable (Heider, 1958; Jones & Davis, 1965; Kelley, 1967).

When this motivation is satisfied, individuals feel pleasant and confident, but when it is threatened, they feel anxious and confused (e.g., Weary, Gleicher, & Marsh, 1993). The motivation to exert control over the world was also an important part of White's (1959) analysis of effectance motivation, and the related concepts of competence and self-determination were central themes in theories of intrinsic motivation (de Charms, 1968; Deci, 1975). The devastating consequences of the loss of perceived control were explored in research on learned helpless (Abramson, Seligman, & Teasdale, 1978; Seligman, 1975) and reactance motivation (Brehm, 1966; Brehm & Brehm, 1981).

The motivation to maintain cognitive consistency is central to dissonance theory (Festinger, 1957) and Heider's balance model (1958). Humans need a social world that makes sense to them, where beliefs, attitudes and behaviors are coherent and consistent. In the absence of such consistency, people experience psychological discomfort and have trouble planning and engaging in effective interpersonal relations (Mead, 1934). Festinger in his theory of cognitive dissonance proposed clearly motivational explanations for many kinds of puzzling, unexpected and apparently irrational social behaviors. These motivational issues have a clear impact on the way people perceive and process the social world. In essence, the motive to create and maintain meaning and consistency recruits many cognitive and perceptual processes to its service and shapes our representations of the social world into a coherent and sensible whole.

In a similar way, Lewin in his field theory developed a new dynamic motivational account of all social behavior based on social actors' mental representations of their life space, the subjective field within which alternative courses of action can be planned. The need for accuracy is another motive that clearly influences cognition and is central to understanding how people effectively function in the social environment (Pittman, 1998). The desire to make sense out of chaos drives many theories of attribution and causal reasoning. Accurate (or relatively accurate) attribution is an important part of successfully interacting with others in a variety of social contexts (Heider, 1958). The motivation to establish and maintain control continues to spark interest in contemporary social psychology (Higgins; Carver et al.; Macrae et al.; Koole et al., this volume).

The motivation to understand may also be fundamentally related to the *motivation to act upon the environment* (Harmon-Jones, Amodio, & Harmon-Jones, 2009). Theories concerned with the motivation to act include the action-phase model (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987), motivational intensity theory (Brehm et al., 1983; Wright & Kirby, 2001), achievement motivation theories (Atkinson & Feather, 1966), expectancy-value theories (e.g., Feather, 1990), and self-efficacy theory (Bandura, 1986). Interest in the motivation to act upon the environment continues to pervade social psychology (Balcetis & Cole, this volume; Harmon-Jones et al., this volume).

Motivational theories of the need to maintain, protect, and extend our *self-conceptions* have also been prominent within social psychology, including self-verification theory (Swann, 1983), self-discrepancy theory (Higgins, 1989), self-evaluation maintenance theory (Tesser, 1988), self-affirmation theory (Steele, 1988), and terror management theory (Greenberg, Pyszczynski, & Solomon, 1986). Self-preservation is an important motivation central to the evolutionary success of homo-sapiens as a species. The "survival instinct" may indeed be the most basic or fundamental motive that we possess. Some researchers place this particular motivation at the heart of many other social motives, behaviors, and judgments. The desire to keep conscious knowledge of our mortality at bay can lead to symbolic defensive behaviors like maintaining excessively high self-esteem, creating strong social bonds, and embracing others who share our cultural norms and values. Clearly our motivations to stay alive and to cope with the knowledge of our mortality are a driving force in many of our social behaviors. There is continuing active interest in understanding these motivations related to self-conceptions, as manifested by several contributions to this volume (e.g., Halberstadt & Jong; Kitayama, Tompson, & Chua, this volume).

As this by necessity brief review shows, historically motivation was often considered as a prerequisite for conscious, intended, purposive behavior, and many early theories saw the conscious "will" as the source of motivated action. In contrast, much contemporary research suggests that a great deal of motivated social behavior is actually driven by latent, unconscious and as yet poorly understood psychological mechanisms (see, for example, chapters by Higgins; Bargh & Huang; Maner & Leo; Harmon-Jones et. al.; and Balcetis & Cole, this volume).

Not only are social actors frequently unaware of the real motivational reasons for their behaviors, but more surprisingly, they cannot even accurately report on their motivational mechanisms when questioned directly (Wegner & Gilbert, 2001). Indeed, some theorists suggested that the entire notion of intentional, free and purposive goal-directed behavior that is so fundamental to our self-conceptions as autonomous individuals—the very existence of a human "will"—may be misconceived. Several of the chapters here suggest that we may need to revise our deepest philosophical assumptions about human beings as conscious, rational, goal-pursuing creatures (see, for example, chapters by Carver et al.; Macrae et al.; Koole et al.; Inzlicht & Legault; Most; and Forgas, this volume).

AFFECT, MOTIVATION, AND SELF-REGULATION

Affect plays a critical role in coordinating motivational and self-regulatory processes (Forgas, 1981; Zajonc, 2000). Several influential theorists see affective states as essentially feedback signals that indicate the progress of motivated, goal-directed behaviors (Carver & Scheier, 1998). Although affect clearly does have such a signaling function, this view of the regulatory links between affect and motivation appears somewhat restrictive to us. Much recent evidence suggests that affective states and moods can act as powerful and independent regulatory sources of motivated cognition and behavior. For example, even mild mood states influence how people perceive, interpret, respond to, and communicate in social situations (Forgas, 2002, 2013; see also Forgas, this volume).

The motivational consequences of affect are particularly evident in work on affect as an influence on motivated cognitive strategies. Throughout evolutionary history, affective states have come to signal particular environmental circumstances—some positive moods and emotions imply benign environmental surroundings, while some negative affective states suggest an aversive social context. Experiences of distress can have important regulatory and motivational consequences, as Inzlicht and Legault show (this volume). Affective states can thus mobilize cognitive and regulatory strategies adapted to dealing with particular environmental challenges. Positive affect often facilitates assimilative, top-down, and creative processing, useful in dealing with familiar, threat-free environments (but see Harmon-Jones, Gable, & Price, 2013). Negative states, on the other hand, seem to promote the use of systematic, detail-oriented, accommodative information processing, a cognitive style more suited to dealing with novel or aversive situations (Fiedler, 2001; see also Forgas, this volume).

In addition to these general mood effects, specific emotions like fear and anger can have particular influences on motivated perceptual and cognitive processes (see Most; Balcetis & Cole, this volume). Recent research clearly illustrates the importance of studying the interactive relations between motivation, affect and cognition (see in particular chapters in Part II, this volume). Many motivational and affective impulses can only become effective by recruiting cognitive processes to their service (Kunda, 1999). Recent developments in

the study of social motivation as illustrated by these contributions provide new and exciting insights into the subtle motivational mechanisms that drive human social behavior.

LINKING MOTIVATION AND SELF-REGULATION

Regulation is defined by standard dictionaries as a rule, principle, or condition that governs a procedure or behavior, and to regulate means "to bring order, method, or uniformity." Self-regulation in turn refers to goal-directed behavior (e.g., Hofmann, Schmeichel, & Baddeley, 2012). A more specific type of self-regulation is self-control, which can be understood as the control over unwanted motivational impulses (Carver & Scheier, 2011). Thus, we can be motivated to control ourselves, including how we inhibit or promote impulses or motivational urges in order to achieve long-term goals.

Self-regulation and self-control became of growing interest to social psychologists in the 1970s and 1980s. For example, studies of delay of gratification (Mischel, 1974, 1996) asked persons to choose between immediate but less valuable rewards and delayed but more valuable rewards. Individuals who were able to delay gratification at age 4–5 had better self-control 10 years later as measured by school performance, social competence, and effective coping with stress and frustration (Mischel, Shoda, & Peake, 1988), and also had higher Scholastic Aptitude Test scores at age 17–18 (Shoda, Mischel, & Peake, 1990). These results suggest that better self-control in early life can produce enduring and important benefits for later achievements.

Another self-regulatory model was Duval and Wicklund's (1972) self-awareness theory, concerned with how individuals addressed discrepancies between their current selves and how they believed they ought to behave (i.e., their standards). Carver and Scheier (1981, 1982) expanded this theory by integrating it with ideas from Powers' (1973) elaboration of cybernetic theory, and proposed a self-regulatory feedback loop of motivation control that has four steps. First, one assesses how one is doing. If one is falling short of the standard, one engages in action to reduce the discrepancy and achieve the standard. Then, another test assesses whether one has reached the standard. If the standard is not yet met, one renews effort to achieve the standard. If the standard is met, one can exit the feedback loop. Carver and Scheier's model also proposed a hierarchy of feedback loops where broader units of behavior were conceptualized as higher levels, whereas smaller units of behavior were conceptualized as lower levels. The lower levels of behavior are often the means to achieving the higher levels. If one's higher level goal is blocked from being achieved, then one focuses on lower levels to attempt to reach the goal (see also Scholer, this volume).

Since the 1990s, the concept of regulation has received increasing attention (Gross, 1998), focusing on cognitive processes of monitoring as well as reappraisal and cognitive restructuring. For example, individuals who possess better skills in executive functioning—that is, individuals who perform better with updating information, shifting mental sets, and inhibiting dominant

responses—are better able to control their emotions (Schmeichel & Tang, this volume). Another cognitive process that may assist in the regulation of behavior is mental simulation. That is, our mental journeys or simulations may function to assist us in controlling our behavior. We may mentally draft plans for what we should do and then mentally evaluate the potential consequences so that we may decide which plan of action is most likely to lead to desired consequences. As such, mental simulations may assist with optimizing self-control (Macrae et al., this volume).

While self-regulation is typically found to be associated with adaptive outcomes, it may also have negative consequences. Specifically, immediately after individuals exert self-control, they become depleted or less able to control themselves in subsequent situations (Baumeister, Vohs, & Tice, 2007). Some motivations, especially those involving avoidance may undermine self-control because they deplete resources (see Elliot et al., this volume). Self-control can also lead to the negative consequence of causing individuals to be alienated from their emotional preferences (Koole et al., this volume).

One of the primary ways of conceptualizing the interrelationship of motivation and regulation is in terms of motivations impelling individuals to do things that need to be controlled or regulated. For instance, the approach motivation associated with desire and anger often drives individuals to behave in ways that are socially unacceptable. Avoidance motivation, such as fears of public speaking, heights, spiders, snakes, death, and so on, also can be especially debilitating (see Elliot et al., this volume). Many of these motivations are additionally regulated via belief systems, values, societies, and cultures (see Part IV, this volume).

However, typically motivations are functional, in that they guide and direct behavior toward adaptive ends. Individuals who are lacking in motivation, as in major depression, may not avoid potential harms and may fail to approach necessary ends. Motivations are also fundamental to many other psychological processes. Basic learning and memory research conducted with rodents could not occur if the animals were not rewarded with food or punished with electric shock. In other words, the animals must expect rewards or be threatened with punishments before they will learn simple associations.

Often, motivations themselves serve regulatory functions. That is, one motivation may overwhelm the influence of another motivation to assist us in governing our behavior or bringing order to our lives. For instance, our motivation to yell at our boss when she has prevented us from leaving work on time to go bicycling with friends can be, and is often, down-regulated by our motivation to keep our jobs. But even this process can be considered from multiple angles as one can have conflicts between higher-order goals and lower-order temptations (the standard view) or conflicts between two goals or two ways of achieving those goals. These diverse ways of representing motivational conflict may influence how individuals respond to failures to meet desired goals (Scholer, this volume). We shall next turn to a brief summary of the contributions included in this volume.

OVERVIEW OF THE VOLUME

The contributions to this volume have been divided into four parts dealing with (1) basic issues and theories in the study of motivation and self-regulation, (2) the links between affect and motivation, (3) the mechanisms involved in the regulation of approach versus avoidance motivation, and (4) the social, interpersonal and cultural aspects of regulating motivation.

Part I. Introduction and Basic Issues

In the next chapter *(Chapter 2), Tory Higgins* argues that the way people experience valued outcomes depends not only on the hedonic experience of pleasure and pain, but also on the nature and the strength *of their engagement,* such as their ability to control events (control effectiveness) and the manner and means of the goal pursuit. In *Chapter 3, Bargh and Huang* deal with the paradoxical situation when one's currently active goal pursuit may come to dominate one's judgments and behavior, overriding self-interests and central beliefs and values. The relative power and sovereignty of goals versus the self is analogous to the greater power of genes versus the host organism. In *Chapter 4, Carver, Johnson and Joormann* consider two simultaneous modes of processing experience, one older, basic and reactive, the other newer, deliberative, and planned. They suggest that variation in serotonergic function is related to impulsive aggression, borderline personality disorder, and depression, as higher serotonergic function seems to enhance the influence of the higher-order, reflective response system compared to the fast, impulsive response system.

In *Chapter 5, Macrae, Christian and Miles* explore the role of imagination in behavioral control, and suggest that manipulating characteristics of the mental world can alter action orientation. For example, using a third-person (vs. first-person) perspective when imagining an event can alter the kind of information accessed, and may influence activities such as emotional appraisals, impression formation, and approach and avoidance behaviors. *Chapter 6 by Koole, Tops, Strübin, Bouw, Schneider and Jostmann* argues that even though self-control is essential to achieve long-term goals, it also entails hidden motivational costs, leading people to become alienated from their intrinsic preferences and desires. Compulsive self-control or "ego fixation" occurs in a variety of domains, including consumer evaluations, eating behavior, self-judgments, and behaviors. What may appear as lack of self-control may actually be the result of overly rigid, compulsive forms of self-control. Thus, excessive self-control may foster alienation from the self when not balanced by sufficient (intrinsic) motivation.

Part II. Affective Mechanisms and Affect Control

In the first chapter of this section, *Chapter 7, Inzlicht and Legault* explore the adaptive role that distress plays in motivating people to remediate aversive situations, a principal dynamic that underlies effective self-control. Distress is

initiated by goal and response conflict, and motivates control. Several experiments indicate that psychological distress is an integral part of the self-control system, motivating corrective behaviors. In *Chapter 8, Schmeichel and Tang* point out that even though emotion regulation is essential to well-being, not enough is known about the role of the executive functions in emotional and motivational processes. The chapter reviews evidence for the role of executive functions to emotion regulation, and suggests that although cognitive ability helps to shape human emotional life, the mechanisms linking these domains remain poorly understood. *Chapter 9* by *Most* discusses the role of higher-order attentional, motivational, and affective processes in shaping the way visual perception works, including the mechanisms responsible for "inattentional blindness." For example, the rapid presentation of an emotional picture could impair people's ability to see subsequent targets, an effect labeled *emotion-induced blindness*. Most shows that conscious perception can be robustly shaped by the internal states and motivations, although it is unclear how early in visual processing such internal states exert their regulatory effects.

Chapter 10 by *Forgas* suggests that from an evolutionary perspective, affective states perform an important regulatory function, triggering more or less assimilative or accommodative processing strategies. Numerous studies confirm the regulatory effects of moods, and show that negative affect recruits a more accommodative, externally focused processing strategy, improving performance on memory, judgments, social perception, and strategic interactions. *Chapter 11* by *Denson* examines how impulsive aggressive behaviors can be motivated by anger, as distinct from instrumental aggression. The chapter presents empirical evidence from social neuroscience demonstrating that impulsive aggression is often due to aggressive people lacking the ability to control themselves, and that increasing self-control capacity can reduce aggression in people high in trait aggressiveness.

Part III. Approach and Avoidance Processes in Social Motivation

In *Chapter 12 Harmon-Jones, Price and Harmon-Jones* examine bodily influences on approach motivation. Their studies show that in the presence of approach-related stimuli, body posture influences approach motivation, such that leaning forward enhances approach responses, including simple reflexes, early visual cortical activations, and cognitive responses. These results highlight the important role of bodily cues in motivational processes, linking approach motivation to the action-readiness of the body. *Chapter 13* by *Elliot, Schüler, Roskes and De Dreu* argues that avoidance goal pursuit (moving away from an undesirable outcome) requires strong self-regulatory resources, and is particularly ego-depleting compared to approach goal pursuit. Several studies provide support for this prediction, showing that pursuing avoidance (relative to approach) over a month-long period depletes self-regulatory resources. In *Chapter 14, Scholer* examines the importance of responding flexibly to changing

situations as an aspect of self-control, and outlines a hierarchical self-regulatory framework of self-control conflicts. Such conflicts can be either hierarchical (conflict between a higher-order goal and a lower-order temptation), or horizontal (a conflict between two goals or between two means). The implications of vertical and horizontal conflict representations are discussed in the light of the trade-offs of these different representations.

Chapter 15 by *Balcetis and Cole* reviews research demonstrating that visual perception is biased, at least in part, to regulate action. Just as real proximity promotes action readiness, perceived proximity serves a similar function. Their research suggests that both desirable and threatening objects appear closer when they call for action. The chapter explores the mechanisms that contribute to these motivated perceptual biases, suggesting that "seeing is for doing."

Part IV. Interpersonal, Social and Cultural Implications

Chapter 16 by *Maner and Leo* argues that evolutionary psychology provides a powerful meta-theoretical framework to understand the regulation of human motivation. The paper explores the links between motivation, self-regulation, and social cognition in the domain of human mating. When short-term mating motives are active, people seek to reap reproductive benefits of mating with desirable partners. When long-term mating motives are active, people in committed relationships display adaptive processes aimed at avoiding the temptation of alternative partners. *Chapter 17* by *Napier* discusses the motivation to hold positive perceptions about ourselves, our groups, as well as the social *system* we live in. Among low status groups, motivated system justification can produce conflict, justifying their relatively low status. Disadvantaged groups may reduce this conflict by holding essentialist rather than meritocratic explanations for inequality. For example, when system justification motives are activated, individuals who were primed to feel low personal control reported higher self-esteem when presented with an essentialist (genetic) explanation for inequality (vs. a meritocratic explanation).

In *Chapter 18 Kitayama, Tompson and Chua* focus on the cognitive dissonance mechanisms of choice justification, and examine how individuals with different cultural backgrounds may experience dissonance in different circumstances. They also review recent neuroscience evidence and conclude that both culture and neuroscience are essential to expand the scope of the theoretical analysis of choice justification, contributing to the emerging field of cultural neuroscience. In *Chapter 19 Halberstadt and Jong* explore the role of death anxiety in acute explicit and implicit religious beliefs, as well as the effectiveness of religious beliefs in ameliorating both explicit and implicit anxiety. Their studies identify different self-regulatory processes operating and triggering controlled and automatic responses to existential threat. For example, nonreligious individuals report greater explicit disbelief, but also greater implicit belief, when faced with death anxiety, suggesting the operation of a motivated worldview defense mechanism. Finally, *Chapter 20* by *Zadro, Godwin and Gonsalkorale*

examines the motivational mechanisms involved in social ostracism for both sources (i.e. ostracizers) and targets (i.e. the ostracized), asking what motivates sources to ostracize, and what factors motivate targets to respond to the ostracism episode in a pro-social or anti-social manner? Zadro et al. also discuss the role of self-control mechanisms during the ostracism experience for both targets and sources.

SUMMARY AND CONCLUSIONS

As this by necessity brief overview shows, there are clear benefits in integrating research on motivation and self-regulation both with respect to conscious and unconscious motivational processes. Understanding how and why people adopt purposive action and how they regulate their motivational states for optimum effect is one of the most interesting yet complex tasks in social psychology. To return to the metaphor of the automobile we used in the introduction, we already know quite a lot about how the motivational "motor" produces movement, but we are only now beginning to understand how the essential regulatory systems analogous to the gearbox, brakes, and cruise control of an automobile direct and channel this motivational force. While the history of our discipline reveals a great deal of emphasis on the conscious and unconscious motivational processes that underlie social behavior, the work reviewed in this book suggests the need for the development of a more subtle, integrated and balanced approach and greater focus on the regulatory mechanisms to understand motivational processes. Our purpose here was to offer an up to date survey of this important emerging field. We very much hope that the contributions to this volume will achieve their objective and generate further interest in this fascinating area of social psychology.

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Part I

Introduction and Basic Issues

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2

Beyond Pleasure and Pain

Value From Engagement

E. TORY HIGGINS

Where does value come from? What do people want? We all know the answer to these questions. It's all about pleasure (good/want) and pain (bad/don't want). The ancient Greeks gave us this answer centuries ago in the hedonic principle, and there are dozens of recent books on "happiness" that agree with them. Indeed, this answer also underlies the common assumption that the best way to motivate others is with "carrots" (promising pleasure) and "sticks" (threatening pain). But if having a life of pleasure (and no pain) is the answer to what people want and what makes life valuable, how do we explain what happened in the Garden of Eden?

Adam and Eve were blessed by God in being placed in *the* original paradise—the Garden of Eden. This was a place of all pleasure and no pain. Moreover, in the midst of the garden was the *tree of life*, and Adam and Eve knew, from God's command, that they could eat from the *tree of life* and thereby have a life of all pleasure and no pain *forever*. Instead, Adam and Eve chose to eat the forbidden fruit from the *tree of knowledge*—the only act that would make them lose paradise.

If what people really want is to maximize pleasure and minimize pain, Adam and Eve would never have made this choice. Thus, there must be more to human motivation than maximizing pleasure and minimizing pain. What else is there? The answer lies in why Adam and Eve would want to eat the fruit of the tree of knowledge. The tree of *knowledge* is the tree of *truth* and a central motivation of humans is to *establish what's real*, to distinguish between truth and falsehood, between reality and fantasy. This motivation for the truth can be as important to humans as life itself (see Higgins, 2012). Moreover, the tree of knowledge is not just any knowledge—it is the *"tree of the knowledge of good*

and evil." This means that eating the fruit of this tree also satisfies another central human motivation, the motivation to *manage what happens*, the motivation to control our lives. Only when humans have the knowledge of what is good and what is evil can they be in control of their lives. And when you combine truth and control—when truth and control *work together* as in the tree of the knowledge of good and evil—then humans can live a life in which they "*go in the right direction.*"

Importantly, Adam and Eve's life in the Garden of Eden has little need for truth or control because everything is provided for them in this paradise. To be effective at having truth or control, at living a life in which *they* go in the right direction, they must eat from the tree of the knowledge of good and evil. What the Genesis story captures is that there is more to human motivation than just having pleasure, just having desired outcomes. It is not just the destination that matters. It is also the journey. Humans want to go in the right direction, and this requires being effective in truth and in control (see Higgins, 2012).

Importantly, when people are effective in truth and control their *engagement* in their goal pursuits is strengthened. Stronger engagement in goal pursuit activities makes people "feel alive" and contributes to well-being. And it does something else as well. It intensifies the value experience itself. It makes attractive things even more attractive, and it makes repulsive things even more repulsive. Thus, there is an irony here. Being effective in truth and control not only contributes to well-being beyond the value that derives from having desired outcomes, it also independently contributes to the experienced value of objects and activities beyond their hedonic properties. Not only is the journey itself worthwhile, but it impacts the value intensity of the destination itself. To understand how this happens, I need to introduce *regulatory engagement theory*.

REGULATORY ENGAGEMENT THEORY

Jeremy Bentham made an influential early statement on the importance of hedonic experiences to both ethical and non-ethical value (Jeremy Bentham, 1781/1988, p. 1): "Nature has placed mankind under the governance of two sovereign masters, *pain* and *pleasure*. It is for them alone to point out what we ought to do, as well as to determine what we shall do." In the voluminous literature on emotions and affect, hedonic experience has again been given a central role. Although differing in several respects, the two best known models of emotional experiences, the appraisal and circumplex models, as well as other influential models, universally agree in proposing a basic dimension that distinguishes between pleasant and painful emotions (e.g., Frijda, Kuipers, & ter Schure, 1989; Feldman Barrett, & Russell, 1998; Larsen & Diener, 1985; Ortony, Clore, & Collins, 1988; Roseman, 1984; Watson & Tellegen, 1985; see also Forgas; Inzlicht & Legault; Scholer, this volume). Influential theories and findings in decision science have also emphasized basic hedonic experiences, such as the pleasure of gains and the pain of losses or the pleasure of hope and the pain of fear (see Kahneman & Tversky, 1979; Lopes, 1987).

Despite this historical emphasis on hedonic experience, there are common sayings or maxims that suggest that the contribution of experience to value is not restricted to the pains and pleasures of goal pursuit outcomes: "It is not enough to do good; one must do it in the right way," "What counts is not whether you win or lose, but how you play the game," "The ends don't justify the means," and "Never good through evil." What these maxims are saying is that there is something else about the process of goal pursuit, about *how* goals are pursued, that contributes to value experience beyond hedonic experience. This extra something has been usually understood in terms of moral or ethical factors, but might there be more to the story than that? Might there be something else about the goal pursuit process that contributes to value experience beyond hedonic experience that need not even involve ethical considerations? The answer is "Yes." There are process factors involving truth and control that can *strengthen engagement* in goal pursuits, and stronger engagement can then intensify our positive or negative reactions to something.

Figure 2.1 provides an overall illustration of what *regulatory engagement theory* proposes as contributors to value experience (for a fuller discussion of regulatory engagement theory, see Higgins, 2006; Higgins & Scholer, 2009). Hedonic experience is one contributing factor but there are other factors as well, including those like need satisfaction and standards that contribute to

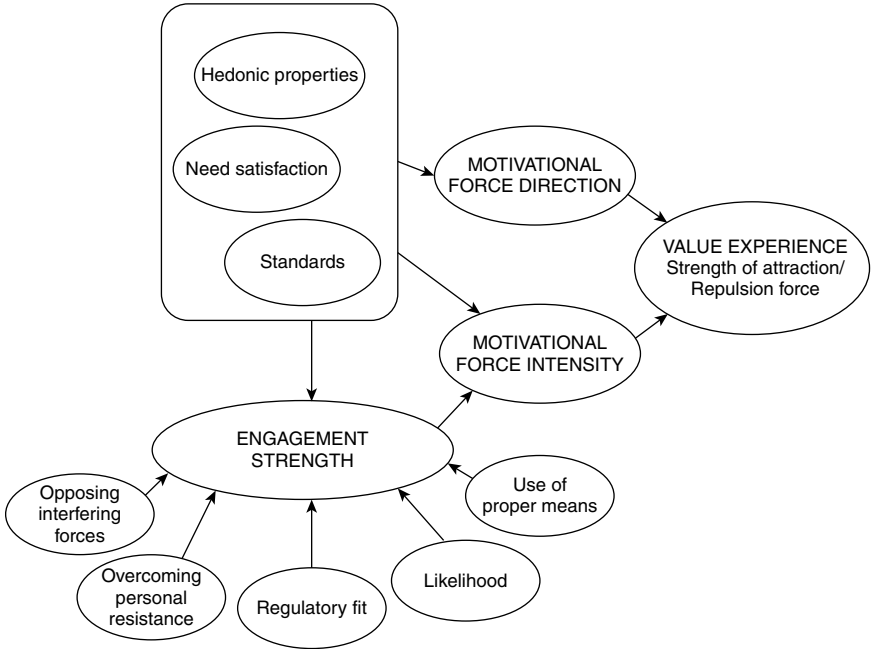

Figure 2.1 Illustration of proposed relations among variables contributing to the value experience.

value experience through their impact on engagement strength. In discussing this proposal, I begin with the value experience itself on the far right side of Figure 2.1. What exactly is the nature of this value experience?

For Lewin (1951), value is related to *force*, which has direction and intensity. Lewin's concept of "force" can be extended to personal experiences that have direction and intensity. Experiencing something as having positive value corresponds to experiencing a force of attraction toward it, and experiencing something as having negative value corresponds to experiencing a force of repulsion from it. Value experiences vary in intensity. The experience of a force of attraction toward something can be relatively weak or strong (low or high positive value), and the experience of a force of repulsion from something can be relatively weak or strong (low or high negative value).

The factor of engagement strength is shown on the bottom left of Figure 2.1. The state of being engaged is to be involved, occupied, and interested in something. Strong engagement is to concentrate on something, to be absorbed or engrossed with it (Higgins, 2006). Strength of engagement alone does not make something attractive or repulsive; that is, it does not have direction. Instead, strength of engagement contributes to the *magnitude* of positivity or negativity—intensifying the force of attraction toward something or intensifying the force of repulsion away from something.

As illustrated in Figure 2.1, value creation mechanisms such as need satisfaction, hedonic experience, and standards of different kinds all contribute to the direction of the motivational force, to whether the value force is positive attraction or negative repulsion. These mechanisms also contribute to the intensity of the motivational force, to how attractive or how repulsive something is. In contrast, strength of engagement, as illustrated in Figure 2.1, only contributes to the intensity of the value experience. However, this contribution can be important. In the subsequent sections I will describe collaborative research that illustrates how different truth and control factors can contribute to the intensity of the value experience through their impact on engagement strength—regulatory fit, use of proper means, opposing interfering forces, and likelihood (for fuller reviews, see Higgins, 2006, 2012; Higgins & Scholer, 2009).

STRENGTHENING ENGAGEMENT BY CREATING REGULATORY FIT

People experience *regulatory fit* (Higgins, 2000) when their goal orientation is sustained (*vs*. disrupted) by the manner in which they pursue the goal. For example, some students working to attain an "A" in a course are oriented toward the "A" as an accomplishment or an aspiration, as a grade that they ideally want to attain (a *promotion* focus). Others are oriented toward the "A" as a responsibility or as security, as a grade that they believe they ought to attain (a *prevention* focus). As a way to attain the "A," some students read material beyond what has been assigned (an eager strategy) whereas others are careful to make sure all course requirements are fulfilled (a vigilant strategy). Pursuing the goal of

attaining an "A" with an eager strategy sustains a promotion focus (a fit) whereas pursuing it with a vigilant strategy disrupts a promotion focus (a non-fit). In contrast, pursuing the goal of attaining an "A" with a vigilant strategy sustains a prevention focus (a fit) whereas pursuing it with an eager strategy disrupts a prevention focus (a non-fit). Regulatory fit represents *effective control* of the goal pursuit that strengthens engagement in the goal pursuit process. According to regulatory fit theory and regulatory engagement theory (Higgins, 2000, 2006), this should intensify the value of what one is doing. This prediction was tested in two different research programs—one examining the value of the object of goal pursuit and one examining the value of the goal pursuit activity itself.

Buying a Chosen Object: The Mug and the Pen Study

In an early test of fit effects on value (Higgins et al., 2003), undergraduates at Columbia University were given the choice of deciding whether they preferred a Columbia coffee mug or an inexpensive pen. Some participants had especially strong concerns with accomplishments and advancement (i.e., a predominant promotion focus) whereas other participants had especially strong concerns with safety and security (i.e., a predominant prevention focus). By itself, this personality difference had no effect on participants' choice, which was overwhelmingly the Columbia coffee mug (as expected), nor did it affect how much they were willing to pay to buy the chosen mug (when they were later given the opportunity to buy the mug with their own money).

The manner in which participants made their decision was also manipulated by giving them different instructions prior to making their choice. Half of them were told to think about what they would *gain by choosing* the mug and what they would gain by choosing the pen—an *eager* manner of choosing that ensures advancement. The other half were told to think about what they would *lose by not choosing* the mug or what they would lose by not choosing the pen—a *vigilant* manner of choosing that ensures against making mistakes.

By itself, the manner of choosing also had no effect on participants' choice nor how much they valued their choice. What did matter was whether the manner of making the choice was a fit or non-fit with participants' regulatory focus orientation. Predominant promotion participants who made their decision eagerly and predominant prevention participants who made their decision vigilantly (the two effective control conditions) offered much more money to buy the mug than predominant promotion participants who made their decision vigilantly and predominant prevention participants who made their decision eagerly—almost 70% more money for exactly the same mug!

Choosing to Perform an Activity Again: Fun versus Importance

In another regulatory fit research program (Higgins et al., 2010), participants were initially asked to perform an activity, and they were told that if their

performance was good enough they would receive a reward (an instrumental or reward contingency goal pursuit), which they all did. Before leaving the room for several minutes, the experimenter then told the participants that they could spend their time doing any of the activities that were available in the room, which included performing again the activity they had just completed or playing computer games or reading magazines. This was the *open period*. The study examined the participants' interest in doing the completed activity again—a measure of how much they valued it.

These parts of the experimental procedure were the same for everyone. Other parts varied. At the beginning of the study, some participants were assigned to perform a fun "Shoot-the-Moon" activity (trying to get a small ball to travel up a pair of parallel rods before falling) while others were assigned a non-fun but important "Financial Duties" activity (managing three types of financial transactions, like credit card payments). In addition to manipulating which activity participants were given to perform, there were two other experimental manipulations. First, the participants were told to think of the reward they could receive either as an *enjoyable reward* "like a prize you win at a carnival" or as a *serious reward* "like the salary you receive at work." Second, the participants had the open period introduced to them either as an *enjoyable "free time" period* or as a *serious "time management" period*.

"Shoot-the Moon" is a fun task, for which an enjoyable surrounding situation is a fit and a serious surrounding situation is a non-fit. The opposite is true for the "Financial Duties" task because it is an important task rather than a fun task. When doing this important activity, a serious surrounding situation is a fit and an enjoyable surrounding situation is a non-fit. The study found that participants with a fit (*vs*. a non-fit) were more interested in doing the completed activity again during the open period.

What happened for the "Financial Duties" activity is especially interesting. Making the surrounding situation more enjoyable *reduced* rather than enhanced subsequent interest in doing that activity again because performing an important task in an enjoyable way is a non-fit that weakens engagement and thus deintensifies attraction toward the task. Moreover, adding a contingent reward for performance neither generally increased nor generally decreased subsequent interest in the completed activity. It was the fit between the nature of the reward (enjoyable or serious) and the activity (important or fun) that mattered.

These findings have implications for previous classic research on "undermining intrinsic motivation" (e.g., Deci, 1971; Kruglanski, Friedman, & Zeevi, 1971; Lepper, Greene, & Nisbett, 1973). In the Lepper et al. (1973) study, for example, children who liked to draw were promised an award for helping out an adult by drawing pictures. This study found that the children in this instrumental reward condition later spent less time drawing in an open period than other children. Drawing pictures for these children would be a fun task, but receiving an award from an adult for drawing would be a serious surrounding situation. This would be a non-fit that could have decreased interest in doing more of

the task during the open period. However, what the "Shoot-the Moon" results show is that introducing an extrinsic, instrumental reward need not undermine interest in an intrinsically fun task *if* a fit is created by making the reward an enjoyable surrounding situation rather than a serious one. Moreover, introducing an extrinsic, instrumental reward *and* having a serious surrounding situation also need not undermine interest in re-doing a task *if* a fit is created by the task being important rather than fun.

STRENGTHENING ENGAGEMENT BY USING PROPER MEANS

Regulatory fit represents one kind of control effectiveness that strengthens engagement—effective use of a manner of goal pursuit that sustains one current goal orientation (e.g., eager manner for a promotion orientation). Another kind of control effectiveness that strengthens engagement is the use of proper or appropriate means when pursuing a goal—pursuing the goal in the *right way*. As I mentioned earlier, there are common maxims that suggest that pursuing goals in the right way contributes to value beyond the pains and pleasures of goal pursuit outcomes: "It is not enough to do good; one must do it in the right way" or "What counts is not whether you win or lose, but how you play the game." But the use of proper means need not involve behaving in a moral or ethical way in order for it to contribute to value. For example, James March (1994), a major figure in organizational decision making, has proposed that pursuing goals in an appropriate or proper way has its own relation to value creation, separate from just hedonic outcomes (i.e., separate from instrumentality).

Consider, for instance, what happens when individuals choose between a coffee mug and a pen. Some people might believe that the proper or right way to make this choice would be to list the positive and negative properties of the mug, then list the positive and negative properties of the pen, look over each list, and then make the choice. Making the choice in this way would not traditionally be considered a moral or ethical issue. But it does involve our doing something in a proper or right way, and this can strengthen engagement in what we are doing. This stronger engagement in turn can intensify our attraction toward our ultimate choice—independent of the inherent properties of that choice.

In recent studies we have investigated this possibility (see Higgins et al., 2008). Columbia undergraduates were asked to express their preference between a Columbia coffee mug and an inexpensive pen. As in our regulatory fit mug and pen study described earlier, we were only concerned with those participants who made the *same* choice—overwhelmingly the coffee mug.

In one study, before the participants actually made their choice, they were randomly assigned to two different conditions that varied in what was emphasized about the decision. One condition emphasized the "Right Way"; it began with the title, "Making Your Decision in the RIGHT WAY!", and then continued as follows: "You need to make your decision in the *right way*. The right way

to make a decision is to think about which choice has the better consequences. Think of the positive and negative consequences of choosing the mug. Think of the positive and negative consequences of choosing the pen. Please write down your thoughts on the lines below." The second condition emphasized the "Best Choice"; it began with the title, "The BEST CHOICE!", and then continued as follows: "The *best choice* is the choice with the better consequences. Think of the positive and negative consequences of owning the mug. Think of the positive and negative consequences of owning the pen. Please write down your thoughts on the lines below." Note that in both conditions the specific behaviors requested of the participants were exactly the same. What varied was whether those behaviors were perceived by the participants as making their decision in the right way or as leading to the best future outcomes.

After considering the two options and expressing their preference, the participants were given the opportunity to buy the mug that they preferred. The study found that the participants in the *Right Way* condition offered much more money to buy the same chosen mug than participants in the *Best Choice* condition. But that was not all. This study also asked participants how much they agreed with three cultural maxims concerning the importance of pursuing goals in a proper way: "The end does not justify the means"; "What counts is not whether you win or lose, but how you play the game"; and (reverse coded) "To do it this way or that, it does not matter—results are all that count." An index of "strength of belief in the importance of pursuing goals in a proper way" was computed by combining these three items. The more strongly individuals believed in pursuing goals in a proper way, the more strongly they should engage in the decision process when they are, indeed, behaving in the proper way, and this stronger engagement should intensify the value of the mug. In fact, for those participants with only weak beliefs in pursuing goals in a proper way, there was no significant difference between the *Right Way* condition and the *Best Choice* condition in the money offered to buy the mug. But for those participants who strongly believed in the importance of pursuing goals in a proper way, the money offered to buy the mug was much higher in the *Right Way* condition than the *Best Choice* condition—$6.35 in the *Right Way* condition versus $2.61 in the *Best Choice* condition. The findings from this research are consistent with the idea that pursuing goals in the right or proper way strengthens engagement in what we are doing, which intensifies attraction toward a positively valued object.

STRENGTHENING ENGAGEMENT BY OPPOSING INTERFERING FORCES

We have now considered two different kinds of control effectiveness that strengthens engagement and intensifies value—regulatory fit from pursuing goals in a manner that sustains one's current goal orientation, and using proper means or the right way to pursue a goal. There is a third kind of control effectiveness that can strengthen engagement and intensify value that my collaborators

and I have investigated—*opposing interfering forces*. We investigated this mechanism by examining different ways of dealing with adversity.

It is common for people to confront difficulties while they pursue their goals. Obstacles in the path toward a goal have to be removed. Forces pushing back from the goal have to be resisted. Aversive background conditions must be dealt with. In another research program (Higgins, Marguc, & Scholer, 2012), my collaborators and I investigated whether the direction of change in the value of a positive goal pursuit object (more attractive *vs*. less attractive) would depend on how people dealt with an adversity. When people encounter adversity in goal pursuit, they can either redouble their focus on the task at hand—the kind of response to difficulty that Woodworth (1940) described as resistance, as illustrated by leaning into a wind that is impeding one's progress—or they can direct their attention away from the task at hand and attend instead to something else, such as their unpleasant feelings. When people focus their attention on the task at hand, they will be more engaged in the focal goal pursuit, whereas when people attend to their feelings, they will be less engaged in the focal goal pursuit.

More specifically, while working on a task, one way of dealing with an unpleasant background noise is to represent it as something that is interfering with the goal pursuit and thus must be overcome in order to succeed on the focal task—opposing the interference from the background noise by paying even more attention to the focal task. This response to difficulty should strengthen engagement with the focal task activity, which would increase attraction toward a positive goal object. But another possible response is to represent the background noise as an aversive nuisance which produces unpleasant feelings that must be coped with—responding to difficulty as *coping with a nuisance*. By reducing focus on the task in order to cope with the unpleasant feelings created by the nuisance, this response to difficulty should weaken engagement with the focal task, which would *decrease* attraction toward a positive goal object. A recent study provides evidence that supports both of these predictions.

Supposedly to simulate real-world conditions in which people have to deal with unpleasant ambient noise while they are working, participants worked in the presence of an aversive background noise to solve enough anagrams to receive a prize. The noise was the same for everyone and consisted of a series of 12 different animal sounds (e.g., birds, sheep, horse, bear). The participants were randomly assigned to one of two instructions for how they should deal with the background noise they would hear while working on the task. Participants in the"*opposing*" condition were told, "the background noise is something you will have to overcome in order to attend to the task,", and "to do well on the task, you will need to overcome the distraction and oppose its interference." Participants in the "*coping*" condition were told, "the background noise is a bit of a nuisance to cope with. It is something that may cause you to feel a bit unpleasant—a feeling that you'll need to cope with." After ostensibly checking their solutions, the experimenter told all participants they had won the lottery ticket for the prize. Participants then indicated how much they valued this prize.

At the end of the study, there was a surprise recognition task for the content of the background noise that served as our measure of attention to dealing with adversity as instructed. In this task, participants were presented with each of the twelve animal sounds that had been played during the anagram task and an equal number of animal sounds that had not been played before. For each sound, participants indicated whether or not they had heard it before. For both the "opposing" condition and the "coping" condition, the more that participants dealt with the background noise as instructed, the worse their memory would be for the background sounds because, instead of paying attention to the sounds, they would be paying attention to either opposing or coping. For those participants who paid more attention to either opposing or coping as instructed, the value of the prize changed in opposite directions as predicted: for those who paid attention to opposing the background noise as an interfering force (strengthening engagement in the focal anagram task), the positive value of the prize increased (intensified attraction); for those who paid attention to coping with the unpleasant feelings created by the background noise (weakening engagement in the focal anagram task), the positive value of the prize decreased (deintensified attraction).

What this research highlights is that adversities, although unpleasant, do not necessarily make positive things in life less positive. Adversities can have this diminishing effect when people deal with them by disengaging from what they are doing in order to cope with the unpleasant feelings produced by the adversities. Such disengagement would decrease the positivity of positive things. But if people instead oppose adversities as interfering forces and redouble their focus on what they are doing, i.e., strengthen their engagement, then dealing with adversities can actually make positive things in life even more positive. These findings extend current models of how obstacles affect value by providing evidence that *how* adversity is dealt with plays a critical role in whether adversity increases or decreases the value of something.

STRENGTHENING ENGAGEMENT BY USING HIGH LIKELIHOOD EXPRESSIONS

Thus far I have considered how mechanisms of *control* effectiveness can intensify (or deintensify) the positive value of something through strengthening (or weakening) engagement. In this section I will describe how a mechanism of *truth* effectiveness can both intensify the positive value of a positive object *and* intensify the negative value of a negative object by strengthening preparatory engagement for something that will *really* happen.

The concept of likelihood, and related concepts such as probability and expectancy, holds a special place in psychology and other disciplines studying judgment and decision-making. In psychology and economics, the concept of likelihood is perhaps best known for its role within the model of *subjective expected utility* (SEU). The model assumes that the possible outcomes from taking some action are disjunctive; that is, the outcomes are *mutually exclusive*

alternatives, joined by "or." In addition, the outcomes are *exhaustive*, capturing all of the possible outcomes. In the simple case of succeeding or failing on a task, success and failure as outcomes are mutually exclusive and exhaustive. There is a subjective probability of success and a subjective probability of failure, summing to 100% (see Atkinson, 1957).

In a SEU model, beliefs about the probability of a specific outcome are important because of the information they communicate about whether a particular future outcome is likely to occur, with the only *motivating* force (the pull) coming from the subjective value of that future outcome. In the SEU model, for example, when there are two possible future outcomes—"I will have cereal instead of eggs this morning" and "I will have eggs instead of cereal this morning"—a high probability of one outcome (e.g., 80% likelihood of having cereal) is *equivalent* to a low probability of the alternative outcome (e.g., 20% likelihood of having eggs). In this model, it is the future outcome that matters, and the probabilities are providing the *same information* about what will happen in the future; i.e., my having cereal is more likely to happen than my having eggs.

But what if subjective likelihood has a motivational force in its own right because it concerns another way of being effective—truth effectiveness? What if, as James (1948/1890) suggested, high subjective likelihood establishes something as real rather than imaginary? If this were the case, then a subjective likelihood about a future event could contribute to value not only by providing information about whether *that* specific outcome is likely to happen in the future, but also by affecting strength of engagement *now—preparatory engagement for a future reality*. And this preparatory engagement could affect the value of something *else* in the *present* by intensifying current evaluative reactions. When individuals experience high likelihood, future outcomes feel real. And because they need to prepare now for something that will really happen, their engagement in what they are doing in the present is strengthened. And stronger engagement will intensify evaluative reactions to what they are doing now.

From this perspective, then, experiencing high likelihood of some future outcome, by strengthening engagement now, could affect the value of something else in the present. A recent research program investigated these implications (Higgins, Franks, Pavarini, Sehnert, & Manley, 2013). In one study, undergraduates believed that they were participating in a marketing study for a new dairy company that was trying to decide what would become their newest flavor of yogurt. In the first part of the study, they tasted two different types of yogurt flavors (labeled A and B). One type of yogurt flavor was pre-tested to be good-tasting (flavored with sugar and nutmeg) and the other was pre-tested to be bad-tasting (flavored with clove). The participants were also told that in the second part of the study they would try either more concentrations of just type A yogurt or more concentrations of just type B yogurt. It will be either A or B.

The likelihood of later trying just Type A or just Type B was expressed using either a *high likelihood expression* (80% chance) or a *low likelihood expression* (20% chance). For example, if it was probable that participants would later try more concentrations of the good-tasting yogurt A, the high likelihood expression

condition said "You have an 80% likelihood of later tasting concentrations of yogurt A," whereas the low likelihood expression condition said "You have a 20% likelihood of later tasting concentrations of yogurt B"—different likelihood expressions (80% A *vs*. 20% B) for the *same* future probable event (i.e., it is probable that they will later taste concentrations of yogurt A rather than yogurt B).

According to the SEU model, the high probability of later tasting sugar and nutmeg concentrations would intensify positive anticipation of the good yogurt, and the high probability of later tasting clove concentrations would intensify negative anticipation of the bad yogurt. Perhaps looking forward to tasting more of the good yogurt later would make people feel good now, and being upset about tasting more of the bad yogurt later would make people feel bad now, and these good or bad moods could affect evaluations of the two yogurts now. But no such mood effects were actually found in the study. Instead, what was found was an *expressed likelihood effect*.

Regardless of whether the probability was about tasting the good yogurt in the future or the bad yogurt in the future, describing the future activity as a 80% likelihood intensified evaluative reactions to both yogurts in the present more than describing the future activity as a 20% likelihood—the good yogurt tasted even better and the bad yogurt tasted even worse when the future was expressed as an 80% likelihood of something happening. When the future is expressed as being likely to happen, people prepare for it in the present, and such preparation strengthens engagement in present activities, which intensifies evaluative responses to those activities (both positive and negative responses).

Let us consider one implication of this expressed likelihood effect by reconsidering Atkinson's classic SEU model of achievement motivation (see Atkinson, 1957). Like other SEU models, this model is concerned with the probability of some future outcome; in this case, the probability of succeeding on a future achievement task. Because the probability of success and the probability of failure must sum to 100%, the probable future event can be expressed either in terms of the likelihood of success, such as "the likelihood of success is 80%," or the likelihood of failure, such as "the likelihood of failure is 20%." According to Atkinson's theory, *both* the (subjective) likelihood of success and the likelihood of failure contribute to overall achievement motivation by combining with the (subjective) value of success and the value of failure.

Because the likelihoods of success and failure necessarily move in opposite directions, when the probability of one is high the probability of the other is low. From the perspective of the expressed likelihood effect, if the high probability were expressed as high likelihood and the low probability were expressed as low likelihood, the forces from these two expressed likelihoods on engagement strength would work in opposite directions and cancel each other out. But the expressed likelihoods could *instead* be manipulated independent of probability, such that the same probable future event, such as a high probability of future success, could be expressed either as "there is an 80% likelihood of success on the future task" or as "there is a 20% likelihood of failure on the future task." Compared to the latter low likelihood expression, the former high likelihood

expression for future probable success should induce a stronger experience of what's real and thus strengthen engagement, which should in turn increase mobilization of resources for the upcoming event (i.e., preparation) that should enhance performance.

CONCLUDING REMARKS

People want to be effective not only at having desired outcomes (value effectiveness), like having pleasure and not pain, but also at managing what happens (control effectiveness) and establishing what's real (truth effectiveness). Not only do control and truth effectiveness themselves contribute to our overall well-being independent of value, they can contribute to value as well through strengthening our engagement in goal pursuit activities (Higgins, 2012). Stronger engagement intensifies value, making attractive things more attractive and making repulsive things more repulsive (Higgins, 2006).

Our research has demonstrated such effects of control effectiveness (regulatory fit; use of proper means; opposing interfering forces) and truth effectiveness (expressed likelihood). As mentioned earlier, there are clear benefits to well-being from such mechanisms because individuals "feel alive" when they are strongly engaged in what they are doing and feel strongly about things in their life. And when control and truth *work together* effectively, we experience our life as *going in the right direction*.

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3

The Evolutionary Unconscious
From 'Selfish Genes' to 'Selfish Goals'

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Evolutionary social cognition (e.g. Ackerman, Huang, & Bargh, 2012; Kenrick et al., 2010; Neuberg et al., 2004; Neuberg & Schaller, in press) seeks to link the human information processing adaptations gleaned from eons of natural selection to social cognitive tendencies of the present day. It seeks to answer the question of how evolved mental structures from the distant past play out in contemporary environments to influence social judgment and behavior. Certainly, basic motivational systems to stay alive, and to reproduce offspring into the next generation, would afford the human (and any other) species a survival advantage. While positing these two motives is almost tautological, it is the consideration of the relative strength of the two basic motives that makes things a bit more interesting.

The essential theme of Richard Dawkins' profoundly influential work, *The Selfish Gene* (1976), is that when it gets down to brass tacks, the genes' survival (reproduction) trumps the survival of the individual host organism. Dawkins describes how every organism is comprised of multiple genes, each of which can be seen as using that organism as a survival machine. According to his theory, genes influence the design of their host organism in order to maximize their chances of replication into future generations, and not necessarily to increase the welfare of their host (unless doing so is relevant for replication). He argues with much varied evidence across the animal kingdom that it is the genes that are ultimately in charge, in that the imperative to reproduce and propagate into the next generation trumps the survival of the individual host organism, when

the two are in conflict. For example, we are much more "altruistic" in giving up resources and risking our own safety in order to help our nearest genetic neighbors, and our self-sacrifice is a function of the genetic similarity (more help to children than cousins, more to cousins than strangers, etc.).

Here (see also Huang & Bargh, in press) we draw an analogy between the genes' ultimate control, often trumping even the self-interests of their host organism, and the proximal control over human judgment and behavior exercised by one's currently active goal pursuit, often trumping the more stable self-interests and central beliefs and values of the individual pursuing that goal. We will marshal evidence that it is the current goal's agenda that drives the show when the two (individual self versus current goal) are in conflict.

FROM GENES TO GOALS

Dawkins (1976, p. 131) drew an explicit link between genetic influences and purposive goal pursuits. Essentially, he argued, genetic influences are from too long ago and cannot possibly anticipate future environmental conditions tens of thousands of years into the future to be able to provide guidance within the organism's specific environmental circumstances. Thus instead genes equip the individual organism with minimal, basic motivations that are most probable to aid survival and reproduction, and leave the system "open-ended" (see also Mayr, 1976) so that the individual's early experience can fill in the fine-tuning to most successfully adapt that individual to the current conditions that happen to be in force when and where he or she is born. A wonderful example of this kind of mechanism is language acquisition (Pinker, 1994), in which the toddler rapidly learns the local language and even dialect around age 3—but any newborn can be taken to any part of the world and any culture, and learn that particular language perfectly. (We suggest that this natural absorption of the local language extends to the rapid and natural absorption of the local cultural values and norms—rules of safe social conduct—as well.)

For Dawkins, then, our goal pursuits, and executive processes more generally, are the present-day agents that carry out genetic influences from the past. They operate to guide our social cognitive processes mainly through the direction of selective attention (Neuberg et al., 2004) to certain aspects of the environment and not others, to motivationally relevant stimuli, which then complete the process by serving as activating stimuli (primes) for associated mental representations. The content of these mental representations contains not only relevant information about the stimuli but also appropriate behaviors for acting on those stimuli. The cycle operates thus: genes → goals → attention → environmental stimuli → specific stimulus-related goals and expectations/anticipations driven by the particular set of stored knowledge activated. We will return to a more detailed description of this interactive goal-environment mechanism in Section 3.

An evolutionary perspective on unconscious motivations, and unconscious social-cognitive processes more generally (those that become active and operate without the conscious intent or awareness of the individual), is consistent

with and uniquely accounts for four major developments in social cognition research:

1. the observed high similarity between conscious and unconscious motivation outcomes and processes,
2. the direct and automatic connection of internal social automatic mental processes and external behavioral tendencies,
3. the unconscious operation of goal structures itself, capable of detecting goal relevant stimuli and transforming it using organs of executive processes to further the goal pursuit, and
4. the overriding of chronic self-related values and interests in the service of the active goal pursuit.

1. SIMILARITY OF CONSCIOUS AND UNCONSCIOUS MOTIVATION

The contemporary research on unconsciously operating goal pursuits reveals a high degree of similarity with what is known about conscious goal pursuit from a century of research on the latter (see Bargh, Gollwitzer, & Oettingen, 2010)—in processing outcomes as well as particular processing stages; in subjective, phenomenal qualities of experience during the pursuit as well as consequences for affective states and future motivational strength. Primed goals—triggered by the incidental processing of goal-related stimuli in one's environment and not by conscious intentions, and thus operating without the person's knowledge or explicit intent—nonetheless proceed through similar sub-stages as consciously pursued versions (as is shown in the case of the impression formation goal; McCulloch et al., 2008). They produce the same tendencies towards completion, overcoming obstacles in the way, and resumption after interruption, as Lewin (1926) first noted for conscious goal pursuits (see Bargh et al., 2001). They use the same executive processes of working memory and selective attention in order to transform incoming information to suit the purposes of the currently active goal (Bargh, 2005; Marien et al., 2012; Neuberg et al., 2004). They become stronger and more likely to be chosen to be pursued in the future after successful attainment of the goal, and weaker and less likely to be pursued after failure (Bongers, Dijksterhuis, & Spears, 2009; Chartrand et al., 2010; Chartrand & Bargh, 2002), as has been well established for consciously pursued goals by Bandura's extensive research program into self-efficacy effects (e.g., Bandura, 1977, 1986). In their experimental research, Custers and Aarts (e.g., 2005, 2007) have shown that it is the mere associative pairing of positive affect with the goal representation—as presumably happens upon successful goal completion (Bandura, 1986)—which increases goal strength, and similarly negative affect which decreases goal strength, with this effect on future motivational tendencies an entirely unconscious one (i.e., not requiring reflective, deliberate conscious thought processes to occur).

Indeed, cognitive neuroscience studies of the brain regions involved in motivated behavior support a model wherein the same underlying mechanisms

govern both unconscious and conscious forms of goal pursuit. Pessiglione and colleagues (2007) showed that people automatically increased effort on a handgrip task when the reward cue (amount of money to be won on that trial) was presented subliminally, the same as what occurred when the reward cue was presented to conscious awareness. They also found that the same region of the basal forebrain moderated task effort level in response to both the consciously perceived and the subliminally presented reward signals. The authors concluded that "the motivational processes involved in boosting behavior are qualitatively similar, whether subjects are conscious or not of the reward at stake" (p. 906).

How can we explain the high similarity observed between conscious and unconscious motivational processes, outcomes, and effects? Traditionally, cognitive psychology has viewed unconscious or automatic processes as developing out of an extensive period of skill acquisition (e.g., Anderson, 1983; Newell & Rosenbloom, 1981) in which an initially conscious process becomes more efficient with consistent experience, needing fewer (limited) conscious attentional resources and less guidance over time (see especially Shiffrin & Schneider, 1977). The traditional conscious-centric model of pursuit, however, cannot account for the qualities recently observed for unconscious goal pursuit. For one thing, frequent and consistent experience with an initially conscious process is held to cause the *proceduralization* of the process so that its components do not require attentional resources and no longer have the phenomenal, in-awareness qualities of experience—the "bells and whistles"—of the original conscious process (e.g., Anderson, 1983). Yet unconscious goal pursuit does produce the tensional, experiential states of resumption and effort increase and also the affective consequences associated with success versus failure at the pursuit (see review in Bargh et al., 2010). And it does draw upon executive process resources of limited attention and working memory to attain its ends (Marien et al., 2012). Thus the skill acquisition model cannot account for the extensive similarities in conscious and unconscious goal pursuit.

Arguably, for much of our evolutionary history, humans did not possess conscious information processing capabilities—it was a relatively late evolutionary development (e.g., Deacon, 1997; Dennett, 1991; Donald, 1991). The evidence that only a subset of processes and regions of the brain are associated with consciousness, plus the fact that humans share much of this unconsciously-operating nervous system with earlier-evolving members of the animal kingdom (some of whom arguably lack consciousness), leads to the conclusion that conscious processes are a phylogenetically later adaptation of the brain. As Dennett (1991, p. 171) pointed out, "Since there hasn't always been human consciousness, it has to have arisen from prior phenomena that weren't instances of consciousness."

It is therefore more likely that the similarities arise because an originally (over evolutionary time) *unconsciously* operating motivational system can now be accessed and manipulated by (later evolved) conscious mental processes. That is, there is but one motivational system, but one that can be put into motion either by conscious or unconscious mental events. There are not two, or more than two, motivational systems (i.e., a separate Unconscious) as posited

by Freud, and the existing system is not an exclusively conscious one that only becomes unconscious with deliberate practice, as held by contemporary cognitive science models of nonconscious process development.

2. UNCONSCIOUS BEHAVIORAL GUIDANCE SYSTEMS

Another prediction can be derived (and retroactively tested) from the foregoing logic. If it is the case that unconscious mental systems evolved in order to guide behavior in adaptive ways, then these unconscious systems—and here we include mechanisms that produce discrete behavioral events (as in imitation and mimicry; see review by Chartrand & Lakin, in press) as well as motivational effects extended over longer periods of time—were shaped by the forces of natural selection. But natural selection can only operate on overt behavioral responses to the environment, not on internal cognitive processes for which there is no direct outward behavioral manifestation. This means that there should exist evidence that each of the basic forms of social automaticity discovered in the past quarter century should link directly to behavioral impulses and tendencies. If they represent evolved adaptations, then they must have direct, unconscious influences on outward behavioral tendencies, not just internal cognitive processes.

As it turns out, in line with the above prediction, each of the basic forms of social automaticity have indeed been found to produce adaptive behavioral tendencies in an unconscious manner (Bargh, 1997; Bargh & Morsella, 2010).

Automatic Evaluation

Attitudes were shown capable of unconscious, automatic activation (e.g., Fazio, 1986) long before it was discovered that they were linked to approach (for positive attitudes) and avoidance (for negative attitudes) muscular tendencies (Chen & Bargh, 1999). Moreover, this link between automatic evaluation and muscular readiness has recently been successfully exploited in therapeutic techniques for the treatment of addictions, with patients making incidental avoidance arm movements in response to addiction-related stimuli across hundreds of trials, which has the consequence of significantly reducing their cravings and use of the substance, with decreased rates of relapse (Wiers et al., 2011).

However, the original (and still dominant) model of automatic attitude formation was one of skill acquisition, positing the necessity of frequent and repeated activation of the attitude over time (Fazio, 1990) for it to become automatic. This is inconsistent with a model in which (evolved) unconscious influences over behavior are primary, and do not require conscious instigation. That meant further evidence was needed that even novel attitude objects would be evaluated automatically as positive or negative, and furthermore, that these original immediate evaluations would also produce adaptive approach or avoidance muscular action predispositions. Again, although their predictions were not generated from this kind of evolutionary model, two studies by

Duckworth et al. (2002) showed both that entirely novel attitude objects were automatically evaluated as positive or as negative, and that these evaluations were automatically linked to muscular approach versus avoidance tendencies, in harmony with the present thesis that automatic evaluative processes are an evolved adaptation.

Automatic Social Perception

A second form of unconscious behavioral guidance system is mimicry or imitation of the behavior of others, the general principle being that the perceived behavior of others naturally produces tendencies to behave in the same way. While this appears to be noncontroversial in the case of natural, unconscious imitation or mimicry of the physical, directly observed behavior of others (Chartrand & Bargh, 1999; Chartrand & Lakin, in press), the extension of the perception-behavior link (Dijksterhuis & Bargh, 2001) to less ecologically valid semantic cues is not as widely accepted at present. In this latter line of behavior priming research (e.g., Bargh, Chen, & Burrows, 1996; Dijksterhuis & van Knippenberg, 1998), verbal stimuli associated with the particular behavior, or stereotyped set of behaviors, are the perceived stimuli hypothesized to automatically produce behavioral tendencies. Even within this currently disputed domain of research, however, there is consistent and reliable evidence that social perception unconsciously leads to social behavioral tendencies when the perceived content makes contact with one's self-concept, that is, becomes part of one's "active self" (see Bargh et al., 2012, for review). And the issue about whether symbolic vehicles such as verbal stimuli can also reliably prime social behavior aside, the important point here is not in question: what we see and hear others do unconsciously creates "chameleon-like" tendencies for us to do the same thing. As Asch (1961) argued long ago now, when one is unclear as to what is the safe thing to do in a given situation, what others are currently doing is likely a good bet.

Automatic Goal Pursuit

Returning to our main theme, evolved genetic influences from the distant past exert their influence in the present-day largely through goal programs, or adaptive motivations that apply to a variety of situations and which guide behavior over extended time periods. We argue that these motivational structures were originally unconscious and are, in the present, able to be triggered through conscious and intentional processes as well. These motivational structures most directly and concretely carry out the dictates of the "selfish genes" through behavioral tendencies in the service of basic evolved (and gene-serving) motivations to survive (including safety, shelter, and disease avoidance) and reproduce (including social belonging, attraction and attractiveness, and extension of survival and safety concerns to reproduction-relevant others such as partners and children). We will flesh out this argument with evidence in the next section.

3. MECHANISMS OF MOTIVATION: THE GOAL—ENVIRONMENT INTERACTION

How does unconscious goal pursuit operate without conscious guidance? If purposive goal pursuits are the proxy for genetic influences in the animal kingdom, as Dawkins argued, then they operate unconsciously in many if not most organisms (who presumably lack the qualities and capacities of human consciousness). Dawkins' own examples of goal structures operating on environmental stimuli were exclusively unconscious in nature, such as servo-regulators and thermostats, which react automatically to discrepancies between environmental conditions and the desired steady state of the organism. He restricted himself to unconsciously operating goal structures and programs because he wanted his principle to apply to genetic influences generally and thus not be dependent on the special, relatively unique powers of human consciousness.

Like Darwin (1859), Dawkins (1976) did not discuss human beings at all, leaving it up to his readers to decide whether the offered description of natural processes across the organic kingdom would also apply to humankind. Given the presumed continuity of human psychology with the other natural sciences (Pinker, 1994; Symonds, 1992), one should expect to find evidence of unconscious motivational influences in human beings as well. From Freud's (e.g., 1901) case studies through the "New Look" in perception (Allport, 1955; Bruner, 1957; Erdelyi, 1974) to modern social-cognitive work on unconsciously operating motivational-cognitive structures (e.g., Aarts, Custers, & Marien, 2008; Bargh, 1990; Custers & Aarts, 2010; Dijksterhuis & Aarts, 2010; Huang & Bargh, in press; Kruglanski, 1996; Marien et al., 2012), there is now abundant experimental as well as clinical evidence to support the extension of Dawkins' argument to humans.

Selective Attention to Opportunity Conditions and (then) Goal-Relevant Information

Supporting the notion that unconsciously operating goal processes are capable of influencing individual-level outcomes, experiments from both evolutionary psychology and social cognition highlight early-stage orienting mechanisms (e.g., selective attention and perception) which serve as "building blocks" for subsequent human behavior (Aarts, Custers, & Marien, 2008; Balcetis & Dunning 2006, 2010; Maner, DeWall, & Gailliot, 2008; Neuberg et al., 2004).

A wide variety of situational features have been shown experimentally to unconsciously activate relevant goals, from social contexts such as having power (Chen, Lee-Chai, & Bargh, 2001; Custers et al., 2008), to material objects such as dollar bills or briefcases (Kay et al., 2004; Vohs, Mead, & Goode, 2006), scents (Holland, Hendricks, & Aarts, 2005), and even the names of significant others in one's life (Fitzsimons & Bargh, 2003; Shah, 2003). In the everyday world, the presence of a goal-relevant object usually signals the presence of an opportunity for pursuit (e.g., when a person encounters a piece of cake, usually,

he or she has an opportunity to eat it). The context-sensitivity of goal activation highlights how goal processes can unconsciously prepare a person for pursuit the instant that potential opportunities arise.

For instance, implementation intentions, in which one commits oneself to a goal-furthering action in advance by mentally associating a specific concrete goal-pursuit action with an expected future event ("when, where, and how" the action will take place), have been shown to be highly effective means to attain otherwise difficult ends (diet, exercise, difficult health regimens; Gollwitzer, 1999; Webb & Sheeran, 2006). Implementation intentions effectively delegate control over one's future behavior to the environment, so that a specified reliably-occurring (e.g., routine) future event becomes the automatic trigger of that desired behavior (Gollwitzer, 1999). In this way a temporary or strategic automatic effect is created in the service of conscious goal pursuit.

Furthermore, similar to its conscious counterpart (Anderson & Pichert, 1978; Hastie & Park, 1986), an unconsciously operating impression formation goal causes greater selective attention to behavioral information inconsistent with the target's general and emerging pattern of behavior (Chartrand & Bargh, 1996; McCulloch et al., 2008). Highly accessible goal constructs provide "orienting value," automatically guiding the individual's attention to relevant stimuli in the environment (Bruner, 1957; Roskos-Ewoldsen & Fazio, 1992), which increases the probability that these objects will be used to achieve that goal. Goal-facilitating objects can also appear more accessible along different dimensions, by appearing closer in proximity to the pursuer or even larger in size. For instance, Veltkamp and colleagues (2008) established that participants who were subliminally primed with a gardening goal overestimated the size (height) of goal-instrumental objects (e.g., a shovel), but not of goal-irrelevant objects (e.g., a pen).

Use of Executive Process Structures and Working Memory

Mainstream accounts of executive control or working memory within cognitive science long held that all of the contents of working memory were accessible to conscious awareness—indeed, until recently, "working memory" and "conscious awareness" were used as synonymous terms (e.g., Smith & Jonides, 1998). Yet for goal pursuits to operate unconsciously, in real-time interaction with the fluid and dynamic external environment, active goals must make use of flexible working memory structures that operate on and often transform incoming informational input to serve the goal's agenda (Cohen, Dunbar, & McClelland, 1990).

The original studies (Bargh et al., 2001; Chartrand & Bargh, 1996) found that primed, nonconscious goals produced the same outcomes, not only behavioral but cognitive (e.g., memory structures) and motivational (e.g., resumption of interrupted tasks; Lewin, 1926) as well. Additional research later supported the notion that nonconscious goals also implicated the same subprocesses and brain regions as during conscious pursuit of the same goal (McCulloch et al.,

2008; Pessiglione et al., 2007). Bargh (2005) argued that logically these similarities could only be obtained if unconscious goal pursuit made use of the same executive functions and working memory as used in conscious goal pursuit, in order to selectively attend to some features of the environment over others and transform those to suit the current needs of the task. Several recent studies have documented and validated this prediction.

Hassin and colleagues (Hassin, 2005; Hassin, Bargh, & Zimerman, 2009) showed that a nonconsciously operating achievement goal served to increase working memory capacity on the serial reaction time task, and also to significantly improve performance on the Wisconsin Card Sorting Task, both standard measures of executive functioning. Across six experiments, Marien et al. (2012) subliminally primed a variety of goals (e.g., socializing, academic performance) and found that they all took attentional capacity (executive processing resources) away from an ongoing conscious task (e.g., proofreading). In a major review of this literature, Dijksterhuis and Aarts (2010) concluded that unconscious goal pursuit makes use of attention and executive processes in furtherance of the goal, just as does conscious goal pursuit, but in the absence of conscious awareness of the pursuit.

Evaluation or "Valence" of Goal-Relevant Stimuli

People's everyday judgments of other people, objects, and events are strongly influenced by how those stimuli relate to the goals they are pursuing. This principle has been a staple of social and motivational psychology since the seminal writings of Kurt Lewin (1935, p. 78) who defined the *valence* of an environmental object or event in terms of whether it helps or hinders the attainment of one's current goals and the satisfaction of one's current needs.

Active goal influence is so powerful that it can change evaluations of friends, enemies, and even significant others—the very people about whom one's opinions presumably remain stable over time. Fitzsimons and Shah (2008) found that participants who were unconsciously primed with an achievement goal evaluated friends who had helped them with their academic pursuits more positively compared to friends who had not helped them academically. This momentary favoritism towards goal-instrumental friends was not observed for unprimed control participants.

Additional studies have shown that one way through which nonconscious goal pursuit furthers attainment of the end-state is by changing the valence or positivity of environmental stimuli, making goal-facilitating more positively evaluated. Because this positive evaluation is linked with stronger approach motivations (Chen & Bargh, 1999) this naturally increases approach motivational tendencies towards those goal-facilitating objects and people (Ferguson, 2008; Fitzsimons & Shah, 2008). For example, Fitzsimons and Fishbach (2010) found that when the achievement goal was primed, participants reported that they liked their study friends more than their party friends, but when the socializing goal was primed, they now liked their party friends more.

Reconfiguration of Chronic Processing Tendencies to Serve The Active Goal

The transformational power of the active goal over cognitive and affective processes is further indicated by its ability to override otherwise chronic, automatic encoding tendencies. For example, there is much evidence of the automatic manner in which other people are automatically encoded or categorized in terms of their race, age, and gender (e.g., Bargh, 1999; Brewer, 1988). Recent research, however, suggests that chronic goals to be egalitarian inhibit the same prejudicial biases previously assumed to be automatic and uncontrollable (e.g., Kunda & Spencer, 2003; Maddux et al., 2005; Moskowitz et al., 1999).

A similar overriding effect of automatic, prejudicial processes occurs with temporarily active goals as well. Research also suggests that default negative racial IAT responses to African-American faces can be flipped into positive evaluations when participants are informed that those same faces belong to their online teammates (Cunningham, van Bavel, & Johnsen, 2008). These findings are consistent with the notion that joint goals (which are introduced by new alliances) can override automatic processes, causing the recategorization of outgroup members into in-group members.

Spencer and colleagues (1998) provide perhaps the most dramatic example of a nonautomatic process becoming automatic when it facilitates the current goal pursuit. Research suggests that conditions such as attentional load can prevent people from engaging in negative stereotyping processes. Spencer and colleagues reasoned, however, that negative stereotyping is a means through which one can enhance one's own self-esteem (at the expense of others), and therefore should persist even in conditions which normally impede stereotyping effects given participants' active needs to restore their self-esteem. Indeed, by providing (bogus) feedback that participants had done very poorly on a task, the experimenters were able to elicit automatic stereotyping effects under conditions where such processes normally do not occur, thereby providing a particularly powerful demonstration of the active goal's ability to reconfigure a person's cognitive machinery in the service of its own pursuit.

Automatic Strengthening and Weakening of Goal Tendencies Based on Experience

Just as the probability of nonconscious goal activation increases with the reward or incentive structure of the environment (as indicated by the amount of positive affect associated with the goal representation), so too does the strength of the goal map onto one's success at pursuing it (Bongers et al., 2009; Chartrand & Bargh, 2002; Moore, Ferguson, & Chartrand, 2011). Following the priming of the achievement goal, for instance, "success" at an easy anagram filler task increases both positive mood and how hard participants work on a subsequent verbal task; "failure" on a hard (impossible) filler anagram task has

the opposite effects. Success also increases the positivity of automatic attitudes towards the goal, and failure decreases them (Moore et al., 2011); all of these effects serve to automatically perpetuate the goal into future situations by increasing the probability that one will pursue relatively rewarding and attainable goals and decreasing probability of pursuit of goals that are low in relative reward value and which one is less likely to obtain due to external or internal obstacles (Veling, Holland, & van Knippenberg, 2008).

Of course, it bears repeating that evidence of the operation of unconscious motivations is prima facie evidence for the unconscious operation of all of the above sub-processes as well (see Bargh, 2005, 2006). Participants in studies in which goals are primed and activated unbeknownst to them cannot know in advance which goal-relevant stimuli might be presented; in fact, they are not even aware of which stimuli are goal-relevant and which are not. Nevertheless, in each experimental demonstration of unconscious goal pursuit, the primed goal produced the goal-appropriate outcomes, just as with conscious goal pursuit. For the obtained results to have occurred, the active goal had to be ready for whatever goal-relevant environmental input might arise, and then operate on it when it did occur; unconscious goal pursuit therefore must involve the use of executive control and working memory functions as used in conscious goal pursuit (Frith, Blakemore, & Wolpert, 2000; Hassin, 2005).

4. ACTIVE GOAL VERSUS SELF-CONCEPT AS ULTIMATE CONTROLLER

The "selfish gene/selfish goal" analogy generates a fourth broad implication: that just as genes operate "selfishly" to propagate themselves into the next generation, sometimes at the expense of their host organism when their interests conflict, so too do active goals operate to pursue their own agendas, sometimes in contradiction to their individual human hosts' important self-values and self-interests.

Traditional psychological approaches to human motivation have assumed an agentic, conscious self at the helm, deliberately forming judgments, making decisions about which courses of action to take, and then guiding one's behavior along those intentional lines (e.g., Ajzen & Fishbein, 1980; Bandura, 1986; Baumeister, 1998; Locke & Latham, 1990; Mischel, 1973). However, research on the limits of introspective access demonstrates that people are often unaware of the reasons behind their actions and the actual sources of their evaluations and subjective feelings about the external world (Bar-Anan, Wilson, & Hassin, 2010; Nisbett & Wilson, 1977; Wilson & Brekke, 1994)—access they would be expected to have if they were always consciously aware of making those choices and deciding what to do. Certainly we do often make these choices consciously, but consciousness is not necessary for the selection and guidance of action (see Baumeister & Bargh, in press).

Neuroscience evidence also supports the dissociation of action systems from awareness. That executive control structures can operate without the person's

awareness of their operation would require the existence of dissociable component processes within executive control or working memory structures (Baddeley, 2003; Baddeley & Hitch, 1974; Buchsbaum & D'Esposito, 2008). Evidence of such dissociations has been reported in stroke patients with "environmental dependency syndrome" caused by lesions in the frontal cortical lobes (Bogen, 1995; Lhermitte, 1986). This evidence has led some to conclude that conscious intentions are represented in the prefrontal and premotor cortex, while the parietal cortex houses the representation used to guide action (Frith et al., 2000). (For additional evidence of the operation of action systems dissociated from conscious awareness, see Dijksterhuis & Aarts (2010), Milner and Goodale (1995), Bargh and Morsella (2010), and Wegner (2002).) We take such findings as additional support for the notion that the mechanisms guiding individual behavior evolved separately from the mechanisms furnishing conscious awareness of their operation.

As multiple goals within a single individual become active, operate, and turn off, the person pursuing those goals may appear to be acting inconsistently, or in a manner which seems contrary to his or her stable self-concept or self-interests. In the "goal turn-off effect," once a goal pursuit attempt is completed, the goal de-activates (e.g., Atkinson & Birch, 1970; Lewin, 1926) and then for a time inhibits the mental representations used to attain that goal (Förster, Liberman, & Higgins, 2005; Marsh et al., 1998), which can ironically produce behaviors contrary to those originally encouraged by that goal. For example, in research on "moral licensing effects" (Monin & Miller, 2001) participants who were given the opportunity to disagree with blatantly sexist comments were thereafter ironically more likely than a control group to recommend a man than a woman for a stereotypically male job (Monin & Miller, 2001; see also Effron, Cameron, & Monin, 2009).

The pursuit of everyday goals has "selfish" effects as well, and may cause an individual to desire things that one may not have wanted were one not actively pursuing the goal. For example, young women primed with the mating goal express more positive attitudes towards and stronger intentions to engage in attractiveness-enhancing yet dangerously unhealthy behaviors such as spending time in tanning booths and taking diet pills (Hill & Durante, 2011). Those behaviors may facilitate the currently active goal of mating (by increasing one's sex appeal) but operate against the long-term interest of the individual. Indeed participants' attitudes towards these behaviors when the mating goal was not currently active were considerably more negative. However, while such changes in evaluation may further pursuit of the current goal, they may not be in the long-term best interest of the individual (Huang & Bargh, in press). Hill and Durante (2011) found that the unconscious activation and operation of the mating goal caused women to view the health consequences of tanning booths and dangerous diet pills as less negative and personally threatening, leading them to report, while that goal was active, stronger intentions to use them.

CONCLUSIONS

The present framework offers advantages in explanatory power while remaining in harmony with evidence and principles from other natural sciences. The advantages in explanatory power include accounting for two major empirical developments in the study of social automaticity that are difficult to reconcile with the assumptions of contemporary models of cognitive science. The first of these is the observed high similarity in not only the outcomes but also the subprocesses, experiential or phenomenal states, and neurological circuits involved in conscious and unconscious motivational processes, respectively. Second is the observed direct connection between internal social automatic processes such as concept activation by relevant external stimuli (e.g., stereotypes), on the one hand, and external behavioral tendencies on the other. That these internal automatic processes of social perception, evaluation, and motivation/goal activation each directly moderate the current behavioral tendencies of the human perceiver is consistent with their being the product of natural selection, which can only operate on overt behavioral tendencies.

Instead of a tabula rasa view of automatic or nonconscious processes in which they are held to arise exclusively from each individual's own extensive past conscious experience (skill acquisition), the evolutionary approach to the unconscious recognizes that unconscious purposive and adaptive processes guided human behavior prior to the relatively recent addition of conscious access to those processes, and that these original unconscious behavioral guidance systems are still in operation in the present day. The human mind did not go through a sudden and dramatic reconfiguration when conscious processes emerged; rather the older and more primitive mental strata remain today very much a part of every individual's brain, mind, and daily life.

The selfish-goal model holds that human goal pursuit—whether operating consciously or unconsciously—constrains a person's information processing and behaviors in order to increase the likelihood that he or she will successfully attain that goal's end-state. These multiple, sometimes conflicting goals can produce different behaviors, judgments, and even self-representations in the same person that may appear inconsistent or contradictory across time, because they will vary as a function of which of these goals happens to be most active and motivating at that moment. Put another way, observed incoherencies in a person's actions may result because behavior is being selected (and is coherent) at a lower, less apparent goal level.

Today, just as had Freud (1901) in the *Psychopathology of everyday life*, contemporary psychological theorists are invoking the concept of motivation (unconscious or conscious) in their explanations for why people behave in ways that seem to run against their self-interest and values—for example, by engaging in risky health behaviors in service of the fundamental reproduction/attraction goal (Hill & Durante, 2011). In political psychology, Jost and colleagues (2008) have focused on *system justification* effects, in which people perceive the current status quo regarding political power and division of resources as legitimate

and fair—even those who are low status and for whom the system actually operates against their self-interests. The researchers explicitly appealed to the operation of an unconscious system-justification motive in order to account for these "relatively puzzling cases of conservatism, right-wing allegiance, and out-group favoritism among members of low-status groups," which can only be understood if they are "not even aware of the extent to which they are privileging the status quo and resisting change" (p. 596).

We have argued that just as genes have their own agendas separately from those of their host organism, active goal pursuits seek their desired end states often against the interests and values of their host individual. As proxies for genetic influences from the distant past, they are powerful enough to reconfigure even chronic, automatic processes into their service, and to make usually effortful processes into highly efficient, automatic ones (as in the case of implementation intentions). This reconfiguration of the mental machinery by the currently active goal pursuit is revolutionary in its implications for the plasticity of cognitive structures and processes (see also Fiske, 2012), and is just one of what we hope will be many further insights that such an evolutionary approach will generate.

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4

Dual Process Models and Serotonergic Functioning

Impulse and Self-control

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The concept of motivation is used to convey the sense of being impelled toward action of one sort or another. Once evoked, the action sometimes occurs immediately and freely. In other cases, several motivations are in play at the same time, yielding competition among incompatible actions. In this latter case, the result is typically that one action occurs and the other (or others) will be suppressed. The restraint of one or more action tendency implies the regulation of one motivation, generally by the overriding influence of another motivation. Human life is filled with such regulatory events.

Psychologists have recognized this proliferation of regulatory events with a (smaller) proliferation of terms. Some use the term *self-regulation* used to refer to such phenomena (Vohs & Baumeister, 2011). Sometimes, though, the term *self-regulation* is used to refer to a broader set of phenomena: the carrying out of an intended behavior by monitoring its consequences, to keep it on the desired path (Carver & Scheier, 1998). The latter usage does not convey any implication of a countervailing motivation. Another term for regulatory events that do involve competing motivations is *self-control*, which explicitly means restraining or suppressing one action tendency in favor of another one (Inzlicht & Legault, this volume). In this chapter we focus on this class of events, and tend to use the label *self-control*.

In contrast to self-control is *impulsiveness*: the occurrence of some action without regard to some of its potential consequences. Impulsiveness is another concept that can be difficult to pin down, however (Barratt, 1985; Block, 2002; Carver, 2005; Dickman, 1990; Eisenberg, 2002; Nigg, 2000; Solanto et al., 2001; Stanford & Barratt, 1992; White et al., 1994; Whiteside & Lynam, 2001, 2003). Impulsiveness can take many forms, including jumping quickly to acquire a potential incentive, being easily distracted from one's current path by other opportunities that arise while the current pursuit is ongoing, and reacting quickly to the occurrence of an emotion.

We emphasize in this chapter an aspect of impulsiveness that is implied by most definitions of it, but is probably less salient than other properties. Specifically, we emphasize the idea that impulses are reactive: relatively immediate responses to some stimulus in disregard of other considerations. Under this view, the impulsive act need not entail approach—indeed, need not entail overt movement. A person can impulsively flee from a stimulus, if it evokes fear. A person can impulsively (reactively) remain passive when action might seem called for. The key, under this view, is that the action property that emerges represents a reactive, automatic association to the stimulus.

This chapter begins with description of a regulatory puzzle in personality psychology, which quite unexpectedly led to different puzzles in neurobiology and genetics, and now has turned to issues in clinical psychology. The focus of the chapter is on issues of impulsive reactivity versus constraint, or deliberative control of action. We begin by describing two accounts of a basis for this dimension of variability in personality. We then turn to evidence that this dimension of variability reflects (in part) variations in serotonergic function. More specifically, we suggest that certain serotonergically innervated brain regions help moderate the effects of underlying systems for approach and avoidance. Then we turn to the possibility that this view may help in thinking about how deficits in serotonergic function could be involved in a broad set of social and emotional problems, ranging from antisocial behavior to depression. The chapter closes with some further consideration of these problems.

IMPULSE AND CONSTRAINT

The field of personality is characterized by great conceptual diversity. Textbook authors often deal with the diversity by describing a range of theoretical views as alternative perspectives on personality and its functions (e.g., Carver & Scheier, 2012). Sometimes textbook authors also try to synthesize across theoretical boundaries, pointing to themes that seem to rise to the surface in one theory after another. Often enough, it turns out, similar themes are addressed by different theories but are handled differently by them.

One such theme is the tension in life between impulsiveness and constraint. At least since the time of Freud, this issue has been important to personality theories, whether framed in terms of delay of gratification, planfulness, socialization, or id versus ego. As noted earlier, the concept of impulsiveness is used

in diverse ways. However, the core of the issue as it emerges within personality psychology is relatively straightforward. People often face situations in which they can immediately follow an impulse or desire, or they can overrule that impulse and evaluate more fully before acting.

It is important to keep in mind that both impulse and constraint have valuable characteristics in the appropriate contexts (Block & Block, 1980). When it is manifested as spontaneity, impulsiveness brings a sense of vigor and freedom to the human experience (e.g., Dickman, 1990; Hansen & Breivik, 2001). There are also occasions in which survival literally may depend on impulsive action—when a threat or an opportunity must be reacted to quickly.

However, impulses can also create problems. Impulsiveness can yield physical danger (e.g., impulsively chasing a ball into the street without looking for traffic). Impulses can interfere with attainment of longer-term goals (e.g., spending for today rather than saving for the future). Impulses can lead to violation of social norms (Cooper, Wood, Orcutt, & Albino, 2003; Lynam, 1996) and thereby to interpersonal conflict and even legal problems. Potential adverse effects of impulsiveness include marital instability (Kelly & Conley, 1987), employment problems (Hogan & Holland, 2003), and disruption of health-maintaining behaviors (Bogg & Roberts, 2004; Hampson et al., 2000; Hampson et al., 2001; Skinner, Hampson, & Fife-Schaw, 2002). Being able to control impulsive reactivity thus is crucial to successful self-management (Schmeichel & Tang, this volume; Vohs & Baumeister, 2011).

What forces determine the balance between impulse and constraint? What prevents impulses from always having free rein? Different theorists have posed different answers to these questions (for broader review see Carver, 2005).

Approach and Avoidance

One answer stems from the general view that incentives draw behavior toward them and threats inhibit or even reverse those actions (e.g., Cloninger, 1987; Davidson, 1984, 1998; Fowles, 1993; Gray, 1994a, 1994b; Lang, 1995). The incentive system is often called a behavioral approach system (BAS; Gray, 1972, 1982, 1994a) or an activation or facilitation system (Depue & Collins, 1999; Fowles, 1980, 1987). When engaged by incentive cues, it yields approach and positive affect (Gray, 1994a, 1994b), including eagerness and desire. The threat system is often called a withdrawal system (e.g., Davidson, 1992, 1998) and was earlier called a behavioral inhibition system (BIS; Gray, 1972, 1982, 1994a), though the latter term has different connotations today (Gray & McNaughton, 2000; McNaughton & Gray, 2000). When activated by threat cues, this system causes ongoing approach to be inhibited and may lead to behavioral withdrawal (Fowles, 1993; Gray, 1994a). It also underlies emotions such as anxiety or fear (Carver & White, 1994; Davidson, 1992; Gray, 1982).

It can be argued that nothing more is needed to account for variability in impulsiveness than these basic approach and avoidance processes. The stronger the tendency to approach cues of incentives, the greater is the likelihood of

impulsive approach. Indeed, Gray (1994a) chose *impulsivity* as his label for the personality dimension deriving from sensitivity of the approach system. In the presence of threat cues, however, the threat system becomes active, stifling ongoing approach. One might think of this stifling of approach as representing regulation of the approach motive by the avoidance motive. On the other hand, one might also think of a very reactive threat system as being impulsive in itself, yielding reactive avoidance that is not down-regulated by the approach system.

Approach competing with avoidance is one starting point in thinking about impulse and constraint. There are a number of reasons, however, for suspecting that the competition between approach and avoidance is not the entire story. One reason is that in comprehensive trait models of personality, both the trait that reflects approach and positive emotions and the trait that reflects avoidance and negative emotions are distinct from the trait that reflects constraint (Clark & Watson, 1999; Depue & Collins, 1999; Zelenski & Larsen, 1999). That is, threat sensitivity and constraint are separate dimensions.

Another reason for believing that approach and avoidance are not the entire story is that it is relatively easy to point to situations in which constraint seems to be unrelated to anxiety. An example is delay of gratification: foregoing a small reward now in order to obtain a larger one later (Mischel, 1974). Constraint in that situation does not seem to be based on avoidance of any threat, but rather about using time and planning to create more desirable overall outcomes.

Dual Process Models

A different view derives from the idea that people process information in two somewhat distinct ways simultaneously, one more primitive than the other. The two processing modes appear to use different aspects of available information (Rudman, Phelan, & Heppen, 2007). There is also evidence that the two modes learn in different ways, and that the two patterns of learning create parallel and potentially competing paths to action, which require continuous arbitration (Daw, Niv, & Dayan, 2005). The more primitive mode operates largely outside consciousness. The other is the familiar symbolic processor of the rational mind.

By now this idea and variations on it have been taken up as a useful conceptual framework in many areas of psychology (Barrett, Tugade, & Engle, 2004; Kahneman, 2011; MacDonald, 2008). The literature of personality psychology contains several dual process models, including what may be the earliest one in contemporary psychology: Epstein's (1973, 1985, 1990, 1994) cognitive-experiential self theory. This theory proposed that humans experience reality via a somewhat slow symbolic processor (the rational mind) and also an associative and intuitive processor that functions automatically and quickly. Epstein argued that both systems are always at work and that they jointly determine behavior. Metcalfe and Mischel (1999), drawing on decades of work on delay of gratification, proposed a similar model. They proposed that the relative strength of two systems determines whether one is able to restrain oneself: a "hot" system (emotional, impulsive, reflexive, and connectionist) and a "cool" system

(strategic, flexible, slower, and unemotional). How a person responds to a situation with competing pressures depends on which system presently dominates.

The dual process idea has also been widely used in social psychology (Chaiken & Trope, 1999). The essence of such a view existed for decades in the literature of persuasion, but it has long since expanded beyond those bounds. Perhaps the most widely known dual process view in social psychology at present is Strack and Deutsch's (2004) reflexive-impulsive model (see Hofmann, Friese, & Strack, 2009). But the ideas have proliferated far more widely.

The dual process idea also has an important presence in developmental psychology. For example, Rothbart and her colleagues (e.g., Rothbart, Ahadi, & Evans, 2000; Rothbart et al., 2001; Rothbart & Bates, 1998; Rothbart et al., 2003; Rothbart & Posner, 1985) have argued for the existence of basic temperament systems for approach and avoidance, and a third temperament termed effortful control (see also Kochanska & Knaack, 2003; MacDonald, 2008; Marcovitch & Zelazo, 2009; Nigg, 2000, 2003, 2006). Before the emergence of effortful control, behavior is a resultant of the influences of approach and avoidance temperaments (Figure 4.1). Greater sensitivity of the approach temperament makes impulsive action more likely; greater sensitivity of the avoidance temperament makes reflexive restraint more likely.

Effortful control emerges later in development than approach and avoidance temperaments. The label "effortful" conveys the sense that this is an executive, planful activity, entailing the use of cognitive resources to deter the tendency to react impulsively. Effortful control is said to rely on certain prefrontal brain areas (e.g., Eisenberg et al., 2004; Kochanska & Knaack, 2003; Nigg, 2001, 2003; Rothbart & Bates, 1998), and evidence from neuroimaging studies of both adults

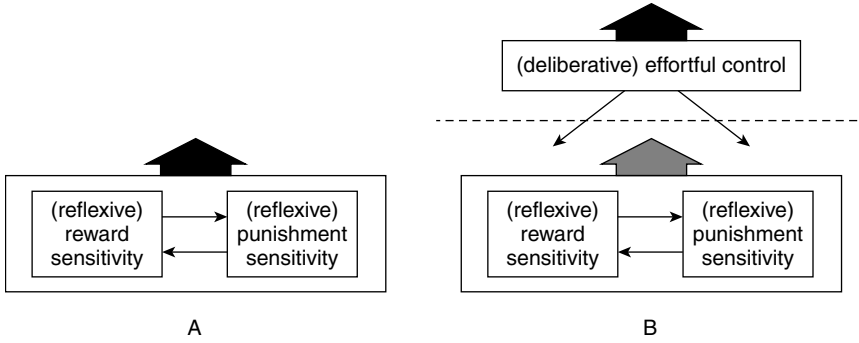

Figure 4.1 Three temperamental influences on behavior. A. A reactive system for approaching rewards and a reactive system for avoiding threats or punishment compete for ascendance; in the absence of effortful control, the resultant of that competition is expressed in behavior. B. The engagement of an effortful control system permits the resultant arising from the competition of the reactive systems to be overridden, thus dampening the role of the reactive systems in determining behavior. From Carver, Johnson, & Joormann (2008), adapted from various statements by Rothbart, Eisenberg, and others.

and children supports that argument (e.g., Durston, Thomas, Worden, Yang, & Casey, 2002; Durston, Thomas, Yang, Ulug, Zimmerman, & Casey, 2002).

Effortful control is superordinate to approach and avoidance temperaments (e.g., Ahadi & Rothbart, 1994; see also Clark, 2005). Its emergence permits control over reactive behavior: suppressing tendencies that are triggered by the approach or avoidance temperament, when doing so is situationally appropriate. If effortful control capacity is available, the grabbing of incentives that arises from a sensitive approach system can be restrained (Kochanska & Knaack, 2003; Murray & Kochanska, 2002). This child (or adult) can delay gratification.

Importantly, this child (or adult) can also do other things. It can override a reflexive tendency toward avoidance, in situations where the avoidance temperament is more active than the approach temperament. Thus, this person can remain in a difficult social situation rather than flee from it. If the approach temperament is weak, effortful control can override a reflexive tendency toward *inaction*. It can make you go to the gym when you don't really want to.

Thus, exerting effortful control can move a person toward either restraint or action, depending on what reflexive response is being overcome. As suggested early in the chapter, this casts a somewhat unusual light on the concept of impulsivity. In this view, what is impulsive is what is *reactive*, whether its outward display is of action or inaction.

This dual process model of influences on action seems to address issues that are not well handled by the viewpoint that considered only approach and avoidance. In this model, behavior is restrained sometimes because anxiety is stronger than desire (thus creating a kind of reflexive restraint) and behavior is restrained sometimes because the reflective mode is acting to optimize longer-term outcomes.

Characterizations of the two processing modes by various writers are not identical, but they share many elements. The more primitive mode is typically described by such terms as impulsive, reflexive, reactive, implicit, heuristic, and associative. It is said to be responsive to situational cues of the moment, schematic associations, and especially to strong emotions. Its strengths are its quickness and its low demand on processing resources. It spontaneously creates action when its schemas are sufficiently activated. It thus can act even with little available information and high time urgency. The other mode is typically described by such terms as reflective, explicit, strategic, deliberative, and logical. Its strength is its ability to take into account circumstances that go beyond the immediate present. This mode requires substantial processing resources and thus loses efficiency when cognitive capacity is limited. This is the general viewpoint on self-regulation that we will assume as we continue.

SEROTONERGIC FUNCTION

We now turn to a different topic. A number of people have begun to consider the possible roles played by different neurotransmitter systems in the management of behavior, and thus in the variations that emerge among people's personalities. One neurotransmitter system that has been the subject of much

investigation is the serotonergic system. In this section we consider a potential role for serotonergic function in impulse and constraint.

Serotonin has been studied for some time, in both humans and other animals (for greater detail see Manuck, Kaplan, & Lotrich, 2006). The processes by which it operates are not fully understood (Hensler, 2006; Lesch & Canli, 2006). It can be misleading to think only in terms of level of serotonin per se, because a good deal more is involved (e.g., Neumeister et al., 2006). On the other hand, some manipulations do influence the level of serotonin available during a definable window of time. An example is acute tryptophan depletion. Tryptophan, an amino acid that is a precursor to serotonin, can be depleted by administering a drink (or capsules) containing high levels of other amino acids but no tryptophan. Several hours later, behavioral effects of artificially lowered serotonin can be studied.

Another methodological strategy is to relate behavior to genetic polymorphisms that have independently been linked to serotonergic function (Manuck et al., 2006). Most of this research has examined the gene that codes the serotonin transporter. Transcriptional activity of this gene is believed to be influenced by (or at least associated with) a repetitive sequence in a region called 5-HTTLPR, which has a short version and a long version (i.e., has more repetitions). A variety of indirect evidence links this polymorphism to variation in serotonergic function (reviewed in Carver, Johnson, & Joormann, 2008). It is now widely believed that the short allele is a marker of low serotonergic function (e.g., Canli & Lesch, 2007). This genetic paradigm is used to test what kinds of characteristics (behavioral, affective, cognitive, or personality) differ between persons with the short allele and those with the long allele.

The sections that follow provide a flavor of some of the research that has been done using these methods and others. We will argue that this research tends to suggest that the serotonergic system functions to decrease reactivity and to increase constraint.

Correlates of Serotonergic Markers in the Laboratory

Some of the evidence comes from laboratory studies, in which tryptophan depletion appears to impair constraint over automatic emotional responses. As an example, consider a task in which specific cues are rewarded, and for which the response thus becomes habitual. Then the rules change and this response is no longer rewarded. Tryptophan depletion impairs the ability to inhibit those responses after the rule changes (Cools et al., 2005; Park et al., 1994; Rogers et al., 2003). Tryptophan depletion has also led persons to report more sadness during exposure to uncontrollable stress (aversive noise), whereas the effect was only minor when the noise was controllable (Richell, Deakin, & Anderson, 2005). These types of studies suggest that the serotonin system can help inhibit responses to both rewarding and aversive stimuli.

Several studies have examined effects of tryptophan depletion on aggression. An important conceptual point was made in a study by Cleare and Bond (1995). Participants were pre-assessed as being either high or low in aggression. Those

high in aggressive tendencies became more aggressive, hostile, and quarrelsome after tryptophan depletion, but there was no effect for those low in aggressive tendencies. Similar results were reported by Finn et al. (1998). This pattern suggests that effects of low serotonergic function on aggression are less about aggression per se and more about the release of existing habitual tendencies to be aggressive (see also Manuck et al., 2006; Spoont, 1992). A later study (Bjork et al., 2000) further reinforced this point: tryptophan depletion in this case led to greater aggressive response to provocation among men high in aggressiveness but had an opposite effect among those low in aggressiveness.

Correlates of Serotonergic Markers with Personality

Another set of studies has examined relationships of serotonergic function to personality self-reports, using several procedures to assess serotonergic function. Some of this work focused on qualities pertaining to aggression and impulsiveness; others examined a broader range of qualities. Hostility as a trait has been related to low serotonergic function in nonclinical samples (Cleare & Bond, 1997; Depue, 1995; Netter, Hennig, & Rohrmann, 1999). Depue (1995) related low serotonergic function as well to the Control-impulsivity facet scale from the Constraint factor of the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1985), the Aggression facet of the MPQ's Negative emotionality factor (but not other facets), two sensation seeking subscales, and several indices of impulsiveness.

There is also a substantial literature on the serotonin polymorphism and personality as assessed by broad-ranging self-report inventories. These studies permit investigation of diverse possible associations, if facets as well as factors are examined. This work began with several large-scale studies with thorough examination of the data. Lesch et al. (1996) found that the short allele (linked to low serotonergic function) related positively to neuroticism (by NEO-PI-R) and inversely to agreeableness. In facet analyses, the neuroticism facets most closely linked to the short allele were Angry hostility, Depression, and Impulsiveness. Greenberg et al. (2000) also related the short allele to both neuroticism and agreeableness, with an additional weaker association for conscientiousness. Analysis of neuroticism facets again revealed the strongest relations for Angry hostility and Depression.

Many other studies have since been done, and even several meta-analyses (for review see Carver et al., 2008). Importantly, however, the meta-analyses have all focused on neuroticism, as has most of the developing literature. The consistent association with agreeableness has generally been disregarded.

Correlates of Serotonergic Markers with Impulsive Disorders

A good deal of research has also examined serotonergic function in adults with clinical conditions reflecting impulsive aggression (for more extensive review see Manuck et al., 2006). Lower serotonergic function has long been linked to

history of fighting and assault (Coccaro et al., 1997), domestic violence (George et al., 2001), and impulsive aggression more generally (Cleare and Bond, 1997; Coccaro et al., 1998).

Genetic evidence also connects serotonergic function to violent and antisocial behavior. For example, Dolan, Anderson, and Deakin (2001) linked low serotonergic function to higher impulsivity and higher aggression in male aggressive offenders. Interestingly, both impulsivity and aggression also related to higher anxiety in this sample. This argues against a path in which impulsive aggression is a product of low anxiety.

Characterizing the Pattern

The pattern of these findings (and others) appears consistent with the view that serotonergic pathways are involved in impulse control (Depue, 1995; Depue & Collins, 1999; Depue & Spoont, 1986; Manuck et al., 2003; Soubrié, 1986; Spoont, 1992; Zuckerman, 2005), particularly impulses that reflect strong emotions. On the other side, high serotonergic function appears to relate to consideration of the future consequences of one's behavior (promoting conscientiousness) and to positive social connection (promoting agreeableness).

We have characterized this pattern in terms of the dual process viewpoint described in the preceding section of the chapter (Carver et al., 2008). We said there that the basic, reactive mode of functioning is impulsive and is highly responsive to strong emotions. The reflective mode is planful and less reactive to immediate emotional cues. Joining these descriptions with findings described in this section, we suggest that serotonergic function may shift the balance of influence between these two modes of functioning. That is, it appears that lower serotonergic function may increase the influence of the reactive system or decrease the influence of the reflective system.

DEPRESSION AND SEROTONERGIC FUNCTION

We now turn to depression. As mentioned in the previous section, depression as a facet scale of neuroticism has been linked repeatedly to the serotonin transporter gene, with the short allele being associated with higher depression scores. There is also an accumulation of evidence from other studies linking serotonergic function to more clinically meaningful depression (for review see Carver et al., 2008). Early studies looked for direct links from the polymorphisms to depression vulnerability. More recent work has focused on gene by environment interactions.

Caspi et al. (2003) first reported that the serotonin transporter polymorphism interacted with early maltreatment to predict depression diagnosis by early adulthood: negative life events had an adverse effect on those carrying at least one short allele, but not among those with two long alleles. A number of other studies followed, and by now there have been several meta-analyses of this literature (Risch et al., 2009; Uher & McGuffin, 2008, 2010). The outcomes of

the meta-analyses have varied as a function of selection criteria. However, Uher and McGuffin (2010) found that the serotonin transporter polymorphism interacted with early maltreatment to predict vulnerability to depression in each of the 11 studies that used objective or interview measures of maltreatment (see also Caspi et al., 2010).

Impulsivity and Depression

Previous sections described studies linking low serotonergic function to impulse expression, particularly impulsive reactions to emotional cues. Studies were also described linking low serotonergic function to behavioral problems in which a salient feature was poor control over impulsive action. The idea that high reactivity to emotions underlies impulsive violence, sensation seeking, and externalizing problems such as substance abuse is both intuitive and supported by a great deal of data (Cyders et al., 2009; Dick et al., 2010; Whiteside & Lynam, 2003).

Now we are saying that low serotonergic function also relates to vulnerability to depression. This assertion may seem paradoxical in light of the others. Depression is not generally associated with impulsive overt action. It is more often associated with lethargy, an absence of behavioral engagement (Sobin & Sackeim, 1997). What accounts for this very substantial difference in presentation?

In addressing this question we return to the dual process models, and also to our working definition of impulsiveness. Dual process models suggest that the reactive mode acts impulsively (reflexively) and is highly responsive to emotions. But these are "operating characteristics" of that mode of function. How the operating characteristics are manifested overtly depends on what emotions the person is experiencing and what reactive action impulse thereby is being triggered.

In most cases, emotions call for outward action of some sort. Eagerness promotes approach. Fear promotes avoidance. But sadness is different. Sadness—the affective core of depression—is a *deactivating* emotion (Frijda, 1986). It calls for passivity, for giving up of effort (Frijda, 1986). A general overresponsiveness to emotions, if applied to sadness, would promote behaviors that sadness ordinarily triggers. The behavior that is triggered by sadness is *in*action. Thus, many aspects of depressed behavior reflect passivity and apparent difficulty in initiating action.

Paradoxically, then, the same functional property (behavioral reactivity to emotion) that can help release bursts of violence or acting out may also help create essentially the opposite profile of behavior in response to a different emotion. This leaves two issues. First, something other than low serotonergic function must distinguish between these divergent cases. People who are sensation seekers and people who are vulnerable to depression must differ systematically from each other in some way other than low serotonergic function. How do they differ? Second, the case that depression should be viewed as similar to overtly impulsive, externalizing sorts of behavior seems somewhat

circumstantial. It depends entirely on a set of findings concerning correlates of the serotonergic system. Is there any further evidence that this argument is tenable? These questions are considered, in order, in the next sections.

Further Influences: Approach and Dopamine

The idea that low serotonergic function and the resulting deficits in effortful control have divergent effects in different groups of people requires hypothesizing an interaction of some sort (see Depue & Lenzenweger, 2005). That is, it is not just low serotonergic function that yields a phenotypic manifestation. Something else must differ between the groups.

What other variable might interact with serotonin function to yield such a divergence with respect to sensation seeking versus depression? A plausible candidate is the sensitivity, or engagement, of the incentive approach system. When poor executive oversight is combined with moderately high incentive sensitivity (a reactive approach system), the result is overt approach-related impulsiveness. When poor executive oversight is combined with low incentive sensitivity (a nonreactive approach system), the result is impulsive inaction: lack of effort toward potential rewards. In both cases, the effects of variation in level of basic incentive sensitivity (high and low, respectively) are amplified by the absence of effortful override (Figure 4.1, earlier).

In the case of depression vulnerability, a lack of incentive sensitivity means that the person is not strongly motivated to approach potentially rewarding contexts. A relative deficit in effortful control amplifies this problem, such that the person has greater difficulty overcoming this lack of motivations. This combination thus should yield apathy, passivity, and fatigue, which characterize many cases of depression.

There are several sources of evidence that depression is associated with a blunted approach system. For example, EEG laterality has been used as a way to measure activity of the approach system. Several studies suggest that behavioral and personality measures of approach motivation correlate with higher activation in left than right anterior cortical areas (e.g., Coan & Allen, 2003; Harmon-Jones & Allen, 1997; Sutton & Davidson, 1997; for review, see Harmon-Jones, Price, & Harmon-Jones, this volume). Previously depressed (Henriques & Davidson, 1990) and clinically depressed persons (Henriques & Davidson, 1991) have been found to have lower activation in left anterior cortical areas than non-depressed persons, with no difference in right anterior activation.

Behavioral research also suggests that depression relates to blunted incentive sensitivity. For example, depressed persons have been found to be less responsive to reward than non-depressed persons (Henriques, Glowacki, & Davidson, 1994; Henriques & Davidson, 2000). Other evidence relates self-reports of low incentive sensitivity to depression (Campbell-Sills, Liverant, & Brown, 2004; Pinto-Meza et al., 2006). Indeed, three separate studies have found that self-reports of low incentive sensitivity predicted worse course of depression over time (Campbell-Sills et al., 2004; Kasch et al., 2002; McFarland et al., 2006).

Blunted approach motivation may also be reflected in low dopaminergic function. Dopaminergic pathways are believed to be critical in the engagement of goal-directed effort (Farrar et al., 2007; Salamone et al., 2007; Salamone et al., 2005; Salamone et al., 2006). A weakly functioning dopaminergic system yields less "wanting" for appetitive outcomes (Berridge, 2007) and less engagement of effort in pursuit of them (Salamone et al., 2005, 2006, 2007). A recent review reported a range of evidence for deficits in the function of dopamine among depressed persons, drawing from pharmacological studies, genetic studies, and dopamine challenge studies (Dunlop & Nemeroff, 2007).

Depression and Impulsive Reactivity to Emotion

Is there is any direct evidence linking depression to over-reactivity to emotions? Evidence comes from at least three studies. Two of them (Ekinci, Albayrak, & Caykoylu, 2011; Peluso et al., 2007) linked a particular measure of impulsiveness to diagnosis of major depressive disorder (MDD). In both of these studies, persons diagnosed with depression reported greater motor impulsivity on the Barratt Impulsiveness Scale (BIS; Barratt, 1965) than controls; in one of them (Ekinci et al., 2011), a similar difference emerged for BIS attentional impulsivity. The measure used in those two studies is a relatively general one, and its item content makes it difficult to attribute the impulsiveness assessed to emotional versus non-emotional sources.

We have recently collected data of our own to explore this idea more explicitly (Carver, Johnson, & Joormann, 2013). We examined a sample of college students, using a variety of questionnaires bearing on impulsiveness versus control, some preexisting and others developed explicitly for our study. A subsample also completed a diagnostic interview for lifetime episode of major depressive disorder (MDD). The question of interest at present is whether the self-reports differentiated those who had positive diagnoses from the others.

Of the self-report scales administered, some were chosen to pertain to reflexive reactivity to emotions. Some focused on reactivity to negative emotions. Associations of these measures with lifetime MDD would be consistent with the widely held view that depression vulnerability is related to an enhanced experience of negativity (Bylsma, Taylor-Clift, & Rottenberg, 2011; Kendler et al., 1993). However, the measures we used focused not on the frequency of occurrence of negative emotions but on the tendency to respond relatively reflexively and automatically to them, either cognitively (e.g., by drawing further conclusions) or behaviorally.

It is important, though, that the dual process view suggests that what is involved here is not just a propensity toward negativity. In holding that the reflexive system is highly reactive to emotions, this viewpoint does not distinguish among emotional valences. The reflexive system is simply held to be highly reactive to emotions. In applying this idea to depression vulnerability, the implication would seem to be that people who are vulnerable to depression should

have a general reactivity to emotion of diverse sorts, not just negative emotions. To test this reasoning, we included one scale that addressed impulsive behavioral reactions to emotions "in general," and another scale that assessed impulsive reactions to *positive* emotions in particular (the Positive Urgency Measure; Cyders et al., 2007).

Our focus, then, was on aspects of impulsivity that imply a reflexive response to emotions. However, we also included measures to test the specificity of this reasoning, that is, measures that pertain to better versus worse self-control without involvement of emotions. A measure of comorbid alcohol problems was also included, to test whether any associations of lifetime MDD with reactivity to emotions would actually be attributable to this commonly comorbid externalizing syndrome.

The impulse-related questionnaires used in this project were distilled to three underlying factors (Carver et al., 2011). Factor 1 (Pervasive Influence of Feelings) reflects a broad tendency for emotions to reflexively shape the person's orientation to the world: having one's worldview affected by temporary feelings, generalizing from negative events to the overall sense of self-worth, and reacting to sadness and fatigue with inaction. Factor 2 (Follow-Through) centers on the tendency to complete tasks versus being distracted and letting things go. This factor has no obvious involvement of reacting to emotion. Factor 3 (Feelings Trigger Action) centers on impulsive behavioral reactivity to emotions, including positive emotions. Factor scores for each participant were created from that factor analysis by the regression method, and the factor scores were the outcomes of interest.

Regression analyses (Carver et al., 2013) confirmed that persons diagnosed with MDD lifetime had higher scores on Factors 1 and 3 than did persons with negative diagnoses. There was no difference between groups on Factor 2. Importantly, these differences between groups were robust to several kinds of analyses controlling for effects of current depressive symptoms and externalizing symptoms.

Results thus support the idea that lifetime MDD is related to elevated reactivity to emotions. This result is unsurprising with respect to Factor 1, because Factor 1 reflects in part reactions to negative emotions and to fatigue, along with overtones of passivity and automatic coloring of one's view of the world from (mostly negative) events. Less intuitive, but far less ambiguous in supporting the dual process viewpoint, is the finding that the lifetime MDD group also endorsed a more general impulsive reactivity to emotions—including positive emotions—to a greater degree than did the control group. This suggests that a contribution to depression vulnerability is made by an over-responsiveness to emotions in general, rather than only by a specific responsiveness to sadness or negativity. It is worth emphasizing that a link between history of MDD and reactivity to positive emotion would be very hard to predict from a viewpoint other than the dual process viewpoint with which we entered the study.

Serotonergic Polymorphism and Impulsive Reactivity to Emotion

This project has yielded another outcome that is also quite relevant to the overall argument being made here (Carver et al., 2011). Blood was also drawn from the participants, and assays were conducted for the serotonin transporter polymorphism. The three factors pertaining to impulsivity that were described in the preceding section were then related to the serotonin transporter polymorphism. Both of the factors that reflected impulsive reactions to emotions—the very factors that distinguished persons with a history of MDD from controls—were related to the polymorphism in the expected way. That is, carriers of the short allele (in interaction with reports of early childhood adversity) had higher levels of emotion-triggered impulsiveness. The factor that did not convey any implication of reactivity to emotions did not display this pattern.

Toward Transdiagnostic Vulnerability?

Our focus on depression in this section of the chapter reflects our interest in that disorder, but it also reflects the highly counterintuitive nature of the idea that vulnerability to depression would be associated with reactivity to emotions. Previous findings have related reactivity to positive emotions to a range of externalizing problems, including vandalism, risky sexual behavior, and gambling, and drug use (Cyders et al., 2007; Zapolski, Cyders, & Smith, 2009), but there is less evidence regarding its role in internalizing problems. Across how broad a spectrum of disorder is reactivity to emotion—even positive emotion—a contributor?

The three factors described here have also been studied in one other psychopathology-related context (Johnson, Carver, Mulé, & Joormann, 2013). That study examined correlates of manic temperament, measured by the Hypomanic Personality Scale. This scale was found to be correlated significantly with Feelings Trigger Action, but not to the other two factors. Thus, reports of an over-responsiveness to positive emotions and emotions in general appear to relate to mania vulnerability as well as to depression.

The possibility that the broad spectrum of psychopathologies may be characterized by a more limited number of features that are actually transdiagnostic has been raised in a number of places in recent years (e.g., Harvey et al., 2004; Johnson-Laird et al., 2006). It is worth asking whether an impulsive overreactivity to emotions may be one such trans-diagnostic feature (see an argument made by Johnson-Laird et al., 2006, about the role of emotional over-responsiveness in psychopathology). We are presently pursuing this question further (Johnson, Carver, & Joormann, 2013).

Indeed, a broad question for the future is whether other interactions should also be explored more fully (Depue & Lenzenweger, 2005; Nigg, 2006). For example, it has been argued that overt expression of a vulnerability to anxiety disorders may also depend on poor executive control (Lonigan et al., 2004).

Consistent with this idea, serotonin has been implicated in the development of anxiety disorders (Leonardo & Hen, 2006). These findings suggest an interactive combination of a highly sensitive threat system and low serotonergic functioning.

Many observers have noted that the attempt to link any given neurotransmitter to the operation of a single behavioral system is likely to be a great oversimplification. Nonetheless, it does not seem too far an extrapolation from the evidence to suggest that low serotonergic function promotes a stronger manifestation of whatever tendencies the person has at the reflexive or implicit level of functioning (for similar conclusions see Depue, 1995; Nigg, 2006; Spoont, 1992). In an incentive-sensitive person, low serotonergic function amplifies the pursuit of incentives. In an incentive-*in*sensitive person, low serotonergic function exaggerates the lack of effortful engagement. In a threat-sensitive person, low serotonergic function may enhance vigilance to threat.

The specific cases of depression, externalizing disorders, and anxiety disorders are only three possibilities, reflecting interactions of a serotonergic system with two other systems. A more complete understanding of the role of serotonin in behavior will require a more elaborated understanding of how serotonergic function interacts with effects of other neurotransmitters. The idea that diverse disorders follow from diverse combinations of system sensitivities (Depue & Lenzenweger, 2005; Fowles & Dindo, 2009; Lenzenweger & Willett, 2007) is very intriguing, and seems worthy of much more examination.

Dual Process Models

Recent years have seen an explosion of interest in neurobiological processes underlying behavior. Psychologists are now routinely collecting genetic data and they are very often, if not quite routinely, collecting imaging data to indicate what areas of the brain are especially active in varying experimental conditions. The involvement of different neurotransmitters—such as serotonin—in psychological phenomena is also an active area of exploration.

We have argued that it is useful to conceptualize certain functions of the serotonergic system in terms of dual process models of self-regulation. Viewed through this lens, the evidence suggests that serotonergic function can be linked to the trait dimension of impulsivity versus constraint in the personality literature, effortful control processes in the cognitive and developmental literatures, and (not addressed here, but discussed in Carver et al., 2008) executive control over the amygdala and other subcortical areas in the neurobiological literature. This dual process picture helps organize what is known about the experience of depression, and it may also be useful in suggesting new areas of investigation.

The serotonergic system is a biological system. Yet ideas and evidence from literatures that are psychological in nature appear to foster a deeper understanding of the role of this system. It is increasingly said today that biological concepts and knowledge form constraints within which psychological theory

must fit. We would hold, however, that the path of influence goes both ways, that interpretation of neurobiological evidence also benefits from considering the findings through the lens of psychological principles.

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5

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 to do so quite frequently, spending up to half of our waking lives mentally detached from the here and now (Killingsworth & Gilbert, 2010; Smallwood & Schooler, 2006). But with so much time spent engrossed in an imaginary world 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 human 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 a highly practical strategy. 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 illuminates the fundamental belief that we have jurisdiction over our own actions. 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 think we have (at least some) power over the outcomes. This assumed control can be optimized when we draft imaginary plans and preview their potential consequences to determine what needs to be done (or indeed not done) in order to achieve desired results (Gilbert & Wilson, 2007, 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 (see chapters by Denson, and by Scholer, this volume). 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 (see Koole, this volume). 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 (Gilbert & Wilson, 2007, 2009). 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; Kosslyn, Ganis, & Thompson, 2001). 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 provoke anxiety (Kosslyn, 1994; Kosslyn, Ganis, & Thompson, 2001).

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 unconstrained nature of the imagination 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 by influencing the information that a simulation contains and thus the consequences it elicits. Put simply, imagery can be uniquely tailored to maximize the possibility of a desired response. 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 (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 (see Harmon-Jones, Harmon-Jones, & Price this volume). 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 manner in which 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 provides a fictitious view of the world, in which 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 the content and construal of imaginary events being systematically 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 de-emphasize 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 third-person imagery substitutes 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 (see Denson, this volume) or overwhelmed with a sense of calm when envisioning the sunset on a quiet beach. Depending on the content of a simulation and the desired affective state, the emotional contagion of these imaginary scenes can be either beneficial or problematic (see Forgas, this volume). 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 (see also Schmeichel and Tang, this volume). 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 the point of view from which it is imagined (Williams & Moulds, 2008).

In less extreme circumstances, similar effects emerge. For instance, 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 are naturally accessed from each vantage point. That is, just like looking at a photograph the largely visual experience that ensues when utilizing a third-person perspective provides contextual details, but does not directly supply the interoceptive (internal) 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 overarching life goal, then its emotionality may be more salient from a third-person perspective as compared to an event that 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 (e.g., pain) 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 type 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—either regretting something they did or regretting something they failed to do—regret for actions was 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 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 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 (see also Forgas, this volume). 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 toward 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 physical warmth or coldness would be 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 (Bargh & Shalev, 2012; Williams & Bargh, 2008; see also Bargh, this volume).

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 impact 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 short, we suspect that first-person simulations will be more embodied than third-person simulations.

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 imagined physical temperature influenced 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 person judgments to be impacted by imaginary temperatures when preceded by first, 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 (Macrae et al., 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 occupants (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, Libby, Eibach, and Gilovich (2005) 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 led 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 may be 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 highlights how an individual does not live up to an "idealized self" (Kuyken & Howell, 2006). As such, it seems that we may assess 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 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 (e.g., 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 led to an inferior version of a current 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 (Christian, Miles, & Macrae, unpublished raw data). 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 increases strength over a training period (Ranganathan et al., 2003; Yue & Cole, 1992). Mentally rehearsing complex actions has also revealed practice effects and shown that the patterns of muscle activity (i.e., EMG) that accompany 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 (the cheek muscle active during smiling), whereas unpleasant imagery reveals activity in the corrugator

supercilii (the brow muscle 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 ferocious stomp indicative of anger (Montepare, Goldstein, & Clausen, 1987).

Not only do these embodied emotional states provide a sneak peek into the contents of the mind, they are also a vital medium for social communication (Andrew, 1965; Fridlund, 1991). Of particular note, 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 are spontaneous displays of internal states. Such information is often utilized in order to help us decide whether or not we want to approach or avoid a given individual (see Harmon-Jones, Harmon-Jones, & Price this volume). For instance, during simulated social encounters participants enacted systematic anterior (i.e., approach) postural movements when their interaction partner displayed a spontaneous enjoyment smile (i.e., specifying a safe encounter) but no such behavior when viewing a less socially informative expression (i.e., posed smile or neutral expression, 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 functionally adaptive 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 (i.e., approach and avoidance behavior). 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 placing ourselves in the position of an outside observer makes for less action-oriented simulations, suggesting that visual perspective acts 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 conceived. According to Vallacher and Wegner's (1985) action-identification theory, all goals can be conceptualized at either a subordinate (the concrete steps) or superordinate level (Wegner & Vallacher, 1986). 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 distinct conceptualizations may influence how or even if a behavior is executed.

To explore the impact of 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," people can alter what action sequences are initiated and whether or not they will follow through with behaviors that are consistent with desired self-concepts (Libby et al., 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 (Trope & Liberman, 2010; Vallacher & Wegner, 1985; Wegner & Vallacher, 1986). 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 by-product of a mental simulation, with how far back or forward in time we mentally travel 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 construed 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 & Liberman, 2010; 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, Ouellette, & Fernandez, 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 (Christian et al., 2013).

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 their 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 even when the steps to success 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).

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 the destination of an upcoming wedding or reflect upon 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 impacts the way an event is mentally represented and reduces our ability to act directly. 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 et al., 2006). As such, it is proposed that similar effects would emerge when events are construed as spatially distant as when they are simulated as temporally distant.

Indeed, behavioral discrepancies span spatial distances revealing distinct 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 (Tamir, 2013). 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 superordinate manner than events that are close-by (Fujita et al., 2006; Semin & Fiedler, 1988). As a result, spatially distant simulations may be less likely to evoke action than a similar, but 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 oneself (i.e., from 20cm to 50cm) can decrease consumption (Maas et al., 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 grounded 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 less realistic 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 beyond our control, such as the real time behavioral 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 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 entertain unrealistic visual, spatial, and temporal properties in the mental world can be a highly adaptive means by which we attempt to control emotions, thoughts and actions.

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6

The Ego Fixation Hypothesis

Involuntary Persistence of Self-control

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Towards the end of the 20th century, a Dutch production company introduced a reality game show called "Fear Factor." In the show, contestants compete against each other in various stunts for a cash prize. Some stunts involve extreme physical endurance tests, whereas other stunts involve activities such as eating vile animal parts, live bugs, or a blended cocktail of multiple gross items, immersing one's head or body among scary animals like rats, snakes, or worms, and retrieving items hidden in disgusting substances like blood or lard. For better or worse, Fear Factor has become a popular format that has been watched by hundreds of millions of viewers in some 35 different countries, including the USA, Russia, and the Arab world (source: Wikipedia.org).

Besides being a literally distasteful example of commercial television, Fear Factor highlights how people can use self-control to overcome their natural reactions to powerfully aversive stimuli. Self-control allows people to inhibit their immediate impulses to achieve their long-term goals (Carver, Johnson, & Joormann, this volume; Inzlicht & Legault, this volume; Maner, this volume; Scholer, this volume; Schmeichel & Tang, this volume). By promoting goal achievement, self-control has obvious benefits for individuals and society at

large. However, self-control may also incur less obvious psychological costs. Indeed, in the present chapter, we suggest that self-control processes may lead people to become psychologically alienated from their emotional preferences. Alienation tendencies are associated with various psychological problems, like learned helplessness (Kuhl, 1981), persistent negative emotion (Baumann & Kuhl, 2003), and psychosomatic symptoms (Baumann, Kaschel, & Kuhl, 2005). It therefore seems important to learn more about the potentially alienating effects of self-control.

In the following paragraphs, we begin by placing the notion of alienation in a broader theoretical context. Next, we propose a new theoretical model of alienation that we term the *ego fixation hypothesis*. Ego fixation refers to the involuntary persistence of self-control. One important consequence of ego fixation is that individuals can no longer access their negative reactions to distasteful stimuli. Although virtually everyone may be somewhat ego-fixated from time to time, some individuals may be more vulnerable to this condition than others. In particular, individuals who become easily locked into motivational and emotional states, or so-called "state-oriented" individuals, may be especially prone to become ego-fixated. After discussing our ego fixation model, we review several lines of empirical research on state orientation and ego fixation.

PSYCHOLOGY OF ALIENATION

The word "alienation" in this chapter denotes a motivational-emotional state in which the individual ignores her or his intrinsic needs and desires. Among the earliest and most influential thinkers to write about alienation was political economist Karl Marx (1844, see Bottomore, 1963). According to Marx, members of the working class become alienated when they must function within the capitalist mode of production. Marx's ideas influenced psychologist Erich Fromm (1941, 1976), who regarded alienation as a psychological condition that is caused by greed and materialist values. Fromm's approach to alienation continues to influence contemporary humanistic psychologists (e.g., Deci & Ryan, 2000).

Some of the cognitive mechanisms underlying alienation were addressed by Wilson (2002) and associates. These researchers started by observing that people are often grossly inaccurate in reporting their inner states (Nisbett & Wilson, 1977). To understand this phenomenon, Wilson and colleagues experimentally investigated the effects of introspection on evaluation processes (for an overview, see Wilson, 2002). After analyzing the reasons for their preferences, people were more inclined to disregard the initial affective reactions that normally drive their preferences. When these initial reactions are sensible, reasoning may lead to less optimal preferences. Indeed, leading people to reason about their preferences may lower the quality of their decisions (Wilson & Schooler, 1991) and renders those preferences less stable over time (Nordgren & Dijksterhuis, 2009). Reasoning about preferences may thus be an important cause of alienation.

At first glance, it seems paradoxical that reasoning about preferences would alienate people from the feelings that normally drive their preferences. Yet, in many situations, this may have adaptive advantages. When people's feelings conflict with how they ought to behave, ignoring these feelings may allow people to behave more in line with prevailing social norms. Indeed, self-reflective reasoning can help people to override automatic responses (Baumeister, Masicampo, & Vohs, 2011; Schmeichel & Tang, this volume). The alienating effects of reasoning may thus help people to gain control over their emotional preferences. If this is correct, then it seems plausible that self-control processes other than reasoning, like planning, may also promote alienation. Indeed, Marx (in 1844) saw a close connection between alienation and self-control: "What constitutes the alienation of labor? First, that the work is *external* to the worker, that it is not part of his nature; and that, consequently, he does not fulfill himself in his work but denies himself. (. . .) It is not the satisfaction of a need, but only a *means* for satisfying other needs" (Bottomore, 1963, pp. 124–125).

THE EGO FIXATION HYPOTHESIS

How might self-control lead to alienation? To address this question, it is useful to consider the cognitive mechanisms that govern self-control (Kuhl & Beckmann, 1994a; Kuhl & Koole, 2004). Common to all self-control processes is that they are guided by explicit intentions that can be verbally articulated (Bargh & Huang, this volume; Carver, Johnson, & Joormann, this volume; Metcalfe & Mischel, 1999; Scholer, this volume; Schmeichel & Tang, this volume). A distinctive psychological feature of an intention is that it mentally persists over time, even when the intention is not directly cued by the environment (Bargh & Huang, this volume; Förster, Liberman, & Friedman, 2007; Goschke & Kuhl, 1993; Koole et al., 1999).

The persisting activation of intentions is generally useful because it ensures that people continue to think about their intentions until they are converted into action. However, the mental persistence of intentions can sometimes get in the way of other activities (Bargh & Huang, this volume; Jostmann & Koole, 2006). For instance, while engaged in tender lovemaking, it is undesirable to keep rehearsing a list of unfinished household chores. People therefore need some means of deactivating their intentions when this is appropriate. When people are unable to do so, they may become chronically locked into the intentional self-control mode, a condition that we refer to as *ego fixation*.

When people are ego-fixated, they are unable to release the inhibition of emotional preferences that is part of self-control. Self-control processes particularly inhibit aversions for negative experiences, because tolerating such experiences is essential for self-control. Consequently, to the extent that self-control induces ego fixation, it may lead people to become alienated from their intuitive dislike for aversive experiences.

Though novel, the ego fixation hypothesis is compatible with social-cognitive models that have emphasized the alienating effects of explanatory introspection

(Wilson, 2002). Specifically, from an ego fixation perspective, explanatory introspection may be understood as a self-control process. In everyday life, whenever people wonder why they want something, they are likely to interrupt their spontaneous flow of activities, and are possibly considering an alternative course of action. Explanatory introspection may thus cause a shift from intuitive action control towards a more intentional mode of action control.

We may further compare ego fixation with the influential notion of "ego depletion" (Baumeister et al., 1998; see also Denson, this volume; Elliot et al., this volume; Schmeichel & Tang, this volume). The ego depletion model proposes that acts of self-control deplete the person's limited energy resources (Muraven & Baumeister, 2000). Ego depletion has been implicated in an impressive number of domains, including health behavior, aggression, close relationships, academic performance, spending behavior, and stereotyping (for an overview and meta-analysis, see Hagger et al., 2010). Like ego depletion, ego fixation refers to an unintended negative consequence of self-control. The processes of ego depletion and ego fixation are thus conceptually related. Indeed, we have chosen the term "ego fixation" to emphasize its theoretical relatedness with ego depletion processes.

Nevertheless, ego fixation differs from ego depletion. Ego depletion presumably leads to self-regulatory failure because people stop controlling themselves after an initial act of self-control (in order to conserve energy). Thus, ego depletion is essentially a problem of impulsivity or under-regulation. By contrast, ego fixation presumably leads to self-regulatory failure because people keep on controlling themselves after an initial act of self-control. Ego fixation thus relates to rigidity or over-regulation. In this sense, ego fixation represents the theoretical opposite of ego depletion. In ego depletion, self-regulation breaks down because people are exerting too little self-control; in ego fixation, self-regulation breaks down because people are exerting too much self-control.

Because ego fixation and ego depletion relate to different psychological mechanisms, the two processes will have different empirical manifestations. We can think of at least three important differences, though there are likely to be more. First, the exertion of self-regulatory energies does not drive ego fixation as much as ego depletion. Therefore, ego fixation is likely to arise more quickly than ego depletion. Indeed, as we will show, merely leading people to think about exerting self-control may already trigger ego fixation. A second empirical difference is that ego fixation may often lead people to neglect their hedonic needs, particularly aversions, even (perhaps particularly) when need satisfaction is rather effortless. The over-controlled behavior that results from ego fixation is thus distinct from the impulsive behavior that results from ego depletion (which is aimed at immediate gratification). Third, whereas ego depletion tends to promote irresponsible social behavior, like aggression or ethnic discrimination (see Hagger et al., 2010), ego fixation is likely to promote highly responsible, duty-driven behavior. Indeed, ego fixation can be regarded as a kind of "hyper-civilization," in which people conform to social and cultural norms even when doing so undermines their well-being.

INDIVIDUAL DIFFERENCES IN VULNERABILITY TO EGO FIXATION

Ego fixation is a psychological state that can—at least, in principle—apply to everyone. However, not everyone may be equally vulnerable to ego fixation. Ego fixation derives from the persistence of intentional control processes. Accordingly, one might expect individuals who are prone to involuntary persistence of mental states to be especially susceptible to ego fixation. By contrast, individuals who can actively and flexibly self-regulate their mental states may be immunized against ego fixation.

The construct of action versus state orientation refers to individual differences in the flexibility with which individuals can achieve motivational-emotional changes (Kuhl & Beckmann, 1994a). Action orientation is conceived as a meta-static (change-promoting) regulatory mode that is characterized by flexible and efficient self-regulation of motivational and emotional states. By contrast, state orientation is conceived as a cata-static (change-preventing) regulatory mode that is characterized by perseveration of current mental and behavioral states. Individual differences in action versus state orientation can be measured reliably through self-report and predict self-regulatory behavior both in the laboratory and in real-life domains such as work, education, and sports (for reviews, see Diefendorff et al., 2000; Koole, Jostmann, & Baumann, 2012; Kuhl & Beckmann, 1994a).

Action versus state orientation has different facets, which relate to different self-regulatory skills (Kuhl, 2000). We have found that one facet in particular is a consistent predictor of ego fixation. This facet relates to disengagement versus preoccupation. Action-oriented individuals, who score towards the disengagement end of the scale, can easily relax during unexpected or negative events. This capacity for self-induced relaxation appears to be particularly important in counteracting ego fixation. State-oriented individuals who score towards the preoccupation end of the scale are characterized by compulsive repetitive cognitions, especially after negative events. These compulsive tendencies may render preoccupied individuals especially vulnerable to develop ego fixation. Some illustrative items are presented in Table 6.1.

We conceive of individual differences in action versus state orientation as preferential coping styles that people have acquired while dealing with various life problems. For instance, individuals who grow up in so-called risky families, which are characterized by conflicted or neglectful relationships, may learn that it is dangerous to relax and let their guard down (Repetti, Taylor, & Seeman, 2002). Thus, growing up in a risky family may lead individuals to develop a tendency towards preoccupation. As a preliminary indication of such a pattern, one study found that children from divorced families have higher preoccupation scores (see Koole et al., 2006). Although childhood experiences may be particularly influential, dispositions towards action versus state orientation are likely to remain somewhat plastic throughout the lifespan. Indeed, there is suggestive evidence that preoccupations may decline even into old age (Gröpel, Kuhl, & Kazén, 2004).

TABLE 6.1 Illustrative items of the disengagement-preoccupation facet of action versus state orientation

1. When I have lost something that is very valuable to me and I can't find it anywhere:
   A. I have a hard time concentrating on anything else.
   B. I put it out of my mind after a little while.
2. If I've worked for weeks on one project and then everything goes completely wrong with the project:
   A. It takes me a long time to adjust myself to it.
   B. It bothers me for a while, but then I don't think about it anymore.
3. When I'm in a competition and have lost every time:
   A. I can soon put losing out of my mind.
   B. The thought that I lost keeps running through my mind.
4. If I had just bought a new piece of equipment (for example a smart phone) and it accidentally fell on the floor and was damaged beyond repair:
   A. I would manage to get over it quickly.
   B. It would take me a long time to get over it.
5. If I have to talk to someone about something important and, repeatedly, can't find him or her at home:
   A. I can't stop thinking about it, even when I'm doing something else.
   B. I easily forget about it until I see the person.
6. When I've bought a lot of stuff at the store and realize when I get home that I've paid too much but can't get my money back:
   A. I can't usually concentrate on anything else.
   B. I feel paralyzed.

EMPIRICAL RESEARCH, PART I: THE SELF-INFILTRATION PARADIGM

The empirical investigation of alienation has long posed a challenge to researchers. Even if researchers observe that people fail to act upon their preferences, it could still be that people were aware of these preferences. Indeed, the well-known gap between intentions and behavior is commonly explained by the difficulties that people encounter in implementing their intentions (Denson, this volume; Gollwitzer & Sheeran, 2006; Scholer, this volume). Thus, researchers had to devise innovative methods to establish that alienated people have difficulties perceiving their "true" emotional preferences (Kuhl & Beckmann, 1994b).

One such method was developed by Kuhl and Kazén (1994) in their so-called self-discrimination task. In this task, participants are asked to select a certain number of tasks from a list that are to be performed later on in the experiment. In addition, participants are also assigned by the experimenter to perform certain tasks from the list. Finally, some tasks on the list are neither self-selected nor assigned. In an unexpected memory retrieval test, participants are later asked about the initial *source* of each task, whether it was self-selected, assigned,

or neither. The rate of tasks that are self-ascribed but originally assigned by the experimenter is taken as an index of poor self-discrimination, or "self-infiltration" of self-alien goals.

State-oriented individuals (with high preoccupation scores) show higher self-infiltration rates than action-oriented individuals (Kuhl & Kazén, 1994). Notably, the link between state orientation and self-infiltration emerges only for unattractive activities, not for attractive activities (Kazén, Baumann, & Kuhl, 2003). Furthermore, state-oriented individuals, more than their action-oriented counterparts, are prone to adopt personal goals that are at odds with their implicitly assessed needs (Baumann et al., 2005; Brunstein, 2001). Satisfaction of implicit needs is an important determinant of emotional well-being (Brunstein, Schultheiss, & Grässmann, 1998). Thus, the mismatch between goals and needs suggests that state-oriented individuals ignore their emotional needs when selecting their goals.

Why would state-oriented individuals pursue goals that offer them no emotional satisfaction? Kuhl (2000) has theorized that alienation from the self is due to persistent negative affect. Specifically, Kuhl has proposed that negative affect modulates access to integrated self-knowledge, such that people can only access integrated self-representations (which encode information about people's emotional preferences) when people are in a calm, relaxed affective state. According to this affective modulation model, state-oriented individuals' proclivity towards self-infiltration is due to these individuals' inability to down-regulate negative affect. In line with this reasoning, two studies showed that the link between state orientation and self-infiltration emerges only when individuals experience high levels of sadness (Baumann & Kuhl, 2003). Further consistent with the affective modulation model are findings that stress hormones (i.e., cortisol) are associated with self-infiltration rates (Quirin et al., 2009).

Like Kuhl (2000), we assume that negative affect plays an important role in alienation/self-infiltration processes. Nevertheless, in keeping with the ego fixation model, we believe that self-control processes also play an important, if somewhat underappreciated, role in this context (see also Forgas, this volume; Inzlicht & Legault, this volume; Schmeichel & Tang, this volume, on negative affect and self-control). One clue that points to the influence of self-control is that, in the self-infiltration task, state-oriented individuals do not erroneously perceive activities that were not assigned by the experimenter to be self-chosen. This pattern suggests that inhibited access to self-knowledge is not the whole reason why state-oriented individuals are prone to self-infiltration. Indeed, state-oriented individuals only misperceive assigned activities as self-chosen. Thus, besides poor access to integrated self-knowledge, the observed self-infiltration among state-oriented individuals also seems to reflect a heightened priority that is given to externally assigned goals. This prioritization of assigned goals, from the perspective of the ego fixation model, is likely to be driven by self-control processes.

Other findings from the self-infiltration paradigm may also be considered from an ego fixation perspective. First, the findings that sadness increases

self-infiltration among state-oriented individuals (Baumann & Kuhl, 2003) could be (partly) due to the notion that sadness promotes a more analytic processing style that is conducive to self-control (Forgas, 1995). Second, self-infiltration rates among state-oriented individuals increase after the induction of a to-be-completed intention (Kuhl & Kazén, 1994) and heightened performance pressure (Kazén et al., 2003), both manipulations that encourage reliance on intentional self-control. Taken together, several key findings from the self-infiltration paradigm seem compatible with the ego fixation model. Of course, the self-infiltration studies were not designed to test the ego fixation model. We therefore turn to more recent research that was explicitly conducted from the perspective of the ego fixation model.

EMPIRICAL RESEARCH, PART II: CONSUMER PSYCHOLOGY

Our initial studies on ego fixation were conducted in the domain of consumer psychology. We were drawn to this area in part because thinkers like Fromm (1941, 1976) have suggested that modern consumers are increasingly alienated from their genuine needs (see Kasser, 2003, for a modern analysis in the same spirit). In addition, prior studies of alienation and state orientation were largely restricted to preferences for somewhat degraded stimuli, like simple movements or abstract geometrical patterns. We thus wondered if alienation tendencies among state-oriented individuals might extend to evaluations of more complex and meaningful everyday objects, such as commercially available products.

Our first study (Jostmann & Koole, 2002) was inspired by a classic experiment by Wilson and Schooler (1991), which showed that participants who reasoned about their tastes displayed preferences that corresponded less well with expert ratings than participants who spontaneously provided their taste ratings. From the perspective of our ego fixation model, reasoning may have this effect because it is associated with self-control, which may alienate individuals from their intrinsic preferences. If this is correct, then the effects of reasoning should be more pronounced a) when individuals are state-oriented, and b) when the rated products are low in pleasantness (see Kazén et al., 2003).

To test these predictions, we invited seventy participants to come and taste three brands of soft drinks (colas), which included one brand that was rated favorably and two brands that were rated unfavorably by trained sensory experts. Half of the participants were induced to reason about their preferences, the remaining participants simply rated the soft drinks. In line with the ego fixation hypothesis, we predicted that reasoning about preferences would reduce the correspondence between state-oriented participants' preferences and expert rankings for the low-quality soft drinks. We predicted no such effect for action-oriented participants. Finally, because state-oriented individuals are not inclined to ignore their intrinsic preferences when they are presented with attractive stimuli (Kazén et al., 2003), we predicted that effects of reasoning on state-oriented participants would be eliminated for the high-quality soft drink.

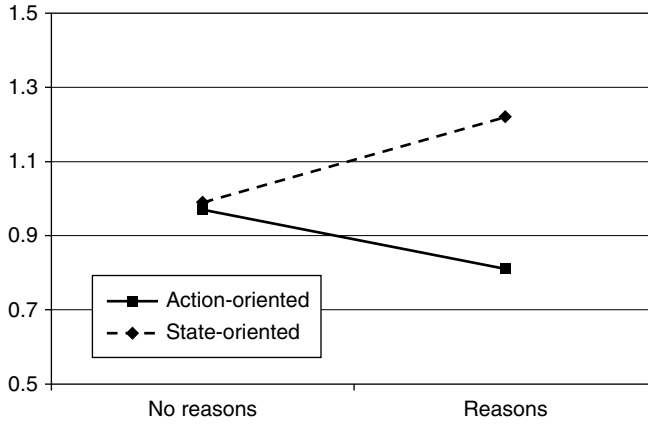

Figure 6.1 Disagreement between participants and experts in preferences for low-quality soft drinks as a function of action/state orientation and reasoning about preferences.

As shown in Figure 6.1, the results of the cola-tasting study were consistent with the ego fixation model. When spontaneously evaluating soft drinks, action- and state-oriented participants' preferences corresponded equally well with the rankings of trained experts. When reasoning about their evaluations, however, preferences of state-oriented participants of low-quality soft drinks diverged significantly more from experts than did the preferences of action-oriented participants. These findings support the notion that the alienating effects of reasoning about preferences occur mainly among state-oriented individuals. As such, these findings connect social-cognitive theories of introspection (Wilson, 2002) with the action-theoretical perspective that underlies the ego fixation hypothesis.

In a second study (Bouw, 2011), we sought to extend the ego fixation model to a different domain. Specifically, we asked sixty-four participants to evaluate the beauty of artwork. Borrowing from Nordgren and Dijksterhuis (2009), we presented participants with paintings. Some of these paintings came from the Museum of Modern Art in New York and are considered by experts to be of the highest quality. Other paintings came from the Museum of Bad Art in Boston and are considered by experts to be of the lowest quality. Participants evaluated a subset of the paintings twice, so that we could assess the stability of their preferences. When people are alienated, their preferences are more strongly guided by external directives and fragmented experiences. Consequently, alienation is likely to destabilize people's evaluations (Kuhl & Beckmann, 1994a; see also Nordgren & Dijksterhuis, 2009; Wilson et al., 1989). Instability of participants' evaluations of the paintings was therefore our measure of alienation.

Between providing the two ratings of the paintings, participants completed a planning exercise that contained our manipulation of self-control priming. To prime high self-control, we asked participants to make a detailed plan of

how they would implement an unpleasant duty that they had to perform in the next two weeks. Prior work has shown that implementation planning increases people's commitment to an intention, even if the intended action is aversive (Gollwitzer, 1999). As such, planning an aversive activity can be expected to mobilize self-control processes. To prime low self-control, we asked participants to make a detailed plan of enacting a fun activity they intended to perform in the next two weeks.

The ego fixation hypothesis suggests that self-control leads state-oriented individuals to become alienated from their intrinsic aversions. In line with this, we predicted that priming self-control would destabilize evaluations of low-quality paintings among state-oriented participants but not among their action-oriented counterparts. We predicted no such effect for evaluations of high-quality paintings. The results confirmed our predictions: After planning an aversive activity, which presumably activates a state of heightened self-control, state-oriented participants displayed greater instability in their evaluations of low-quality paintings than action-oriented individuals. Notably, no such pattern was observed after participants had planned a fun activity nor for evaluations of high quality art. Finally, the effects of planning and state orientation on art evaluations were not mediated by negative mood. The latter fits with the notion that self-control processes contribute to alienation over and above the effects of negative affect.

One important social implication of the ego fixation model is that state-oriented individuals may be more easily cajoled into doing things that are aversive to them. Indeed, state-oriented individuals display more conformity in the classic Asch paradigm than action-oriented individuals (1956; Koole et al., in preparation). Furthermore state-oriented individuals make larger concessions to their partner in a simulated negotiation (Koole et al., in preparation). Likewise, state-oriented individuals display a larger foot-in-the-door-effect, that is, they are more likely to comply with a larger request for making blood donations after they had initially agreed to a smaller request. From the perspective of the ego fixation model, a small initial request leads to exertion of self-control, which impairs state-oriented individuals' ability to turn down subsequent requests. Notably, the ego fixation model predicts greater conformity among state-oriented individuals only when conforming to social norms requires self-control, i.e., doing something that is effortful and aversive. In contexts where conformity is easy and pleasant (e.g., simply mirroring other people's nonverbal behavior), we would not expect state-oriented individuals to conform more than their action-oriented counterparts.

THE SOMATIC NEGLECT HYPOTHESIS

Why would state-oriented individuals be less able to evaluate aversive stimuli? One important clue is provided by Kazén et al. (2003), who observed that state-oriented individuals have faster decision times than action-oriented individuals in deciding whether an aversive activity was externally assigned or self-chosen. This intriguing finding suggests that state-oriented individuals do not access

information that allows them to determine to what extent they prefer (or rather, reject) an aversive stimulus. Of course, this begs the question which kinds of information people require for this evaluative process.

Recent research on embodied cognition has found that people rely on their bodily responses in decision-making (for overviews, see Harmon-Jones, Price, & Harmon-Jones, this volume; Macrae, Christian, & Miles, this volume). In one set of studies, people were found to display anticipatory skin conductance responses when they are considering choices that were associated with heavy losses (Bechara et al., 1997; see also Dunn et al., 2010). These bodily responses may serve as *somatic markers* (Damasio, 1994) that guide people away from potentially dangerous decisions. Indeed, somatic markers seem to be particularly influential among individuals who are high on interoceptive ability, that is, who can perceive subtle bodily changes (Dunn et al., 2010). These findings suggest that the perception of bodily changes is an important determinant of intuitive decision-making processes, particularly for rejecting aversive stimuli.

It is conceivable that ego fixation processes interfere with the perception of the body, thereby undermining people's ability to use somatic markers in their decisions. We refer to this extension of the ego fixation model as the *somatic neglect hypothesis*. The cola-tasting study that we discussed in a previous section (see Figure 6.1) already hints at a link between ego fixation and somatic neglect. The results of that study indicate that a self-control process (i.e., thinking about the reasons for one's preferences) may lead state-oriented individuals to be less sensitive to their taste experiences. This pattern is compatible with the idea that ego fixation may lead individuals to be less discriminating in perceiving their own physical states. We designed additional studies to further examine the link between ego fixation and somatic neglect.

One consequence of somatic neglect may be that state-oriented individuals feel more disconnected from their body. A study by Koole (2008) tested this notion in a study that first manipulated self-control by asking participants to describe a colorful painting either freely (the low self-control condition) or while avoiding the use of color words (the high self-control condition; see Liberman & Förster, 2000). After this, participants were asked to smell the skin on their arm and reported how much they liked this smell. The results showed that the effects of self-control differed strongly by action versus state orientation. Among state-oriented participants, engaging in self-control led to *less* liking of their own body odor. This effect is consistent with the idea that state-oriented participants became somewhat alienated from their body after exerting self-control. By contrast, among action-oriented participants, engaging in self-control led to *more* liking of their own body odor. The latter effect was unexpected, and may indicate that action-oriented participants actively counter-regulate the influence of self-control on their bodily experience (see further Koole, 2009, on counter-regulation processes).

A second consequence of somatic neglect is that it may lead state-oriented individuals to ignore their bodily needs. We explored this idea in the Master's thesis research of Sarah Strübin (2010). In this study, we first prime self-control

by asking all participants to describe a colorful painting without using color words. Next, we asked participants to report how long it was since their last meal and asked them to take part in an alleged "consumer test." During this test, participants tasted two different kinds of food, radishes and cheese crackers. Participants could sample as much of these foods as they wanted and rated how much they liked each type of food.

Ordinarily, one would expect people to like the cheese crackers more and to eat more of these crackers as more time elapsed since their last meal, because food deprivation creates a greater need for high-caloric foods. We indeed found this pattern among action-oriented participants. However, the correlation between the time since their last meal and their liking for cheese crackers was (non-significantly) negative. As state-oriented participants became more food-deprived, their liking and consumption of high-caloric foods declined and, indeed, they started to eat more low-caloric foods (radishes). These findings suggest that somatic neglect may lead state-oriented individuals to ignore even a powerful somatic experience such as hunger.

Finally, a third consequence of somatic neglect may be that it leads state-oriented individuals to be disconnected from the immediate here and now. We explored this notion using a paradigm from visual perception research. People often fail to detect changes in visual scenes, even when these changes are large (i.e., take up to 30% of the scene) and meaningful (Rensink, 2002). We hypothesized that state-oriented individuals might be more susceptible to change blindness after exerting self-control. In his Master's thesis research, David Llamas (2004) manipulated self-control by having participants perform a boring or interesting task. Next, participants were presented with visual scenes, in which elements were sometimes changed after a brief flicker (i.e., white screen). In line with earlier research, participants often failed to detect the visual changes. Importantly, this change blindness was most pronounced among state-oriented participants who had just performed a boring task. It thus appears that self-control may induce perceptual lapses among state-oriented individuals, a finding that is in line with the somatic neglect hypothesis (for more on motivational influences on perception, see Balcetis & Cole, this volume; Most, this volume).

Taken together, three studies using different paradigms have yielded initial evidence for the hypothesis that self-control may induce somatic neglect among state-oriented individuals. Though this line of research is still preliminary, the initial empirical support for somatic neglect seems encouraging.

CONCLUSIONS AND OUTLOOK

Compared to other animals, human beings are endowed with a greatly enhanced capacity for self-control. This capacity for self-control is tremendously useful, by allowing people to behave responsibly even in the face of temptations, distractions, and other impulses that conspire to keep people from doing the right thing (see Carver, Johnson, & Joormann, this volume; Denson, this volume; Inzlicht & Legault, this volume; Maner, this volume; Scholer, this volume; Schmeichel & Tang,

this volume). Indeed, according to some, society would fare much better if only its members would control themselves better (Baumeister, Heatherton, & Tice, 1994). By amping up self-control, people might achieve better grades at school, work more productively, eat more healthy foods, exercise more regularly, stay more faithful to their partner, commit less crimes, and so on.

Should psychologists now advise everyone to maximize the amount of self-control in every aspect of their lives? Perhaps not. Indeed, the present chapter suggests that people can sometimes have too much self-control, in that chronic reliance on self-control can promote certain kinds of self-regulatory failure. We proposed the ego fixation hypothesis, which states that self-control processes, once instigated, may persist involuntarily. One important consequence of ego fixation may be that people continue to suppress their dislike for aversive stimuli. In line with this, we have reviewed evidence that priming self-control processes can impair people's ability to evaluate aversive stimuli, leading to memory errors and unstable evaluations of aversive stimuli. Another consequence of ego fixation may be somatic neglect, such that priming self-control processes may lead people to dislike their bodily experiences, ignore their bodily needs, and experience perceptual lapses.

Although we regard ego fixation as a general mechanism that can affect everyone, some individuals appear to be more vulnerable to ego fixation than others. Indeed, our research has consistently shown that state-oriented individuals, who are prone to experience persistent motivational and emotional states, are especially likely to develop ego-fixated states. We suspect that state-oriented individuals' proneness for ego fixation may render these individuals vulnerable to various psychological problems. Within clinical psychology, therapists have observed a set of phenomena that have some intriguing parallels with ego fixation. In particular, clinicians have discussed something they refer to as *experiential avoidance*, defined as "an unwillingness to maintain contact with internal experiences, such as sensations, emotions, and cognitions, and efforts to avoid these experiences, or the situations that occasion them, even when doing so is harmful" (Baer, 2007).

Therapists have suggested that experiential avoidance may contribute to the onset and maintenance of many psychological problems and disorders, including depression, compulsive behavior, and addiction (Hayes, Strosahl, & Wilson, 1999). So far, however, experiential avoidance has only been investigated through self-report. However, if ego fixation can be linked to experiential avoidance, clinical psychologists may have an experimental model of the causal processes that lead to experiential avoidance. It thus would be important to investigate whether ego fixation tendencies among state-oriented individuals are indeed implicated in experiential avoidance. Furthermore, future research could examine whether therapies designed to overcome experiential avoidance (e.g., mindfulness-based therapy, see Brown, Ryan, & Creswell, 2007) can prevent ego fixation among state-oriented individuals. In so doing, the ego fixation model may illuminate mechanisms of change in psychotherapeutic interventions.

Whereas state-oriented individuals seem to become ego-fixated rather easily, it appears that action-oriented individuals are immunized to an important

degree against ego fixation. Just how action-oriented individuals achieve this immunity remains somewhat unclear. Based on what we know so far, it appears that action-oriented individuals remain more relaxed and mindful of their personal preferences in situations that pressure them into mindless obedience. For instance, action-oriented individuals take more time in verifying whether their obligations were self-chosen or merely imposed (Kazén et al., 2003). Moreover, our somatic neglect studies suggest that action-oriented individuals remain more in touch with their "inner vibes," somatic and perceptual experiences that take place in the here and now, which likely inform action-oriented individuals of their emotional preferences. In future research, we hope to improve our current, admittedly sketchy, understanding of how action-oriented individuals manage to resist ego fixation.

One important way to extend ego fixation research would be to use stronger (more demanding) inductions of self-control. So far, research has used fairly subtle self-control inductions, which either primed self-control or led individuals to exert self-control for no more than five minutes. Although it seemed sensible to start our research with such light-handed procedures, it remains to be seen if action-oriented individuals can still prevent ego fixation in situations that require more prolonged self-control. Theoretically, it is plausible that even action-oriented individuals would have a breaking point, so that they eventually should become ego-fixated if they have to continue to engage in self-control for extended periods of time. And how would action-oriented individuals respond to such situations? Would they still have a self-regulatory advantage over state-oriented individuals? Or would action-oriented individuals be outperformed by state-oriented individuals under these conditions, given that the latter are likely to be experienced with functioning in an ego-fixated state? We hope to explore these intriguing questions in the upcoming years.

Although many questions remain, we hope that the present chapter contributes to a more balanced view of self-regulation. Self-regulation is often equated with a kind of inner battle, in which people must struggle to gain a hold over the hot emotional impulses that interfere with their cold, cognitively represented goals. Although such inner battles sometimes cannot be avoided, it seems psychologically costly for people to live in a continual state of war with themselves. More sustainable forms of self-regulation will therefore seek to work with people's emotional states rather than against them (see also Inzlicht & Legault, this volume). For instance, rather than forcing themselves to look away from tasty but fattening dishes, efficient self-regulators may move towards environments that contain only healthy foods (De Ridder et al., 2012). Paradoxically, the most effective forms of self-regulation may thus minimize people's need to rely on self-control.

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Part II

Affective Mechanisms and Affect Control

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7

No Pain, No Gain

How Distress Underlies Effective Self-control (and Unites Diverse Social Psychological Phenomena)

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AND
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Let's dispense with the obvious: Pain is painful. Pain is the unpleasant experience associated with actual or potential tissue damage. In its social form, pain is the unpleasant experience associated with actual or potential damage to social relationships. Pain is thus related to physical and social damage and recruits unpleasant feelings and sensations. As such, people go to great lengths to avoid pain, for example, staying away from burning elements, steering clear of mean people, and steering clear of mean people near burning elements. Pain is thus adaptive, motivating people to withdraw from damaging situations and to avoid similar situations in the future.

Just as with pain, distress is painful, albeit adaptive. Distress, or anxiety, describes the unpleasant experience that occurs when things have not gone as planned; or when there is potential for things not to go as planned. Because it is unpleasant, people are motivated to avoid distress and to learn from it via the mechanics of negative reinforcement learning. Distress alerts people to the possibility that their goals are at risk of not being met and in so doing arouses shifts in behavior from routine and automatic to deliberate and controlled (Norman & Shallice, 1986). The main point of this chapter is to suggest that, just as with pain, distress inspires people to engage self-control to remediate situations

where things have actually or potentially gone awry. We further want to suggest that this distress-control dynamic underlies–and potentially unites–a number of seemingly diverse social-psychological phenomena.

BRIEF OVERVIEW

Self-control refers to the mental capacity individuals use to influence their own thoughts, emotions, and behaviors. Self-control is initiated whenever there is a conflict between two or more dominant response tendencies or goals, such as when one's goal of losing weight comes into conflict with one's goal of eating delicious, yet fattening french-fries (Stroebe et al., 2008). Conflict, however, is not an affectively neutral event; rather, it is distressing, laden with anxiety (Gray & McNaughton, 2000). According to the *affect alarm model of self-control* (Inzlicht, Bartholow, & Hirsh, 2013; Schmeichel & Inzlicht, 2013), this anxious distress can be adaptive, acting like a kind of signal that there is a potential for things to go wrong. This distress not only orients people to the kind of conflict that can undermine goal attainment, but, because people are motivated to avoid distress, also motivates people to resolve the conflict effectively. Critically, this distress serves to recruit control *only* to the extent that people are open, curious, and accepting of it; it is only by flexibly accepting their distress that people can hear what the distress is trying to "communicate" and then make necessary behavioral corrections. As with physical and social pain, that is, distress can only recruit adaptive responses (i.e., self-control) when people are sensitive to their own avoidant emotions. To be clear, although distress can recruit a whole host of behaviors (e.g., Proulx & Inzlicht, 2012), it will only lead to accommodative, self-controlled behaviors to the extent that the distress is recognized (even unconsciously) and accepted. According to our model, then, distress is a necessary but not sufficient ingredient of self-control.

By casting distress in a starring role, the affect alarm model of self-control offers an understanding of self-control that provides novel insights into how it is recruited. Given the centrality of self-control to so many domains of life–from marital fidelity to criminal behavior, from financial stability to academic performance (e.g., Baumeister, Heatherton, & Tice, 1994)–it should come as no surprise that a number of different social psychological phenomena seem to affect it. For example, autonomous motivation (Deci & Ryan, 1985), self-affirmation (Steele, 1988), mindfulness meditation (Brown, Ryan, & Creswell, 2007), and incremental theories of intelligence (Dweck, 1999) have all been shown to improve aspects of self-regulation, including self-control. Emerging evidence suggests that these diverse phenomena increase control because they amplify the type of short-lived distress response that we suggest is so crucial to self-control. Further, these phenomena increase control because they also increase an openness to distress, a type of non-judgmental stance that allows people to orient to the source of distress and thus do something about it. In other words, these phenomena short-circuit defensive responding to distressing events and instead foster a sort of openness that could, among other things,

foster effective self-control. By suggesting that these diverse phenomena work through the same dynamic, this may further suggest that these phenomena are not so different after all. We start our chapter by outlining the affect alarm model of control and providing details of the various components of the model.

AFFECT ALARM MODEL OF CONTROL

Historically, when it has come to understanding the will, emotion has been at the bottom of the list. So, the proposition that negative affective states like distress form an integral part of self-control might seem counterintuitive. This is because emotion has long been considered the antithesis of reason, with reasoned action the master and bestial emotion the slave (Solomon, 2008). Contemporary views, however, suggest that emotion and cognition are fully integrated and only minimally decomposable (e.g., Pessoa, 2008), which opens the door to the idea that emotions play a central, integral role in cognition, including higher cognitive functions like executive function or self-control.

Control is Initiated by Conflict

The affect alarm model suggests that self-control is instigated by conflict, by which we mean any disagreement or discrepancy between competing mental representations, response tendencies, or actual behavior (Festinger, 1957). We have already mentioned how the conflict between the goal of losing weight and the desire to eat french-fries can instigate control, but other examples abound: cognitive conflict is aroused when having to choose between two desirable choices, when having to choose between a large reward now and an even larger reward later, when wanting to write a chapter but also wanting to check email, or when needing to name the color of a word but also having the strong urge to read it. Conflict is a common starting point for the process of self-control, with many other models starting similarly. Indeed, converging evidence from cybernetics, animal models, neuroscience, and social and personality psychology suggests that goal and response conflicts act as the instigator of control.

Conflict plays a critical role in cybernetic models of self-control, which suggest that control hinges on a simple feedback-loop process that checks for disagreements between desired end states (i.e., goals) and current states of the environment (Carver & Scheier, 1981; Wiener, 1948). Cybernetic principles have been widely used to model control in the behavior of humans and machines. They have been successful because they emphasize the decision point when self-control is initiated–specifically, when things deviate from what is ideal. What starts self-control, in other words, is the presence and detection of conflict. This type of conflict is present, for example, when a depressed person sets the goal of not ruminating on their thoughts, but catches themselves doing just that. As we will see below, cybernetic models further suggest that this detection of conflict produces an emotional response that expedites the instrumental actions that contribute to control.

According to revised *reinforcement sensitivity theory* (RST; Gray & McNaughton, 2000), goal conflict activates the motivational system that is responsible for the braking or stopping of ongoing behavior, the behavioral inhibition system (BIS). Based on animal models, behavioral neuroscience, and the pharmacological effects of classic and modern pharmacological agents, revised RST suggests that behavior depends on three underlying motivational systems–a system sensitive to reward (the behavioral approach system), another sensitive to punishment (the flight-fight-freeze system), and a third (the BIS) that regulates conflicts that arise within and between the other two systems. BIS can be conceptualized as the control system because when it detects goal conflicts, it overrides or inhibits all ongoing behavior while the organism attempts to resolve the conflict to determine the best course of action. Critically, BIS recruits avoidant-motivated, negative affect and is widely considered as the neural substrate of anxiety. In short, BIS is sensitive to conflict and reacts to it by recruiting anxious phenomenological states that help put the brakes on ongoing behavior to eliminate goal conflict.

Conflict also plays a large role in a prominent cognitive neuroscience theory of control, *conflict monitoring theory* (Botvinick et al., 2001; Yeung, Botvinick, & Cohen, 2004). According to this model, control is implemented by two separate neural systems. The first is described as a system that scrutinizes moment-to-moment mental representations for the presence of conflicting response tendencies (Botvinick et al., 2001) or between what is predicted and what actually happens (Holroyd & Coles, 2002). When conflict is detected, this information is passed to the second, regulatory system, which implements the desired response while suppressing incompatible ones. Neuroimaging studies have suggested that these systems are implemented by the anterior cingulate cortex (ACC) and the dorsolateral prefrontal cortex (DLPFC), respectively (e.g., Kerns et al., 2004; see Denson, this volume). Although not stressed by conflict monitoring theory, increasing evidence suggests that the conflict in conflict monitoring is not affectively neutral, with the neural substrate of conflict detection–the ACC–sensitive to pain, distress, and other negative emotions (Shackman et al., 2011). Much of the evidence we present later in this chapter comes from measures of evoked brain potentials that are widely thought to relate to cognitive conflict, but also to negative affect (e.g., Inzlicht & Al-Khindi, 2012).

Social and personality psychology theories also stress the importance of conflict in instigating control, with some theorists suggesting that the detection of conflict is the "defining feature of self-control phenomena" (Hofmann & Kotabe, 2012, p. 711). For example, effective thought control is believed to rely critically on a monitoring process that scans for thoughts that are inconsistent or in conflict with an intended state (Wegner, 1994). A new model of adaptive control (Shackman et al., 2011) suggests that self-control is initiated whenever there is a high need to determine an optimal course of action, such as when people face uncertainty. And, uncertainty can be conceived as a type of conflict between various competing behavioral and perceptual affordances (Hirsh, Mar, & Peterson, 2012). Critically, while uncertainty involves cognitive calculation, it is fundamentally an aversive experience, which people are motivated to avoid.

Conflict Arouses Avoidant Distress

The affect alarm model suggests that mere conflict is insufficient to motivate control; what is also needed is an affective, aversive, and avoidant response to conflict. Without the heat of emotion, conflicts may go undetected–or they may go unresolved even if detected because of a lack of urgency brought about by the desire to reduce the aversive state. Although not sufficient on its own, aversive affect is necessary for self-control.

Before presenting evidence linking conflict with aversive arousal, it is important to define and discuss a few terms and issues concerning affective processes. We use the broad term "affect" to describe the emotions that may be triggered by conflict. Affective states are multi-faceted, whole-body responses involving changes to subjective experience, physiology, and behavior (Mauss et al., 2005). However, although often assumed, these response systems do not always cohere, which suggests that subjective "feelings" may be dissociated from physiological responses. And, indeed, research suggests that affective states can occur without conscious subjective experience of either the cause of the affect or of the affective state itself (Winkielman & Berridge, 2004). What is more, affect can vary on its speed, with some "full-blown emotions" being slow to rise and slow to dissipate, and other affective states being more like quick twinges that may not be conscious, arising very rapidly, possibly within fractions of a second, and maybe dissipating just as quickly (Zajonc, 1980).

Cybernetic models specify that controlled processing is instigated by the detection of some discrepancy from what is ideal. This detection process, however, may be far from affectively neutral, with the detection of fast-changing discrepancies producing positive affect and slow-changing discrepancies, negative affect (Carver & Scheier, 1990). Critically, while positive affect can sometimes lead to the slackening of goal pursuit, negative affect sometimes hastens goal pursuit and hence discrepancy reduction (Carver & Scheier, 2011). Negative affect, in other words, instigates control by orienting people to the fact that a discrepancy was detected and that discrepancy reduction and hence control are required. It not only orients people to discrepancy, it motivates its reduction because people naturally want to reduce negative affect and maximize positive affect (Freud, 1920/1952). The point here is that feedback-loop models of control posit an important role for negative affect in prompting control. Some animal models do the same.

According to revised RST (Gray & McNaughton, 2000), BIS is not only involved in conflict detection and resolution, but forms the basis of a general anxiety network in the brain. Revised RST suggests that BIS functioning contributes to feelings of anxiety, and may be experienced phenomenologically as worry, caution, and vigilance. Anxiolytic drugs like Valium, Xanax, or Diazepam act on the neural substrates of BIS, most notably the septo-hippocampal comparator system, but also the ACC and the locus coeruleus-norepinephrine system (Gray & McNaughton, 2000). Norepinephrine is a catecholamine neurotransmitter that is associated with attention (Aston-Jones & Cohen, 2005),

but also with alerting, sensory arousal, and anxious distress (Panksepp, 1998). For example, single-cell recording studies suggest that norepinephrine neurons in the locus coeruleus (in the brain stem) are sensitive to emotional stressors (Abercrombie & Jacobs, 1987). The release of norepinephrine thus appears to be one of the key processes in the cascade of neural activity underlying anxiety, and a vital part of the conflict-detecting BIS.

Further evidence for conflict's aversive nature comes from work on the error-related negativity (ERN), a negative voltage deflection in the event-related brain potential that peaks around 100 ms after error and is thought to be generated by the ACC (Dehaene, Posner, & Tucker, 1994; Gehring et al., 1993). Although widely assumed to reflect the cold detection of conflict (e.g., Denson, this volume), recent work suggests that the ERN may also reflect an emotional, distressed response to errors (e.g., Inzlicht & Al-Khindi, 2012; Luu, Collins, & Tucker, 2000). The ERN, as the name implies, is time-locked to errors, and errors are typically distressing. Errors, for example, prompt increased skin conductance, greater heart rate deceleration, increased pupil dilation, and larger startle reflexes compared with correct responses (Critchley et al., 2003; Hajcak & Foti, 2008; Hajcak, McDonald, & Simons, 2003). The ERN may thus reflect not only the detection of an error but also the aversive affect that accompanies such detection. This may be why the ERN not only predicts improved cognitive performance (Hirsh & Inzlicht, 2010), but also individual differences in negative affectivity, including anxiety disorders (Hajcak, McDonald, & Simons, 2004). Findings such as these hint at the possibility that distressed affect plays a key role in linking the detection of conflict and instrumental behaviors to resolve the conflict.

Basic research in social psychology further confirms the distressing nature of cognitive conflict. Cognitive dissonance (Festinger, 1957) is a term used to describe the feelings of discomfort when simultaneously holding in mind two or more conflicting thoughts, or two or more action-tendencies (Harmon-Jones & Harmon-Jones, 2008). Although there was once a dispute as to the nature of dissonance (e.g., Bem, 1967), most researchers now agree that dissonance is fundamentally distressing (e.g., Croyle & Cooper, 1983; Proulx, Inzlicht, & Harmon-Jones, 2012; Zanna & Cooper, 1974) with people actively motivated to reduce its presence and effects. Moreover, brain findings suggest that dissonance evokes activity in the ACC (Kitayama, Tompson, & Chua, this volume), which, as we have mentioned above, is implicated in pain, negative affect, and cognitive control (Shackman et al., 2011). In sum, while conflict prompts control, many lines of evidence suggest that conflict is distressing. The affect alarm model suggests that conflict initiates control via its effects on these aversive states.

Distress Recruits Control

The affect alarm model suggests that control is instigated by the presence of conflict that arouses aversive affective states. It further suggests that these states of distress (1) alert people to the presence of conflict and (2) motivate actions to reduce the distress, including resolving the conflict itself.

One reason aversive affect helps recruit control is that affect, both avoidant and appetitive, is especially likely to influence attention and mobilize the organism for action (Bradley et al., 2001). This is why emotional stimuli are viewed for longer than neutral pictures (Lang, Bradley, & Cuthbert, 1997), are associated with extremely fast electrocortical responses reflecting visual attention (Harmon-Jones, Harmon-Jones, & Price, this volume), and can intrude into attention when attentional resources are otherwise occupied (Most, this volume). Emotional stimuli preferentially capture attention because they typically signify the presence of something motivationally relevant or salient (Hajcak et al., 2012). This may be why some affects (e.g., negative moods) lead to controlled responding and a reduced reliance on superficial cognitive heuristics (Forgas, this volume).

Emotions exist to signal states of the world that have to be responded to; they help prepare an organism for effective action (Izard, 2010). That is, they orient people to the motivationally salient aspects of their environments and drive intelligent behaviors (Damasio, 1994). Thus, when the goal conflict faced by a dieter arouses anxious distress, this aversive state not only helps her attend to the presence of conflict, it also helps her prepare for actions to reduce this aversive state. People are typically motivated to avoid distress, which may be why people tend to respond to distressing events by taking actions to diminish them.

As we have already mentioned, cybernetic models place great importance on the detection of conflict as the decision point that gets control started. When conflict is detected this feeds forward to the motor of control that labors to reduce conflict. Critically, when the rate of conflict reduction is below some internal criterion, this produces negative affect that acts to hasten the rate of conflict reduction by feeding-back and pumping the motor of self-control (Carver & Scheier, 1990). Similarly, BIS responds to goal conflict by recruiting anxious states of distress that help put the brakes on ongoing behavior so that an organism can quickly determine the optimal course of action. BIS, that is, functions to resolve goal conflict by inhibiting or overriding movement toward goals, by increasing states of arousal to allow for split-second changes in behavior, and by increasing attention via environmental scanning or other forms of risk assessment (Gray & McNaughton, 2000).

Cognitive neuroscience models of control suggest that the output of the conflict monitoring system is to inform control centers in the brain, especially the DLPFC, when to execute behavior (Botvinick et al., 2001). And there is an abundance of evidence that this conflict system–which is often measured by the ERN and is intricately related to distress (Hajcak & Foti, 2008)–reliably predicts self-control. This includes research linking the ERN with low-level indices of control, such as the degree to which participants slow down and recalibrate after making an error on a speeded reaction-time task (Bartholow et al., 2012) or the frequency of errors on a test of executive function (Inzlicht & Al-Khindi, 2012); but, it also includes research linking the ERN to higher-level indices of control such as better control of racist impulses (Amodio, Devine, & Harmon-Jones, 2008), better grades in college (Hirsh & Inzlicht, 2010), and better emotion-regulation in daily life (Compton et al., 2008).

Moderating the Affect Alarm: Emotion Acceptance

Whether the affect alarm instigates self-control depends critically on questions about whether the signal is heeded. In other words, negative affect is not enough to recruit control. What is also needed is a sensitivity and receptivity to the aversive affective state. When people are sensitive to the emotions they experience and open-minded about those experiences, they not only have the power to make the correct attribution of what instigated the emotion, they can also accept and "hear" the information conveyed by the emotion.[1] While a number of emotion-related factors may moderate the affect alarm, the one we focus on here is emotion acceptance.

We suggest that the efficiency of the affect alarm is increased when people respond to their emotions with an attitude of openness, curiosity, and acceptance. Thus, simply being aware of one's emotions is not enough; what is also needed is an accepting, flexible, and non-judgmental stance towards those emotions (Cardaciotto et al., 2008; Kashdan & Rottenberg, 2010). People who can experience their affective states–especially aversive ones–without defense, judgment, or a desire to escape them, can "hear" the information the emotion is trying to convey about their current situation, even when those emotions are very fast and very subtle. These sorts of people are receptive to their affect, and when the affect signals the presence of goal conflict, they can then act on them by recruiting instrumental control. In contrast, people who avoid or suppress their negative affect will be unable to use this information to motivate subsequent action. To be clear, while people who are receptive to their affects will become less distressed by them in the long run, they will also become better informed as to the source of their distress and thus better able to engage in actions to reduce this distress, namely the control of their behavior. New research is now beginning to confirm this very idea.

UNIFYING DIVERSE PSYCHOLOGICAL PHENOMENA

The idea that the acceptance of distress promotes self-control by underscoring and rectifying response conflict is central to the affect alarm model of self-control. In line with this premise, the model predicts that a number of seemingly diverse psychological phenomena should promote emotional agility in the service of optimizing performance. In particular, we suggest that autonomy, self-affirmation, mindfulness meditation, and a growth-oriented mind-set all increase self-control by enhancing openness and responsiveness to errors, conflict, and threat. In other words, the acceptance of negative affect provides a mechanism through which these various phenomena elicit their effects on self-control.

Autonomy Boosts Self-Control through the Integration of Experience

The experience of autonomy, which involves feelings of self-direction and volition (as opposed to feeling pressured or coerced), is critically linked to

self-regulation. For instance, autonomy predicts adherence to weight loss programs (Williams et al., 1996), likelihood of quitting smoking (Williams et al., 2009), alcohol abstinence (Ryan, Plant, & O'Malley, 1995), and compliance with pharmacological treatment for disease (Williams et al., 2009). At a lower level of analysis, autonomy has recently been shown to predict better performance on tests of cognitive control (Legault & Inzlicht, 2013).

One key finding that can explain the link between autonomy and self-control is that autonomy promotes openness and integration of ongoing experience. One feels autonomously motivated when one is engaged in an activity that is either interesting or personally important. In contrast, externally-coerced individuals' sense of self is socially-defined and their self-worth is contingent upon social standards. Because of this focus on authenticity, those who function autonomously are accuracy-motivated, maintaining openness and responsiveness to reality, whereas externally-coerced individuals are directed by contingencies of self-worth and defensiveness (Hodgins & Liebeskind, 2003).

In addition to increasing self-awareness (Deci & Ryan, 1985), autonomous motivation also promotes the acknowledgment and acceptance of negative affect, criticism, personal shortcomings, and threatening self-relevant information (Weinstein, Deci, & Ryan, 2011). In contrast, externally-coerced individuals tend to accept positive personal attributes and behaviors while rejecting and denying negative ones. In line with the affect alarm framework, we suggest that it is precisely because of this openness to negative experience and feedback that autonomous motivation promotes self-control. Because an autonomous motivational orientation is task-focused rather than ego-involved, there exists a drive to perceive information accurately and honestly in order to learn and grow.

Self-Affirmation Boosts Self-Control by Reducing Defensiveness

Self-affirmation refers to behavioral or cognitive events that sustain the perceived integrity of the self (Sherman & Cohen, 2006; Steele, 1988). When integrity is threatened (i.e., when one encounters information that undermines the competence or goodness of the self), people may respond by denying or minimizing the threatening information through defensive reactions. But, through the process of self-affirmation, threats to integrity can be managed in an adaptive way that preserves self-worth and also promotes accurate responsiveness to threats (Sherman & Cohen, 2006). This process often involves simple reminders of important aspects of the self (e.g., one's deeply held values). By affirming integrity in this way, one's sense of self becomes secured in one's broader view of the self as good, and there is less need to defend against the threat. Like autonomous individuals, self-affirmed people can focus on the demands of the situation, setting aside the need to protect their ego.

We suggest that self-affirmation improves self-control in much the same way as autonomy; that is, self-affirmation enhances self-control by lowering defenses against potential self-threat. Past work has shown that self-affirmation

eases the impact of negative feedback, such that self-affirmed individuals shed defensiveness in favor of more candid and impartial responses. For instance, whereas people typically tend to resist threatening health-related information, self-affirmation has been shown to increase the acceptance of such information, facilitating awareness of potential health risks, and promoting contemplation of their personal implications (Sherman, Nelson, and Steele, 2000). Not only does self-affirmation lower defensiveness, it also improves self-control, including pain tolerance, task persistence, and delay of gratification (Schmeichel & Vohs, 2009). In line with the affect alarm framework, it appears that self-affirmation promotes openness to threat, and that such openness improves functioning–including task performance–by boosting attention to sources of threat in order to correct future behavior (Legault, Al-Khindi, & Inzlicht, 2012).

Mindfulness Meditation Boosts Self-Control by Increasing Emotional Acceptance

Practitioners of meditation are taught to attend to all thoughts, sensations, and feelings, but also to receive these experiences in a non-judgmental way. Indeed, both present-moment awareness and mindful acceptance of emotional states are fundamental principles of mindfulness meditation practice (Cardaciotto et al., 2008). Mindfulness is a state of *being* in which receptiveness to internal and external stimuli is paramount. This is quite distinct from common forms of processing, which fall prey to cognitive distortions such as attributions, judgments, appraisals, and rationalizations.

Because meditators invest such effort and focus on openly perceiving as well as attentively monitoring emotional experience, it is not surprising that they also show superior self-control. It has been shown, for instance, that experienced meditators excel at conflict monitoring on the Attention Network Test (Jha, Krompinger, & Baime, 2007). As a dispositional trait, mindfulness enhances behavior regulation, psychological health, and interpersonal relationships (Brown et al., 2007). It has also been found that trait mindfulness is positively associated with autonomous self-regulation and congruence between implicit and explicit affect (Brown & Ryan, 2003). It also reduces impulsive responding (Wenk-Sormaz, 2005) and promotes tolerance of distressing emotional states, such as anxiety and fear (Eifert & Heffner, 2003). In line with the affect alarm model of control, we suggest that it is because mindfulness facilitates openness to negative emotion and self-threat (e.g., Brown et al., 2008), that it allows people to connect with their mistakes and shortcomings, thus granting them the ability to attend to and resolve the sorts of goal conflicts that precede self-control.

Incremental Theorists See Negative Feedback as Opportunity

Dweck's model of implicit theories of intelligence (Dweck, 1999) distinguishes between individuals who believe that intelligence is unchangeable

and stable (i.e., *entity theorists* or those who have a *fixed mind-set*) and those who believe intelligence is malleable and can be developed incrementally through learning (i.e., *incremental theorists* or those who have a *growth mind-set*). Relative to entity theorists, incremental theorists focus more on learning goals than performance goals (Dweck & Leggett, 1988) and tend to make mastery-oriented rather than helplessness attributions for failure (Henderson & Dweck, 1990). These two ways of thinking about intelligence have important consequences for performance, achievement, and self-control. Various studies have suggested that those with an incremental view of intelligence demonstrate better academic performance than those with an entity view (Blackwell, Trzesniewski, & Dweck, 2007). Similarly, relative to those with a fixed mind-set, those with an incremental view demonstrate superior executive control, as demonstrated on tests of processing fluency (Miele & Molden, 2010).

Much like autonomous, self-affirmed, and mindful individuals, incremental theorists display adaptive responses to failure. Whereas entity theorists view failure as an indication of their own immutable lack of ability and tend to abandon tasks when they fail at them, growth-minded incremental theorists see failure as potentially instructive feedback and are more likely to learn from their mistakes (Dweck, 1999). This may be because incremental theorists are likely to interpret their shortcomings and difficulties as signs that their knowledge and abilities are still developing (Blackwell et al., 2007). Instead of shrinking at errors, incremental theorists view them as part of the growth process. Consistent with the affect alarm model of control, then, incremental mindsets may improve performance, including on self-control tasks, because they allow people to adaptively respond to errors in order to learn and grow from them.

A NEURAL BOTTLENECK FOR DIVERSE PHENOMENA

An important mechanism underlying each of the aforementioned psychological phenomena is an attitude of openness and acceptance to errors and personal shortcomings. When people accept their mistakes, see them as opportunities to learn, they may become more attuned and sensitive to them. Part of this increased sensitivity includes "experiencing" the sorts of upticks in short-lived emotion that (1) orient people to the fact that a mistake was made and (2) that motivate the kinds of behaviors that lead people to avoid such mistakes in the future. Indeed, recent evidence suggests that brain-based responses that reflect both the detection of error and the short-lived affect that accompanies such detection help to explain the effects of autonomy, self-affirmation, mindfulness, and learning orientation on self-control. In particular, the ERN–which, as previously stated, may reflect the detection of and emotional response to conflict (Inzlicht & Al-Khindi, 2012)–appears to mediate the effects of each of these psychological states.

Autonomy and the ERN

Recent work has shown that both trait-level and state-induced autonomy are linked to the ERN (Legault & Inzlicht, 2013; see also Amodio et al., 2008). When those high and low in autonomy completed either a Go/No-Go or Stroop task while ERN amplitudes were recorded using electroencephalography, those high in autonomy showed greater self-control (i.e. fewer errors) and a higher ERN. A test of mediation further revealed that the ERN accounted for the link between autonomy and self-control. Thus, as autonomous motivation increased, the ERN increased as well, which was related to increases in performance.

Self-Affirmation and the ERN

Self-affirmation also increases the ERN (Legault, Al-Khindi, & Inzlicht, 2012). Participants in one study were assigned to either a self-affirmation or non-affirmation condition. Those who asserted their core values, that is, those who engaged in self-affirmation, demonstrated larger ERNs on a subsequent Go/No-Go test than did non-affirmed participants. They also performed better on the test, as evidenced by fewer errors. As this study reveals, affirmation of core values appears to lower defensiveness towards errors, thereby attuning people to these errors so that they can be prevented in the future.

Mindfulness and the ERN

Teper and Inzlicht (2013) have recently shown that mindfulness also predicts ERN amplitudes. When mindfulness meditators and community-matched control participants completed a Stroop task (during which their ERN amplitudes were recorded), meditators showed greater self-control (i.e. fewer errors), as well as higher ERNs. Moreover, meditators showed greater emotional acceptance than did controls. A test of mediation revealed that the link between meditation practice and self-control was explained by both emotional acceptance and heightened brain-based detection of and emotional-response to errors (i.e., the ERN). By increasing acceptance, in other words, meditation leads people to become more attuned to their errors, including experiencing more error-related emotionality, and this then fosters better self-control.

Learning Orientation and Error Positivity

Finally, recent work has shown that having a growth mind-set is associated with enhanced error positivity (Moser et al., 2011). Error positivity (Pe) is a later occurring event-related-potential component, appearing after the ERN on error trials and is thought to represent awareness and allocation of conscious attention to mistakes (Nieuwenhuis et al., 2001). Like the ERN, the Pe plays a role in on-line error monitoring, and correlates with adaptive behavioral adjustments following errors (Hajcak et al., 2003). Moser and colleagues (2011)

demonstrated that incremental theorists performed better on a flanker task compared to entity theorists, likely because they interpreted mistakes as "growing pains" rather than evidence of failure. More to the point, the Pe mediated the relationship between mind-set and performance, underlining the idea that the awareness of errors, which may include emotional responses to errors, increases the ability to rebound from mistakes.

Summary

The above studies indicate that autonomy, self-affirmation, mindfulness, and learning orientation are all related to better self-control. We suspect that these varying phenomena improve self-control because they increase acceptance and non-defensiveness, which may translate to greater awareness of errors and mistakes. Critically, this awareness may be abetted by very brief emotional twinges that orient people to the fact an error was made. And this is one thing we may be measuring with the ERN.[2]

DISCUSSION

Although negative affect is painful and counterproductive in large doses, it serves a vital function in self-control. Without it, people would not know when self-control efforts were lacking and when behavior is in need of correction. Negative affect is thus an adaptive feedback signal that accompanies deficiencies in goal progress and thereby drives optimal performance. However, it is not simply the presence of affect that instigates this reactive form of self-control. The capacity to detect and accept it is just as important.

Despite the significant intersection of negative affect and adaptive functioning, we are mindful not to overstate the benefits of distress. Here, we are referring to the functional role of transient negative affect rather than the debilitating effects of prolonged or full blown negative emotions. We certainly do not suggest that negative emotions are conducive to goal regulation or wellness in general, especially if they are chronic (see Inzlicht et al., 2013). Indeed, pervasive negative emotions, such as would occur for people high in trait anxiety, often undermine self-control (Eysenck et al., 2007) despite producing higher ERNs (Gehring, Himle, & Nisenson, 2000; Hajcak et al., 2004). Negative emotion and amplified ERNs, then, are not sufficient to produce better self-control. Instead, we are suggesting that it is attention to and acceptance of phasic changes in affect that are integral to the dynamic regulation of action. And it is negative affect, in particular, that signals when attention is most needed.

CONCLUSION

The main contribution of the affect alarm model of self-control is to suggest that aversive affect plays an instrumental role in recruiting self-control. Affect, according to our model, is not merely an interloper that moderates control from

the outside, nor is it merely an object or product of self-control. Rather, it is essential to self-control, signaling when it is needed by amplifying the detection of conflict and giving urgency to conflict resolution. Thus, the central aim of this chapter was to highlight the integral role of negative affect in instigating and motivating control.

This chapter also highlights the power of neuroscience to unite seemingly diverse phenomena. Because social neuroscience reduces social psychological phenomena to a core set of functions and mental modules, it reveals links between otherwise distinct phenomena. The finding that autonomous motivation, self-affirmation, mindfulness meditation, and incremental mindsets all foster better control coupled with the finding that they each foster control because of their respective impact on the brain-mediated detection of and emotional response to errors and conflict suggests that these phenomena may not be so different after all. Rather, these phenomena fall under the same mechanistic umbrella, namely they each defuse defensive responding to distressing events–including to goal conflict–and instead nurture a sort of acceptance that fosters effective self-control. Future work should identify other phenomena that can increase acceptance because in so doing they may identify phenomena that can also increase control.

NOTES

1 This sensitivity and acceptance of affect can happen below levels of conscious awareness. That is, people who are skilled with emotion may non-consciously recognize and accept their various affective states, even those states that are non-conscious and very fast.

2 It is important to note that there is no one-to-one relationship between the ERN and emotion and that any connection with the above phenomena and the ERN may thus be due to other non-emotional factors as well (e.g., error detection). Future studies are therefore needed to confirm the emotional interpretation that we prefer.

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8

The Relationship between Individual Differences in Executive Functioning and Emotion Regulation

A Comprehensive Review

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Emotion regulation enhances human social life. In fact, several laws, rules, and social norms explicitly require people to keep their emotions in check. Brazil, Canada, and New Zealand, for example, have enacted "Hate Speech" laws to discourage inflammatory expressions of prejudice or hatred. More prosaically, Major League Baseball reserves the right to disqualify players who express displeasure with an umpire's decision (Rule 9.01d of the Official Rules of Major League Baseball). But even strong sanctions against emotional expression cannot guarantee successful emotion regulation. Consider that legendary player and manager John McGraw expressed sufficient displeasure to be disqualified from 131 baseball games over the course of his Hall-of-Fame career.

Emotion regulation is also an important key to psychological well-being. This is exemplified by the fact that abnormalities in emotion regulation are central to several forms of psychopathology, including mood and anxiety disorders. For example, adults who report more difficulty with emotion regulation also report more anxiety, more worry, and more agoraphobic thoughts relative to other

adults (Kashdan, Zvolensky, & McLeish, 2008). Conversely, although exerting control can have detrimental effects (see Koole et al., this volume), prior research has associated successful emotion regulation with psychological well-being (Bonanno et al., 2004; Côté, Gyurak, & Levenson, 2010).

What contributes to success at emotion regulation? Previous research has identified personality traits such as conscientiousness (e.g., Jensen-Campbell et al., 2007) and agreeableness (e.g., Haas et al., 2007; Tobin et al., 2000) as major influences, along with self-esteem (e.g., Wood, Heimpel, & Michela, 2003); undoubtedly there are others. The present chapter examines the contributions of cognitive ability to successful emotion regulation. More precisely, we review evidence pertaining to the hypothesis that a suite of cognitive abilities known as the executive functions contribute to success at emotion regulation.

EXECUTIVE FUNCTIONS

The executive functions are cognitive processes associated with the frontal lobes of the brain that coordinate and regulate other processes and brain regions. Although a definitive list of the executive functions does not yet exist, the usual suspects include the capacities for response inhibition, forming a plan and implementing it, switching back and forth between tasks, maintaining and updating the contents of memory, and resisting interference from distractions (see Hofmann, Schmeichel, & Baddeley, 2012).

In the current chapter we lean on seminal research by Miyake et al. (2000) regarding the underlying factor structure of executive functioning. They asked a large sample of college students to perform a battery of nine putative executive functioning tasks and found evidence for three related but empirically distinct executive functions: information updating and monitoring ("updating"), mental set shifting ("shifting"), and inhibition of pre-potent response ("inhibition"). Accordingly, in the current chapter we review evidence regarding the contributions of individual differences in updating, shifting, and inhibition to successful emotion regulation.

Ample research suggests that the executive functions underlie performance on a host of complex cognitive or attentional tasks, including tasks that require logical reasoning (e.g., Kyllonen & Christal, 1990), reading comprehension (e.g., Daneman & Carpenter, 1980), dual tasking (e.g., D'Esposito et al., 1995), goal maintenance (e.g., Kane & Engle, 2003), and planning (e.g., Miyake et al., 2000). The consensus view is that the executive functions are central to human cognitive processing.

How about emotional processing? Do the executive functions contribute to human emotional life? Historically, research on the executive functions has been the province of cognitive psychology and cognitive neuroscience, and the bulk of this research has focused on identifying the structures and functions that underlie performance on laboratory tests of cognitive performance. For example, hundreds of studies have examined response inhibition using the Stroop task (see MacLeod, 1991), and numerous studies have found evidence

for increased activation in the dorsolateral prefrontal cortex during tasks that require executive functioning, including response inhibition (e.g., MacDonald et al., 2000) and memory updating (e.g., Barbey, Koenigs, & Grafman, 2012).

Much less attention has been paid to possible relationships between the executive functions and emotional processes and responses. The research that has been done on this topic has tended to assess the impact of emotions on executive functioning (see Forgas, this volume; Inzlicht, this volume; Most, this volume; Mueller, 2011; Pessoa, 2009). In the current chapter we review evidence pertaining to the converse form of influence, namely the influence of executive functions on emotional processes and responses, focusing especially on emotion regulation.

EMOTION REGULATION

Because the executive functions are thought to coordinate and regulate other processes, we reasoned that the most obvious place to look for evidence of a relationship between the executive functions and emotions would be research on emotion regulation. Emotion regulation refers to efforts to change the duration or intensity of an emotional response. For example, a spelling bee winner who hides her pride to spare the feelings of her competitors, an employee who feigns enthusiasm for a tedious task, and a test-taker who reinterprets his anxiety as eager anticipation engages in emotion regulation (Denson, this volume; for a review, see Koole, 2009).

The two most commonly studied emotion regulation strategies are expressive suppression and reappraisal. Expressive suppression refers to the inhibition of outward expressions of emotion. Reappraisal refers to efforts to think differently about an emotional event. The majority of the research reviewed in this chapter concerns success at emotion regulation in the form of expressive suppression or reappraisal, respectively.

Emotional responses and the regulation of emotional responses are often assumed to be distinct phenomena, although in practice these can be difficult to tease apart (see Gross, Sheppes, & Urry, 2011; Koole & Rothermund, 2011). In this chapter we adopt the convention of treating the generation of emotion and the regulation of emotion as distinct events, and we focus the bulk of our attention on the controlled (as opposed to automatic) regulation of emotion. Our guiding assumption is that the generation of emotion is largely an automatic and nonconscious process, and is thus relatively unlikely to be influenced by executive functioning. By contrast, emotion regulation is often a relatively more controlled, conscious process that is more amenable to executive control.

WHAT IS AND WHAT IS NOT REVIEWED IN THIS CHAPTER

Two strands of evidence are brought to bear on the question of whether the executive functions influence emotion regulation. First, we review research on individual differences in executive functioning and their relationship to emotion

regulation. Simply put, some people are more adept than others at updating, shifting, or inhibiting responses. Do these differences in cognitive ability relate to emotion processes and responses? Second, we review experimental research that has tried to disrupt cognitive ability and assess the impact on emotional responding, and we evaluate the implications of this evidence for considering the executive functions as causal determinants of successful emotion regulation.

We review individual differences research focusing specifically on studies that have used behavioral (performance-based) measures of executive functioning, to minimize the possibility that any observed relationships are tainted by self-report biases or socially-desirable responding. Thus, we do not review studies showing that self-reported executive functioning ability moderates success at emotion regulation (e.g., Derryberry & Reed, 2002; Gyurak & Ayduk, 2007; Jones, Fazio, & Vasey, 2012). Furthermore, we do not review the substantial body of evidence assessing brain activation levels using fMRI during different types of emotion regulation tasks (see Kalisch, 2009; Ochsner, Silvers, & Buhle, 2012). Such evidence suggests that the frontal lobes underlie successful emotion regulation but does not directly address the role of individual differences in executive functioning (though this is beginning to change; Winecoff et al., 2011).

INDIVIDUAL DIFFERENCES IN EXECUTIVE FUNCTIONING AND THEIR RELATIONSHIP TO SUCCESSFUL EMOTION REGULATION

In this section we provide a comprehensive review of published evidence of the extent to which individual differences in executive functioning predict success at emotion regulation. We identified and review below 11 articles describing 14 studies that met our inclusion criteria: performance-based measures of executive functioning plus accepted measures of emotion regulation, respectively. Please refer to Table 8.1 for an overview of these studies.

The first relevant investigation sampled children at 22 and 33 months of age (Kochanska, Murray, & Harlan, 2000). All the children completed an age-appropriate battery of tasks assessing their capacities to delay gratification, to slow or suppress responding (e.g., walk down a line to and from the mother as slowly as possible), and to focus attention. The children also experienced one positive and one negative emotional event that supplied the relevant measures of emotion regulation. The positive experience involved viewing a humorous puppet show and then being gently tickled by the puppets. The negative experience involved being strapped tightly into a car seat by the mother. The results revealed that children who scored higher on effortful control expressed less intense anger to the physical restraint challenge and less intense joy to the puppet show, relative to children who scored lower on effortful control. The authors interpreted these patterns as evidence that effortful control ability in children contributes to the successful regulation of approach-related emotional responses.

Another early examination of possible relationships between effortful control and emotion regulation sampled children aged 3 to 5 (Kieras et al., 2005). All

TABLE 8.1 Summary of studies assessing individual differences in executive functioning and emotion regulation

Article	Sample	Measure of Executive Functioning	Measure of Emotion Regulation
Kochanska, Murray, & Harlan, 2000	106 children at 22 and 33 months of age	Battery of 11 effortful control tasks	Emotional expressiveness in response to humorous puppets and physical restraint
Kieras, Tobin, Graziano, & Rothbart, 2005	62 children between 3 and 5 years of age	Battery of 7 effortful control tasks	Emotional expressiveness in response to receiving less (versus more) desirable gift
von Hippel & Gonsalkorale, 2005	71 undergraduates	Stroop task (inhibition)	Negativity of emotional expression in response to invitation to eat a chicken foot
Schmeichel, Volokhov, & Demaree, 2008	Study 1: 45 undergraduates Study 2: 50 undergraduates Study 3: 71 undergraduates Study 4: 63 undergraduates	Study 1: OSPAN (updating) Study 2: OSPAN Study 3: spatial and verbal 2-back tasks (updating) Study 4: OSPAN	Study 1: Expressive suppression during disgusting film Study 2: Expressive suppression during humorous film Study 3: Reappraisal of disgusting film Study 4: Reappraisal of sad or humorous film
Gyurak et al., 2009	48 adults, including 31 with neurodegenerative disease	Digit span, spatial span, Stroop task, trail making test, verbal fluency tasks	Facial expressiveness and body movement in response to anticipated and unanticipated noise blasts
Schmeichel & Demaree, 2010	102 undergraduates	OSPAN	Self-enhancement in response to negative feedback
Stawski, Almeida, Lachman, Tun, & Rosnick, 2010	1,202 adults ranging from 40–59 years of age	Episodic verbal memory test, WM span, category fluency, inductive reasoning, processing speed	Daily reports of emotional response to stressors
Tabibnia et al., 2011	44 healthy adults and 43 meth-dependent adults	Stop-signal task	Reappraisal of negative emotional images

TABLE 8.1 Continued

Article	Sample	Measure of Executive Functioning	Measure of Emotion Regulation
Gyurak, Goodkind, Kramer, Miller, & Levenson, 2012	69 adults, including 48 with neurodegenerative disease	Digit span, spatial span, Stroop task, trail making test, verbal fluency tasks	Heart rate and facial expressiveness when hiding expressions, amplifying expressions, or simply watching disgusting films
McRae, Jacobs, Ray, John, & Gross, 2012	89 healthy adults	OSPAN, global/local task (shifting), verbal ability, Stroop task, abstract reasoning	Reappraisal of negative emotional images
Van Dillen, van der Wal, & van den Bos, 2012	74 undergraduates (Study 1)	Stroop task	Impact of disgust on moral judgments

the children completed tasks that assessed their capacity to slow or suppress responding (e.g., drawing a line as slowly as possible). The children also rated several toys and books and later were videotaped as they received their top-rated toy. Then the children rated another set of books and toys before receiving their least favorite one; again their reactions were videotaped. Emotion regulation was quantified as the difference in positive emotional expressions upon receiving the two gifts, with smaller differences revealing better emotion regulation (i.e., reduced display of socially-inappropriate displeasure). The results indicated that older children and children who scored better on the effortful control tasks exhibited smaller differences in positive emotional expression after receiving the desirable versus undesirable gifts, consistent with the idea that effortful control helps to override negative emotional reactions.

Do the relationships observed between effortful control and emotion in children hold up into adulthood? One of the first investigations into possible relationships between executive functioning and emotion regulation in adults looked for links between inhibitory control and the suppression of a socially inappropriate response (von Hippel & Gonsalkorale, 2005). Participants completed a Stroop task as a measure of individual differences in inhibitory ability. Then, in the crucial condition of the experiment, non-Asian participants were asked by a Chinese experimenter to taste what was purported to be the national dish of China: a chicken foot. Participants' facial expressions and verbal utterances were recorded by a hidden video camera as the chicken foot was revealed. Consistent with the hypothesis that executive functioning contributes to success at emotion regulation, participants who performed

better (more quickly) on the Stroop task exhibited less negative responses to the chicken foot, relative to participants who performed more poorly on the Stroop task.

A subsequent multi-study investigation used more traditional methods of emotion elicitation to assess the relationship between working memory capacity—an indicator of updating—and success at both expressive suppression and cognitive reappraisal, respectively (Schmeichel, Volokhov, & Demaree, 2008). In a first study participants completed a well-validated measure of working memory capacity known as the operation span task (OSPAN; Turner & Engle, 1989), which required them to recall word lists while solving math problems. Then they viewed a highly aversive (disgusting) film clip under instructions to suppress all outward expressions of emotion. Scores on the working memory test predicted emotional expressiveness, such that participants with higher working memory capacity expressed less emotion on their faces. A second study found the same pattern among participants who had been instructed to suppress emotional expressions during an amusing film clip. Further, working memory capacity was not associated with emotional expressiveness among participants who watched the amusing film without trying to suppress. Together, these studies support the idea that working memory capacity contributes to successful suppression of both positive and negative facial expressions of emotion.

Schmeichel and colleagues (2008) also observed a relationship between working memory and success at reducing subjective emotional experience by adopting neutral, non-emotional appraisals of emotional stimuli. Participants in one study completed the OSPAN and then viewed a disgust-inducing film clip under instructions either to view the film clip naturally (express condition) or to adopt a detached, unemotional attitude and think about the film objectively (reappraisal condition). The neutral appraisal instructions resulted in successful emotion regulation, such that participants in the reappraisal condition reported less disgust. Further, working memory moderated this effect, such that only participants with higher working memory capacity reported less disgust in the reappraisal condition. A final study in this series replicated this pattern using a different measure of working memory capacity and different emotion-laden film clips (one humorous and one sorrowful).

Altogether, the studies by Schmeichel et al. (2008) revealed that working memory capacity is important for success at two different forms of emotion regulation—expressive suppression and cognitive reappraisal—and is effective for the regulation of both positive and negative emotional responding. However, a more mundane explanation for these findings is possible, and this explanation applies to the bulk of the research on emotion regulation. Specifically, because participants were instructed by the experimenter to regulate their emotional responses, the results may show simply that individuals with higher cognitive ability are better at following instructions. This explanation is consistent with evidence that working memory capacity predicts success at following instructions in a classroom setting (Engle, Carullo, & Collins, 1991). The question

arises, then, whether more successful emotion regulation among persons with better executive functioning is simply a matter of following instructions.

To address this question, Schmeichel and Demaree (2010) tested the hypothesis that working memory contributes to spontaneous emotion regulation—emotion regulation not specifically instructed by the experimenter. After completing the OSPAN, participants in this study took a bogus personality test and received either negative feedback or no feedback about their personalities. A short while later, participants completed a test described as a new measure of crystallized intelligence. In fact, this test was the over-claiming questionnaire (OCQ), a disguised measure of self-enhancement tendencies developed by Paulhus et al. (2003).

The OCQ asks respondents to rate their familiarity with different book titles, scientific terms, historical figures, and other elements of cultural knowledge using a scale from 0 (*not at all familiar*) to 6 (*very familiar*). Embedded in the OCQ are several foil or fake items, and the outcome measure of interest is the proportion of fake items participants deem familiar. Based on previous evidence of defensive responding to self-threats (e.g., Baumeister, Heatherton, & Tice, 1993; Greenberg & Pyszczynski, 1985), Schmeichel and Demaree (2010) predicted that receiving negative feedback would increase the motivation to self-enhance. The subsequent "crystallized intelligence test" (i.e., OCQ) gave participants the opportunity to act on this motivation by claiming familiarity with things that could not be familiar.

The evidence supported this prediction, but only among participants higher in working memory capacity. They over-claimed more than participants lower in working memory capacity. Participants higher in working memory capacity also reported less negative affect at the end of the experiment, suggesting more successful emotion regulation. These results are consistent with the view that cognitive ability resources are recruited spontaneously to cope with threats to self-regard and to minimize negative emotion. Further, because participants had not been instructed to regulate their emotional responses, the finding of less negative emotion among participants higher in working memory cannot reflect differences in simply following directions.

Another study by a different team of investigators replicated and extended the evidence that working memory contributes to successful emotion regulation. McRae et al. (2012) measured several different cognitive abilities including working memory capacity, set-shifting ability, verbal ability, abstract reasoning, and inhibitory control, and then examined how each of these abilities relates to cognitive reappraisal. Successful reappraisal was quantified as the difference in self-reported responding to emotional pictures viewed under instructions simply to look at the pictures or to reappraise the pictures, with bigger differences reflecting better reappraisal. McRae et al. found that success at reappraisal correlated with working memory capacity and with set-shifting ability, respectively, but not with verbal ability, reasoning ability, or inhibitory control.

The study by McRae et al. (2012) is part of a modest spate of studies examining several cognitive abilities and associating them with success at emotion

regulation. The first such study tested a sample of 17 healthy adults and 31 adults with neurodegenerative brain disease (e.g., Alzheimer's disease; Gyurak et al., 2009). All participants completed a battery of cognitive tests including verbal and spatial measures of updating, the Stroop task to measure inhibition, the trail making test to measure shifting, and a measure of verbal fluency. Participants also experienced an emotionally-arousing event that yielded a measure of emotion regulation ability. Specifically, a startling burst of noise was played over loudspeakers located behind the participant's head while they looked at an "X" displayed on a television screen. The magnitude of the startle response was quantified by coding facial expressiveness during the 5 seconds following the noise burst and by tracking body movement with a sensor located under the participant's chair. Following the initial, unexpected noise burst, two more loud bursts of noise were played; one followed a warning of the impending noise, and one followed a warning plus instructions to suppress outward reactions to the noise.

The question of interest was whether the cognitive ability measures would predict the magnitudes of startle responses to the noise bursts. When the noise burst was unexpected, the answer was no; none of the cognitive measures in the study by Gyurak et al. (2009) predicted responding to the unexpected startle noise. However, after controlling for responding to the unexpected noise, participants with higher (versus lower) verbal fluency startled less when the noise burst followed a warning. The same result was observed when the loud noise followed a warning and instructions to suppress. Thus, verbal fluency predicted successful startle suppression, but working memory capacity, inhibitory control, and task-switching ability did not. This pattern of findings suggests that verbal ability, but perhaps not executive functioning more generally, contributes to emotion regulation.

The same research group conducted a similar study, this time with a sample of 21 healthy older adults and 48 neurodegenerative patients (Gyurak et al., 2012). The same cognitive measures as before were assessed, but a different emotion regulation test was used. In this study participants watched three disgust-inducing film clips under instructions to watch, to down-regulate outward emotional responses, and to up-regulate emotional responses, respectively. Once again, verbal fluency was the only significant predictor of emotion regulation ability, which was quantified as a composite score reflecting changes in heart rate and facial expressions of emotion in the down-regulation and up-regulation conditions, respectively, controlling for responses in the watch condition. Here again, verbal ability but not executive functioning more generally predicted success at emotion regulation.

Does the predictive power of cognitive ability hold up outside the laboratory? One daily diary study including over 1000 adult participants found that executive functioning can indeed be observed to predict successful emotion regulation in response to daily life events (Stawski et al., 2010). Participants completed a phone-based measure of executive functioning that included tests of working memory capacity and verbal fluency, among other cognitive abilities.

They also completed short interviews about their daily experiences and emotions on eight consecutive days. Participants scoring higher on the executive functioning measures were more likely to report experiencing stressors. (The severity of stressors did not vary as a function of executive functioning ability.) Furthermore, better executive functioning was associated with smaller stressor-related increases in negative mood. That is, although adults with higher (versus lower) cognitive ability experienced more daily hassles, they experienced smaller changes in mood in response to those hassles. These results provide novel support for the hypothesis that executive functioning helps to regulate emotional responding to stressors, and they provide compelling evidence that the contributions of executive functioning to emotion regulation exist outside the laboratory as well as in it.

One recent fMRI study tested the hypothesis that the same brain regions involved in executive functioning are also invoked during emotion regulation. Specifically, Tabibnia and colleagues (2011) had healthy participants and methamphetamine-dependent participants complete a well-validated measure of inhibitory control (i.e., the stop signal task) as well as an emotion reappraisal task. Participants with better inhibitory control on the stop signal task were more successful at emotion regulation; they reported less negative emotion after viewing negative emotional images under instructions to reappraise. Further, in addition to worse inhibitory control and less success at emotion regulation, methamphetamine-dependent participants had less gray matter density in the right inferior frontal gyrus, suggesting that this region underlies performance at both the executive functioning and emotion regulation tasks.

We are aware of just one additional article assessing the relationship between executive functioning and success at emotion regulation. Building on evidence that the experience of disgust increases the severity of moral judgments (e.g., Schnall et al., 2008), Van Dillen, van der Wal, and van den Bos (2012) tested the extent to which individual differences in executive functioning moderate the effect of disgust on moral judgments. They found that disgust increased the severity of moral judgments, but only among participants with poorer executive functioning (as measured by the Stroop task in Study 1 or by self-report measures in Studies 2 and 3). Participants with better executive functioning did not render more severe moral judgments following the induction of disgust. Although these studies did not examine the regulation of the subjective experience or expression of disgust, they did find novel evidence of a central role for executive functioning in regulating the influence of disgust on moral judgments.

Summary

The research reviewed in this section demonstrates that individual differences in executive functioning predict success at emotion regulation. This relationship has been observed across diverse measures of executive functioning and emotion regulation, respectively. It holds across a range of ages and cognitive ability levels and has been detected both inside and outside of the laboratory. The most

reliable predictor has been working memory capacity—an index of the executive function of updating. Performance on tests of working memory capacity has been associated with success at expressive suppression, cognitive reappraisal, self-enhancement in response to negative feedback, and coping with daily stressors. However, a few studies found no relationship between working memory and emotion regulation as assessed by startle responses to noise blasts.

The evidence is still relatively scarce pertaining to shifting and inhibition. One study found that shifting (as well as updating) predicted success at reappraisal, though other studies found null effects or did not include a measure of shifting. Regarding inhibition, performance on the Stroop task has been found to moderate the expression of socially-inappropriate emotions and the effect of disgust on moral judgments, respectively, and another study found that performance on a stop signal task predicted more successful reappraisal of negative emotional stimuli (see also Tang & Schmeichel, in press). But a handful of other studies found null effects of inhibition or failed to include a standard behavioral measure of inhibition. This is surprising insofar as inhibition seems like an obvious candidate to play a role in emotion regulation. Two other studies found a reliable relationship between verbal ability and emotion regulation, though most of the studies we have reviewed did not include measures of verbal ability, and those that did found no significant relationship.

Altogether, the most appropriate conclusion is that cognitive ability is associated with success at emotion regulation, but the strength of the relationship depends on the specific executive functioning ability and the specific form of emotion regulation at issue. The trend has been for different investigators to use different measures. One upshot of this trend is increased confidence in the existence of the relationship between the two constructs when the different methods yield converging evidence, and there are obvious signs of this in the research reviewed above. But different patterns of results across studies using different measures of the same constructs conspire to limit the conclusions that can be drawn. A great deal of theoretical and empirical work remains to be done to draw more specific conclusions about when and why executive functioning ability is associated with emotion regulation.

EXPERIMENTAL EVIDENCE THAT EXECUTIVE FUNCTIONS INCREASE SUCCESS AT EMOTION REGULATION

As we have seen, individual differences in executive functioning are associated with success at emotion regulation in both children and adults. This evidence supports the hypothesis that cognitive ability is an important key to emotion regulation, but the evidence reviewed so far suffers an obvious shortcoming: it does not establish a causal effect of executive functioning on emotion regulation. It is thus possible that the causal arrow points in the opposite direction, such that poorer emotion regulation causes a deficit in executive functioning, not the other way around as we have assumed. Perhaps the causal consequences

flow in both directions, or perhaps some other variable that we have not considered helps to explain the observed relationship between executive functioning and emotion regulation.

Compared to the growing stream of evidence based on individual differences in cognitive ability, the evidence from experiments examining the causal relationship between cognitive ability and emotion regulation is sparse. This is likely due in part to the inherent difficulty of manipulating cognitive ability, although we can think of two common experimental methods that could be used for this purpose. One is cognitive load. Occupying attentional resources with a cognitive load leaves fewer resources available for other tasks, and cognitive load is particularly harmful to tasks that rely on relatively more complex or controlled cognitive abilities. If executive functioning drives success at emotion regulation, then cognitive load—which temporarily disrupts executive functioning—should also undermine emotion regulation. The other is ego depletion, which refers to a temporary reduction in the capacity for self-control due to prior self-regulatory exertions (see Elliot, Schüler, Roskes, & De Dreu, this volume). Some theorists have suggested that prior self-regulatory exertions temporarily reduce the capacity for executive functioning (see Inzlicht & Schmeichel, 2012). In this view, evidence that ego depletion undermines success at emotion regulation would suggest that executive functioning plays a causal role in emotion regulation. Below we review experiments that have manipulated cognitive load or ego depletion and assessed the consequences for emotional responding and emotion regulation.

Starting first with cognitive load, an experiment by Wegner, Erber, and Zanakos (1993) asked participants to recall a sad autobiographical memory and write it down. Some participants were instructed not to let themselves feel sad while they were writing, whereas others were encouraged to relive the sadness. The two groups reported different levels of happy mood at the end of the task, consistent with effective emotion regulation. Further, some participants attempted the task under cognitive load (i.e., remembering a 9-digit number), and the results revealed that cognitive load undermines success at emotion regulation. In fact, participants who tried not to feel sad under cognitive load ironically experienced less happy mood compared to participants who relived their sadness. In addition to providing novel support for ironic process theory (Wegner, 1994), these findings were among the first to find that cognitive resources play a causal role in successful emotion regulation. When cognitive resources were diverted to another task, emotion regulation suffered.

To our initial surprise, we found no other experiments that asked participants to regulate their responses to emotional stimuli in the presence versus absence of a concurrent cognitive load. The explanation for this is perhaps a simple one. The vast majority of studies on emotion regulation, unlike the early study by Wegner et al. (1993), have studied emotion regulation by having participants view emotional images and films. Cognitive load should distract attention away from the processing of such stimuli, and thus may be expected to reduce emotional responding even without the participant attempting to regulate their responses.

Consistent with this reasoning, several experiments have found evidence that cognitive load reduces emotional experience. For example, a series of studies by Van Dillen and Koole (2007) found that performing tasks that occupy working memory reduces the impact of negative emotional stimuli. In a first study, participants completed several trials of a task that involved viewing pictures, attempting math problems (or not), and then reporting their emotional state. The pictures depicted neutral, mildly negative, or strongly negative emotional content. Not surprisingly, participants reported more negative emotional states after viewing the negative pictures. More interesting was evidence that participants reported less negative emotional states when they solved math problems after viewing the negative images. In follow-up studies, Van Dillen and Koole found conceptually similar evidence using different forms of cognitive load and in patterns of brain activation revealed by fMRI (see Van Dillen, Heslenfeld, & Koole, 2009). Thus, the results consistently revealed that negative emotions could be down-regulated by tasks that occupy working memory.

Another way to examine the role of cognitive resources in emotion regulation is to manipulate the presence versus absence of emotion regulation attempts and assess the effects on concurrent task performance. A study by Ortner, Zelazo, and Anderson (in press) adopted this approach by asking participants to view neutral and unpleasant images while performing an auditory discrimination task. Further, participants were instructed to suppress or to reappraise their responses to some of the images and simply to view the others. Consistent with the hypothesis that emotion regulation can be an effortful, attention-demanding endeavor, responses to the auditory discrimination task were slower when participants attempted emotion regulation versus no emotion regulation during picture viewing. Thus, attempting emotion regulation diverted cognitive resources away from a concurrent task.

Studies of ego depletion also support the view that emotion regulation relies on limited resources. For example, participants in one study solved moderately difficult multiplication problems or listed their thoughts while trying to avoid thinking of a white bear (Muraven, Tice, & Baumeister, 1998, Study 3). Then all participants watched a humorous film clip under instructions to stifle their emotional responses. Based on the idea that suppressing a forbidden thought temporarily depletes limited resources for self-control whereas solving math problems does not, Muraven and colleagues predicted that participants in the thought suppression condition would exhibit more mirthful responses to the film clip compared to participants in the math condition. Participants' facial expressions during the humorous film clip supported this prediction. Participants were less successful at suppressing their emotional expressions after inhibiting a forbidden thought, relative to attempting math problems. An experiment by Schmeichel (2007, Study 3) provided a conceptual replication of this finding. Insofar as prior self-regulatory exertion temporarily reduces the capacity for executive functioning, these findings support the view that executive functions are causal determinants of success at emotion regulation.

Summary

Experiments that have temporarily depleted or imposed a load on cognitive resources have yielded evidence supporting the hypothesis that executive functioning plays a causal role in successful emotion regulation. But this evidence suffers from shortcomings that prevent definitive conclusions. First, only one study has manipulated cognitive load and examined its effects on purposeful efforts to regulate emotion. More such studies are needed, but they will have to contend with the fact that cognitive load reduces emotional responding directly, independent of any efforts at emotion regulation (e.g., MacNamara, Ferri, & Hajcak, 2011). Regardless of whether a person is trying to regulate their emotions, performing a cognitive task while attending to emotional stimuli reduces activation levels in emotional centers of the brain and reduces subjective emotional experience. Thus, an experiment that includes orthogonal manipulations of cognitive load and emotion regulation (e.g., reappraisal) would be expected to observe reduced emotion due both to the emotion regulation attempt and to the cognitive load (cf. Kamphuis & Telch, 2000). Such results would confirm that cognitive load is itself an effective tool for emotion regulation but would tell us very little about the extent to which cognitive load disrupts emotion regulation.

The results from ego depletion experiments are perhaps more informative, but these too suffer from interpretational ambiguities. Although evidence suggests that prior self-regulatory exertion temporarily reduces the capacity for executive functioning (e.g., Schmeichel, 2007; Clarkson et al., 2011), it has not been established that reduced executive functioning mediates the effects of ego depletion on emotion regulation. Furthermore, evidence has begun to suggest that prior self-regulatory exertions may increase the strength of emotional and motivational urges (Inzlicht & Schmeichel, 2012; Vohs et al., 2013). Thus, reduced success at emotion regulation under ego depletion may reveal stronger emotional impulses, rather than or in addition to reduced capacity for executive control (see Schmeichel, Harmon-Jones, & Harmon-Jones, 2010). Until a more detailed process model of ego depletion has been established, definitive conclusions about the role of executive functions in ego depletion effects must be put on hold. More generally, until an ethically acceptable and more process pure method of reducing cognitive ability is established, causal evidence for the role of the executive functions in emotion regulation will remain elusive.

CONCLUSION

The evidence reviewed in this chapter supports the conclusion that executive functioning is an important key to success at emotion regulation. Although more research is needed to understand the inconsistent results observed across some of the studies and to find more evidence for a causal relationship, we believe

such research would be greatly enhanced by the development of comprehensive theories and the identification of candidate mechanisms to link the two constructs. We hasten to note that, in addition to the evidence reviewed in this chapter, research from developmental psychology and cognitive and affective neuroscience corresponds with the evidence reviewed here and may provide important clues for how to proceed. For instance, one promising approach may be to identify brain structures that underlie both specific executive functions and specific forms of emotion regulation (e.g., Tabibnia et al., 2011). The presumption is that if two different types of tasks recruit the same brain structures, they rely on similar processes.

Of course, although the evidence reviewed here reveals links between executive functioning and emotion regulation, the two constructs are far from isomorphic. Emotional and non-emotional information may be processed differently and in different parts of the brain (e.g., Soutschek & Schubert, 2013). Nonetheless, research indicates that executive functioning and emotion regulation overlap and share at least some common physical and psychological basis.

One unanswered question concerns the relative contributions of executive functioning versus other individual differences that have been found to predict success at emotion regulation. As noted at the outset of this chapter, self-esteem, conscientiousness, and agreeableness have all been found to predict success at emotion regulation. How do individual differences in executive functioning relate to these variables, and do the executive functions contribute predictive power above and beyond these other traits? We presume that they do, but evidence on this point is lacking. It may be the case, for example, that persons higher in executive functioning are also more conscientious, and that the two variables account for redundant variance in emotion regulation outcomes.

It is interesting to us that nearly a century of research on individual differences in cognitive ability has dutifully documented its role in a wide variety of outcomes including academic achievement, job performance, physical health, and socioeconomic status, among several other outcomes (for a recent overview, see Nisbett et al., 2012), but very little research has examined potential relationships between cognitive ability and emotions. A recent study on a nationally-representative sample of Britons found a strong positive relationship between cognitive ability and happiness (Alia et al., 2012), and another found a positive relationship between cognitive ability and positive affect in a large sample of older adults (Isaacowitz & Smith, 2003). We are optimistic that such evidence will spur more research into understanding why people with more cognitive ability are happier. In addition to other known correlates of cognitive ability, such as professional achievement and physical health, we believe success at emotion regulation is likely to be another contributor. We hope the next century of research on cognitive ability pays closer attention to emotional processes and responses, and how and why cognitive ability shapes them.

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9

The Regulation of Vision

How Motivation and Emotion Shape What We See

STEVEN B. MOST

A thoughtful introductory psychology student could be excused for wondering why their course textbook might include chapters on sensation and perception. After all, aren't these functions things that the *eyes* do (in the case of vision)? What does perception have to do with the *mind*—and with the motivations and personalities that define us? The answer is, quite a lot. Even the limited amount of information available to our senses during a passing glance is enough to overflow our capacity for awareness, and thus the contents of awareness are largely driven by what our mind prioritizes, either because of our explicit goals or because of some reflexive attraction. In a very real sense, our motivations and emotional responses regulate what we see.

The idea that our perception of the external world can be shaped by our internal motivations and emotions has held appeal through much of the history of psychological thought. There is something provocative about the notion that aspects of the mind are interconnected even at the earliest information-processing stages. Studies within the "New Look" movement, for example, fired the imagination of researchers across the world, as they seemed to provide increasing evidence that perception itself is shaped by a person's needs, values, and motivations (e.g., Bruner, 1957; Bruner & Goodman, 1947). Although many of these studies have been criticized on methodological and theoretical grounds (e.g., see Pylyshyn, 1999), research supporting this core notion has gone through periods of revival, often with increased methodological rigor (e.g., Balcetis & Dunning, 2010). Readers interested in reviewing recent work along these lines will find much of value in the chapter by Balcetis and Cole in the current volume.

At first glance, the notion that knowledge and internal states can shape perception appears to run counter to suggestions that early visual processing proceeds without input from higher level processes—suggestions that early vision is cognitively "impenetrable" (Pylyshyn, 1999)—but there is room for reconciliation. Even if one accepts as true the hypothesis that early visual computations proceed automatically and are insulated from the influence of knowledge, motivation, expectation, and emotion, the contents of conscious perception are additionally shaped by processes that determine both the input into the earliest stages of visual analysis (e.g., attention) and the handling of its output (Pylyshyn, 1999). Readers interested in how perception is shaped by rapid, unconscious, and surprisingly sophisticated inferences at a post-input stage of processing may wish to examine the fascinating literature on "indirect perception" (e.g., Rock, 1983, 1997). The material covered in the present chapter focuses on how attention guides "input" stages of visual processing, with profound consequences for conscious perception, and how this influence is shaped by our expectations, our goals, and our emotional responses to our surroundings.

THE EMBARRASSINGLY IMPOVERISHED NATURE OF PERCEPTION WITHOUT ATTENTION

The trust we place in our senses to deliver details of our environment to our conscious awareness is somewhat misplaced. When it comes to seeing, despite deeply held intuitions that it is simply a matter of pointing one's eyes in the right direction, what the mind sees can be quite different from what the eyes register. Perhaps no experiment of the past 50 years illustrates the central role of anticipation and attention in perception more effectively than the now-famous "gorilla experiment" (Simons & Chabris, 1999), in which participants watched a videotape of three players in white shirts and three players in black shirts passing a basketball among themselves. Participants counted the number of passes made by one of the two teams, and as a result of their concentration on the task they were oblivious to the fact that—partway through the video—a person in a full-body gorilla outfit casually strolled through the middle of the scene, remaining visible for several seconds. In short, because participants' attention was preoccupied by the pass-counting task, they failed to notice the gorilla despite looking directly at it. This phenomenon is known as *inattentional blindness* (Mack & Rock, 1998).

It is important to note that other phenomena—in addition to inattentional blindness—have also illustrated the impoverished nature of perception in the absence of attention. For example, the widely studied "attentional blink" refers to instances where people fail to see the second of two rapidly presented targets when it follows too soon after a first target: attention to the first target appears to tie up attentional resources that otherwise could have been allocated to the second target, leading that second target to escape awareness (e.g., Chun & Potter, 1995; Di Lollo et al., 2005; Raymond, Shapiro, & Arnell,

1992). But what is particularly striking about inattentional blindness is that whereas the attentional blink occurs because of attention's temporal limitations, inattentional blindness occurs even when the unexpected stimulus is in plain view for an extended period of time (e.g., Most et al., 2001; Most et al., 2005b; Most, 2013). In essence, rather than occurring due to lab-centric manipulations designed to push the limits of attentional resolution, inattentional blindness appears to stem from a volitional misallocation of attention based on a person's assumptions about what they should prioritize, as well as a lack of anticipation for the critical item. (Indeed, because a lack of anticipation is an essential factor, inattentional blindness experiments often involve only one critical trial per participant, making them time-consuming to run; once participants are probed for their awareness of the stimulus, its occurrence on subsequent trials is no longer unexpected and inattentional blindness largely disappears.)

Given the robustness of inattentional blindness, one might expect the phenomenon to be familiar to most people and commonly recognized as a frequent occurrence. Yet, it runs so counter to such deeply held intuitions about perception that its discovery came as a surprise even to many vision experts. Among experts, part of this surprise stemmed from the fact that it seemed to contradict previous evidence that certain types of features could reach awareness in the absence of attention (e.g., Treisman & Gelade, 1980). In contrast, inattentional blindness experiments revealed that even features that appeared to "pop out" in the context of other attention tasks failed to reach awareness when they were unexpected and when attention was preoccupied (Mack & Rock, 1998). In broader society, outside the world of vision experts, under-appreciation of the power and frequency of inattentional blindness has led to dangerous behavior (e.g., driving while talking on a mobile phone) and to misattributions of the causes of people's behaviors, some of which have resulted in legal decisions that have changed lives. For example, in 1995, Boston police officer Kenny Conley was pursuing a shooting suspect on foot when he passed by an ongoing, brutal beating of an undercover police officer whom other officers had mistaken for the suspect. Conley continued his pursuit without stopping. Questioned later in court about why he failed to stop, he claimed that he had not seen the assault. Because the beating had been in plain view, the judge and jury assumed he was lying, and Conley was sentenced to nearly three years in jail for perjury and obstruction of justice (see Chabris et al., 2011). In the wake of this case, a team of investigators simulated the incident: participants were instructed to chase a confederate on a path that brought them past several other confederates engaged in a mock fight. As a means to preoccupy attention, participants were asked to count the total number of times that the runner ahead of them touched his head. Even when this experiment was conducted in broad daylight, almost half of the participants failed to notice the mock fight (Chabris et al., 2011). Clearly, people have intuitions about perception that are as prevalent and strongly held as they are wrong (Chabris & Simons, 2010).

GOAL-DRIVEN VS. STIMULUS-DRIVEN ORIENTING OF ATTENTION

William James famously stated that "everyone knows what attention is," but in truth "attention" refers to a family of mechanisms that is more complex than lay intuition would suggest. At the most general level, "attention" refers to a family of mechanisms that converge to prioritize processing of some aspects of our experience over others. What we attend to is not always under our strict control. *Endogenous* (or goal-driven) shifts of attention refer to those instances when we actively choose to focus on something that interests us, but in some cases attention can seem to shift without our volition. This distraction can be stimulus-driven, or *exogenous*: features that are particularly unique in the environment and stimuli that seem to appear abruptly via a sudden onset have proven to be particularly powerful attentional magnets (Theeuwes, 1992, 1994; Yantis & Jonides, 1984), as have emotional stimuli, which attract attention more robustly than do non-emotional stimuli (e.g., Anderson, 2005; Anderson & Phelps, 2001; Öhman, Flykt, & Esteves, 2001; Vuilleumier & Huang, 2009; cf. Awh, Belpolosky, & Theeuwes, 2012).

Framed in terms of motivational states, attention can be guided by our goals (on the basis of what might be considered "explicit" motivation), but attention can sometimes shift reflexively, often because of—among other factors—our emotional responses to things. (Whereas reflexive shifts sometimes occur without apparent regard for a person's goals, when they occur in response to emotional stimuli they could be said to stem from "implicit" motivation, given the link between emotion and approach-withdrawal action tendencies; e.g,. Carver, 2006; Harmon-Jones, 2003; see also Harmon-Jones, Price, & Harmon-Jones, this volume, and Carver, Johnson, & Joormann, this volume). Given that what we attend to helps determine what we become aware of, this suggests that our goals and emotions have the power literally to shape what we see. The following pages provide a brief overview of research on the contribution of both goals and emotions to perception, focusing on the work we have conducted in my lab and in collaboration with my colleagues.

GOALS

An antsy pedestrian at a crosswalk might eagerly anticipate the onset of a walk signal. A driver merging onto the highway might scan for other cars but less so for motorcycles. A person on a blind date might look for the telltale outfit of his or her suitor. It is often the case that we come to a scene with an idea in mind of what we should be looking for—that is, with goals that guide attention and thus help shape what we see (see Maner & Leo, this volume, for additional interesting work on motivation and attention). A common metaphor for attention is that of a "spotlight" that we move around the visual environment to illuminate whatever falls within its beam (e.g., Posner, 1980). And certainly we are able to shift attention from one spot to another voluntarily. Note, though, that this metaphor

emphasizes attention in space ("spatial attention"), but this is not the only basis on which people are able to select information. People also have the ability to tune their attention for certain features (i.e., establish a feature-based "attentional set"; Folk, Remington, & Johnston, 1992). Consider, for example, the famous children's book series *Where's Waldo* (also called *Where's Wally* in some parts of the world), where readers need to find the protagonist within densely packed scenes of people and places; because readers know that Waldo always wears red stripes, they might establish an attentional set for that color, leading all red items in the scene to become salient. When people seek or prepare to respond to specific visual features, strong interconnections between prefrontal cortical areas and visual areas such as the inferior temporal cortex help enable the strategic modulation of stimulus-linked responsiveness in the latter regions (e.g., Desimone & Duncan, 1995).

In short, people are able both to orient attention to the spatial location they expect to be relevant and to tune attention to prioritize the visual features that they expect to be important. Contrary to possible assumptions that attention to locations and to features reflect simply different manifestations of the same selection mechanism, evidence suggests that they have different consequences for visual awareness. For example, in a computerized analogue of the gorilla experiment, participants viewed a dynamic rectangular display in which a set of black shapes and a set of white shapes moved around a display, occasionally coming into contact with a horizontal line that bisected the display (Most et al., 2000). Participants counted the number of times that one of these sets of shapes touched the line on each of several trials, and on a critical trial a unique gray shape entered the display from the right, traveled slowly on a horizontal path, and exited to the left. Crucially, the shape's horizontal path ran either along the line or at varying distances away from it. Although participants were more likely to notice the unexpected object the closer it appeared to the line—which was presumably the focus of spatial attention—this influence on noticing rate was modest. In fact, fewer than half of the participants noticed the unexpected object when its path overlapped completely with the horizontal line. Additional striking evidence for the modest role of spatial attention in shaping awareness comes from experiments that have combined inattentional blindness tasks with eye-tracking. In a version of the gorilla study, for instance, people who saw and who failed to see the gorilla did not differ in the number of times they looked directly at it (Memmert, 2006). It seems that when a person has no expectation that an object will appear, the proximity of its appearance to the locus of spatial attention has only a small impact on awareness.

In contrast, the tuning of attention for particular properties appears to have profound consequences for conscious perception. For example, in a variation of the computerized task described above, four black and four white items moved through a computerized display and participants kept track of either the black or white shapes during each of several trials, counting the number of times that their target set of shapes bounced off the display edges. On a critical trial, a new, unexpected object entered the display and remained visible for about 5 seconds. When the unexpected object was white, 94% of those tracking white items noticed it, but no one tracking black items did. This pattern reversed when the

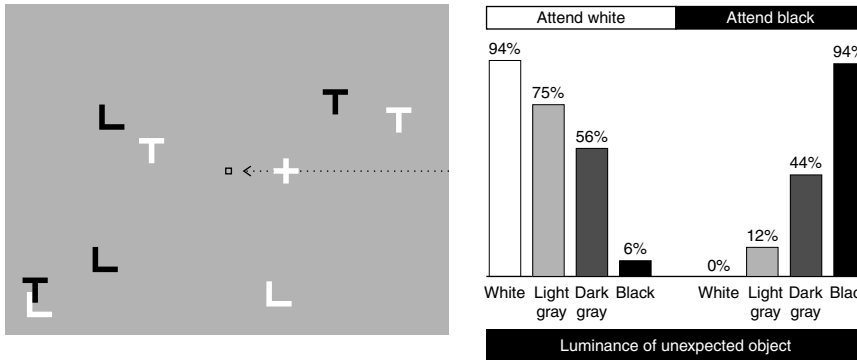

Figure 9.1 Participants viewed a display in which four white and four black shapes moved about the screen, and they counted the number of times that one of the two sets of shapes bounced off the edges of the display (left). On a critical trial, a cross that was either white, light gray, dark gray, or black unexpectedly entered from the right, traveled across a fixation point, and exited to the left, remaining visible for about 5 seconds. The proportion of participants who noticed the cross depended on how similar its luminance was to the luminance participants had "set" themselves to track (right). Adapted from Most et al., 2001, 2005b.

unexpected object was black, and noticing rates were intermediate when the unexpected object was gray (Most et al., 2001). In other words, the more similar the unexpected object was to the targets' features, and the less similar it was to the distractors' features, the more likely it was to be seen (see Figure 9.1).

Note that this ability to tune attention is not limited to the brightness dimension. It is flexible. For example, in a follow-up experiment, participants viewed a display in which two black squares, two white squares, two black circles, and two white circles moved on independent paths, and on each trial participants counted the bounces made either by the four white shapes, the four black shapes, the four circles, or the four squares. On the critical trial, the unexpected object that appeared was a black circle. Replicating the experiment described above, participants counting the bounces made by the black shapes were more likely to notice the unexpected black circle than were those counting the bounces made by the white shapes. Crucially, a similar pattern emerged when people tuned their attention on the basis of shape: those counting the bounces made by circles (black and white combined) were more likely to notice the unexpected black circle than were those counting the bounces made by squares (Most et al., 2005b, Experiment 1).

Notably, people also had the ability to tune their attention for complex arrangements of features, such as those that constitute the most social of stimuli: faces. When people tracked Caucasian faces, they were more likely to notice an additional unexpected Caucasian face that entered the display than a luminance-matched African-American face, and this pattern flipped among people who were tracking African-American faces (Most et al., 2005b, Experiment 3). More recently, it has been shown that people can also tune their

attention for the number of items they expect to appear, which modulates their awareness of an unexpected object (White & Davies, 2008).

Seeing in Search of Meaning

Of course, it would be misleading to suggest that people are always scanning their surroundings for particular, well-defined visual features. The world resonates with the meanings that we assign to objects, people, and events, and given the rapid and seemingly effortless way that people categorize things, the question arises as to whether people can tune attention for *meaning* in a way that also affects visual perception. Strikingly, the answer appears to be that they can. For example, in another variation of the dynamic computerized display described above, the attended and ignored items were sets of block-like digits and numbers. On the critical trial, the letter 'E' or its mirror reverse—a block letter '3'—unexpectedly traveled across the display, and despite the fact that they shared nearly all features, people were more likely to notice the 'E' when tracking the letters than when tracking the numbers, and they were more likely to notice the '3' when tracking the numbers than when tracking the letters (Most, 2013).

At first glance, such findings may seem contrary to arguments that early vision is cognitively impenetrable (Pylyshyn, 1999); it is one thing, one might say, to suggest that the input into early stages of vision can be filtered through a lens that selects for visual features, but it is quite another to suggest that such a filter operates after analysis of semantic meaning has taken place (e.g., Deutsch & Deutsch, 1963). Indeed, there are possible alternative explanations. For example, letters tend to have their open sides facing to the right whereas digits do not, so it is possible that the apparent impact of attentional set for meaning merely reflected a tuning for this featural difference between the stimulus sets. However, in an experiment from another lab, participants saw 1-second displays, each containing two pictures of animals and two pictures of furniture. In a between-subjects manipulation they were asked to identify the stimuli from one of the two categories. On a critical trial, letters spelling out the name of a piece of furniture (e.g., "table") or the name of a type of animal (e.g., "cat") appeared among the pictures, and participants were more likely to notice the word when it belonged to the same category as the pictures to which they were attending (Koivisto & Revonsuo, 2007). Note that this finding cannot be attributed to attentional set for visual features themselves. It thus does appear that people can tune their attention in search of meaning in such a way as to affect what they see.

Although such findings have the potential to be construed as evidence that the earliest stages of visual processing must be subject to the influence of high-level semantic knowledge, the "cognitive impenetrability" hypothesis pertains largely to computations upon information that has been selected for early visual processing, not to how such information is selected in the first place. How might high-level knowledge help guide such selection? Some insight might be gained through the recognition that the passage of information through the visual system is not unidirectional: visual processing does not proceed in linear, "bottom-up"

fashion, with simpler visual analyses always preceding more complex analyses. Rather, connections throughout the visual system are largely "reentrant," with communication between regions incorporating iterative feedback loops that allow the output of one stage of analysis to revise and refine analyses at earlier stages (e.g., DiLollo, Enns, & Rensink, 2000; Felleman & Van Essen, 1991). The notion that higher levels of analysis can help guide the pick-up of information at earlier visual processing stages is reminiscent of the "perceptual cycle" model proposed by Neisser (1976), wherein the initial pickup of roughly detailed information gives rise to hypotheses and expectations about the visual scene, which in turn guide subsequent shifts of attention and accrual of further information. In this way, conscious perception is said to emerge through a bootstrapping process. Although somewhat vaguely characterized, this conceptualization of perception may illustrate how initial expectations and hypotheses regarding the semantic properties of visual stimuli can guide attentional selection—and thus shape perceptual experience—while allowing early perceptual computations themselves to remain unaltered by such high-level processes.

Real-world Consequences of Goal-based Attentional Tuning

The experiments described above suggest that a person's goal-driven attentional tuning can frequently be a dominant factor determining awareness. But how applicable is this to everyday life? Failures to see an unexpected shape on a computer screen have no consequence, but what about unexpected objects and people that cross our path in the real world? If a child runs in front of a speeding car, one might expect that the potential consequences of the driver failing to see her would be enough to lead to an instant prioritization of that information, leading the presence of the child to break through to the driver's awareness. Indeed, as will be discussed in the section on emotions below, emotionally relevant stimuli do tend to enjoy perceptual priority. However, in a recent driving simulation study, we found that the power of goal-driven attentional tuning was such that it influenced noticing under conditions that more closely mimicked what would be a high-stakes scenario in real life. In that experiment, participants "drove" through a virtual cityscape and at each intersection encountered a road sign with blue and yellow arrows pointing in different directions (Most & Astur, 2007). Half of the participants were instructed to follow the yellow arrow at each intersection and half were instructed to follow the blue arrow (thus, establishing an attentional set for either yellow or blue). At a critical intersection, an oncoming motorcycle veered into the driver's path and came to a stop. Crucially, the color of the motorcycle was either blue or yellow, so that it either matched or did not match the driver's attentional set (all combinations were counterbalanced). The results were striking: when the color of the motorcycle matched drivers' attentional set, only 7% of participants collided with it. In contrast, when the motorcycle did not match drivers' attentional set, collision rate skyrocketed to 36%.

Interim Summary

As my colleagues and I have stated elsewhere, to a large degree "what you see is what you set" (Most et al., 2005b): people have a tendency to see what they have tuned themselves to see and to miss other things. We often enter places and situations with an *a priori* idea in mind of the people and objects we expect to be important, and such goal-related attentional preparation can heavily influence what we become aware of.

EMOTIONS

Because most aspects of the environment reverberate with emotional meaning, understanding perception in the real world necessitates understanding how it is impacted by emotion. Evidence suggests that emotional stimuli themselves tend to capture attention and sometimes are perceived under conditions where non-emotional stimuli would typically go unnoticed (e.g., Anderson & Phelps, 2001; Fox et al., 2001; MacLeod, Mathews, & Tata, 1986; Öhman, Flykt, & Esteves, 2001; Vuilleumier & Huang, 2009). Given the combination of the power of emotional stimuli to grab attention and the impoverished nature of perception in the absence of attention, one might predict that encounters with emotional stimuli would have the potential to "blind" people to other things in the environment. And indeed, this does seem to be the case. For example, my colleagues and I discovered that the rapid presentation of an emotional picture could impair people's ability to see subsequent targets, an effect we labeled *emotion-induced blindness*. On each trial, participants viewed a rapid serial sequence of upright landscape photos (presented at a rate of 100-ms/item) and within each stream searched for a single target (a landscape photo rotated 90-degrees clockwise or counterclockwise). When an emotional distractor (e.g., a picture of violence or medical trauma) appeared in the stream just before the target, people spontaneously experienced a brief period of functional "blindness": for about half a second, people became unable to perceive the target that they were searching for even though it appeared right in front of their eyes (see Figure 9.2). This pattern appears to reflect a disruption of conscious perception rather than disrupted maintenance of information in visual working memory, as the size of the effect is comparable regardless of whether participants respond immediately or withhold their response for a brief delay (Kennedy and Most, 2012). Furthermore, this effect seems to stem from the arousal induced by the emotional stimuli, not by their valence (positive vs. negative): in one set of studies, we included a set of erotic pictures as critical distractors—which both men and women tend to rate as emotionally arousing and emotionally positive (Bradley et al., 2001)—and these caused at least as much emotion-induced blindness as did the emotionally aversive distractors (Most et al., 2007). In fact, when participants were offered up to $90 for high target accuracy, their performance in the negative condition improved slightly but no such improvement occurred following the erotic distractors.

In a recent extension of our emotion-induced blindness research, people monitored two simultaneous rapid streams for the target, and the emotional

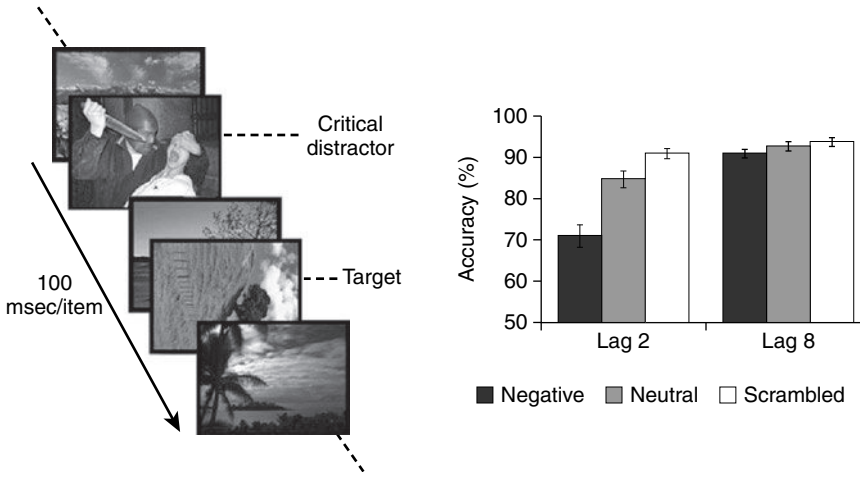

Figure 9.2 Schematic of part of an emotion-induced blindness trial (left) and data from an emotion-induced blindness experiment (right; Most et al., 2005a). On each trial, participants viewed a rapid stream of landscape photos and searched for the one landscape photo that was rotated 90-degrees clockwise or counter-clockwise. On most trials, an irrelevant critical distractor appeared prior to the target. When the critical distractor was emotional and preceded the target by only two items ("lag 2"; as pictured here), accuracy in reporting the target suffered relative to when the critical distractor was non-emotional. This effect was transient: when the target appeared eight items after the distractor ("lag 8"), emotion-induced blindness dissipated. Adapted from Most et al., 2005a; Wang, Kennedy, & Most, 2012.

distractor appeared in either the same or opposite stream as the target. The results of this experiment were surprising: rather than inducing an across-the-board impairment in target perception, emotional distractors primarily disrupted perception at their location, leaving target perception elsewhere in the visual field intact (Most & Wang, 2011).

The apparent spatial localization of emotion-induced blindness is surprising because it is commonly found that emotional stimuli attract and hold spatial attention, thereby *facilitating* perception of subsequent targets appearing at their location (e.g., Jiang et al., 2006; MacLeod, Mathews, & Tata, 1986; Mogg & Bradley, 1999; Van Damme, Crombez, & Notebaert, 2008). This has usually been demonstrated through changes in response time: for example, when an emotional stimulus appears in one of two possible target locations, people respond faster to a subsequent target at that location than in the opposite location. The widely accepted explanation for this effect is that because emotional stimuli capture spatial attention, people are able to process targets appearing at that location without having to "reorient" attention, a time-consuming process that leads to longer response times when the target appears elsewhere. Individual differences in the tendency to orient spatial attention to the location of an emotional stimulus have been used to inform information-processing models of

emotional disorders (e.g., Mathews & Mackintosh, 1998; Mogg & Bradley, 1998; Williams et al., 1997), with related research exploring whether such attentional biases play a causal role in emotional disorders (Mathews & MacLeod, 2002).

Note, however, that the theoretical and empirical endeavors within this literature rely heavily on indexes of *spatial* attention shifts, and there are at least two important limitations to this approach. First, as noted previously in this chapter, the ability to move attention around in space is only one of a family of attention mechanisms that allow us to sample, select, and prioritize information within our environments. Second, increasing evidence suggests a dissociation between indices of spatial attention shifts and conscious awareness: that is, it is possible to shift spatial attention to a location without becoming aware of stimuli at that location (Kentridge, Heywood, & Weiskrantz, 1999, 2004; Lambert et al., 1999; McCormick, 1997; Woodman & Luck, 2003). Thus, studies that focus on individual differences in orienting to the location of an emotional stimulus (or disengaging from that location; Fox et al., 2001) may grant only partial insight into the nature and treatment of emotional disorders, which are often characterized by heightened awareness of emotionally negative information at the expense of competing emotionally positive or non-emotional aspects of the environment.

The spatially localized nature of emotion-induced blindness is also surprising within the context of the broader visual cognition literature. In fact, it is difficult to account for it using contemporary understanding of the attentional blink, which on the surface seems to be the most closely related phenomenon. Decades of research on the attentional blink have suggested that it reflects perceptual disruption at a late, relatively central stage of processing, such as limitations in the ability to consolidate targets into visual working memory (Chun & Potter, 1995; for alternative accounts that also implicate late-stage or central resources, see Di Lollo et al., 2005; Shapiro, Raymond, & Arnell, 1994). The implication of such central bottleneck accounts is that the perceptual disruption should occur across the visual field, and indeed, direct evidence suggests that this is the case for the attentional blink (Lunau & Olivers, 2010; Shih, 2000). Thus, the spatially localized nature of emotion-induced blindness suggests that it may stem from mechanisms other than those that drive the attentional blink.

My students and I recently proposed a novel framework positing a "dual-route" impact of emotion on perception (e.g., Most & Wang, 2011; Wang, Kennedy, & Most, 2012). The underlying hypothesis was that emotional stimuli do attract spatial attention to their location, but they at the same time compete with other representations that might be linked to an overlapping point in time and space. This is consistent with notions that rapidly, sequentially presented stimuli can give rise to neural responses that in themselves overlap in time (even though the stimuli themselves do not), and that when such temporally overlapping representations activate spatially overlapping receptive fields in the visual system these representations compete in a "winner takes all" fashion (Keysers & Perrett, 2002). According to this account, emotion-induced blindness occurs because this competition is biased by people's tendency to spontaneously prioritize emotional representations. One key finding that supports this account is

the following: we found that when targets and emotional distractors were both embedded in the middle of a rapid stream (as is the case in most emotion-induced blindness experiments), emotion-induced blindness was limited to the location of the distractor. However, when the target was the last item appearing in its stream, this pattern reversed: in this case, target perception was *better* at the location of the emotional distractor, consistent with patterns found elsewhere in the attention-emotion literature (Most & Wang, 2011). This evidence suggests that when the target is the last item in its stream and is not "masked" by subsequent items, its persistence in iconic memory renders it relatively immune to suppression by the emotional distractor because there is less potential to confuse the temporal positions of these stimuli. In this case, it is the more common pattern reflective of *spatial* shifts of attention to the location of an emotional distractor that emerges (i.e., with benefits for target processing at the distractor's location).

COMPETITION BETWEEN TOP-DOWN GOALS AND THE REFLEXIVE DRAW OF EMOTIONS

If emotion-induced blindness arises due to competition between targets and emotional distractors, then it may be possible for certain strategies and task manipulations to strengthen people's ability to prioritize targets, thereby reducing the degree to which emotional stimuli disrupt perception. By the same token, certain contexts or emotional states might bias the competition even more in favor of emotional distractors, thereby increasing emotion-induced blindness. In fact, both of these appear to be the case. For example, in one experiment participants were informed in some blocks that their target could be a rotated picture of either (a) a building or (b) a landscape with no building, and in the remaining blocks they were informed that their rotated target would always be a picture of a building (Most et al., 2005a, Experiment 2). The latter case—labeled the "SPECIFIC ATTENTIONAL SET" condition—enabled participants to establish a more concrete attentional template of what their target would look like, and the results revealed that emotion-induced blindness decreased in this condition, at least among participants who had scored low in a measure associated with trait anxiety. This instruction did not reduce emotion-induced blindness among participants who had scored high in the anxiety-related measure, however, perhaps because for them the bias to prioritize emotional stimuli was more difficult to overcome. Such findings are consistent with suggestions that attention-emotion interactions often depend on the resolution of competition between goal-oriented executive control and reactivity to emotional stimuli, and that individual differences are likely to emerge when these two sources of attentional bias are pitted against each other (e.g., Mathews & Mackintosh, 1998).

In a complementary study, temporary anxiety inductions had the reverse effect, exacerbating the disruptive impact of negative emotional distractors on target perception (Most et al., 2010). In this study, male-female romantic

couples visited the lab, and the two members of each couple sat at computers next to each other (with a curtain drawn between them). At the start of the session, a female experimenter stood where both participants could see her and assigned the emotion-induced blindness task to the female participant. The male partner's task, she explained, was to rate the attractiveness of landscapes as they appeared one at a time on his computer screen. The experimenter then left but returned about 10 minutes later to explain that the male partner's task would now change, with the instruction to rate the attractiveness of pictures of single women, many of whom were students at the university (although, in truth, they had no known affiliation with the university). At the end of the experiment, the female partner received a prompt asking her to rate how uneasy she was about the fact that her partner was rating the attractiveness of other women. In two separate experiments, there was a strong correlation between the female partners' reports of unease and the degree of emotion-induced blindness that they experienced during the time that their partner was engaged in this task. Perhaps most strikingly, women who reported themselves as being highly uneasy and those who reported no sense of unease only differed in their performance following emotionally negative distractors, not following neutral distractors or when there were no distractors. Thus, it seems that being in an anxious state may indeed lead people to weight emotionally negative distractors more heavily in the competition for perceptual dominance.

CONCLUSION

Although it may often seem as if the field of perception research lies disconnected from other areas of the field, such as social and clinical psychology, the research reported in this brief review contributes to a growing body suggesting that conscious perception is robustly shaped by the internal states and motivations that often are the focus of these related sub-disciplines. Because conscious perception itself emerges from a complex coordination of mechanisms, an open question is how early in visual processing such internal states exert their regulatory effects. A number of theorists have argued compellingly that early vision is impenetrable by high-level processes such as motivation and emotion (e.g,. Pylyshyn, 1999), and this may yet be the case. The evidence seems clear, though, that when it comes to what we perceptually *experience*, the mind's eye often sees through the filter of the perceiver's heart.

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10

On the Regulatory Functions of Mood

Affective Influences on Memory, Judgments and Behavior

JOSEPH P. FORGAS

INTRODUCTION

Human beings appear to be a remarkably moody species. Almost everything we think and do is colored by the fluctuating mood states that accompany us. Mostly, moods appear to be a mere disturbance and a source of distraction. Beyond their hedonic influence, moods may also play a regulatory role in guiding our reactions to the manifold challenges of everyday life. However, the functions of affective states and their influence on thinking and behavior remain imperfectly understood (Forgas, 1995, 2002; Forgas & Eich, 2012). Despite centuries of interest, the relationship between feeling and thinking, affect and cognition remains one of the great puzzles about human nature.

Within psychology, movements such as "positive psychology" seek to promote happiness as a cure for many of our individual and societal ills. Even a short visit to any bookshop will confirm that advice on how to be happier, more contented and more satisfied is in great demand. However, within an evolutionary framework (Forgas, Haselton & von Hippel, 2007), we should at least consider the possibility that all affective states, including negative ones could serve an adaptive regulatory function. In this sense, moods may operate like functional "mind modules" triggered by various environmental challenges that spontaneously recruit responses appropriate to the situation (Forgas et al., 2007; Frijda,

1986; Tooby & Cosmides, 1992). We do know that affective states do perform an important regulatory role in providing feedback about the progress towards achieving desired goals (Carver & Scheier, 2001; see also Carver; Higgins; Inzlicht & Legault, this volume).

It is the influence of mild, everyday positive moods rather than more intense and distinct emotions that will be of interest here, as moods are more common, more enduring and typically produce more uniform and reliable cognitive and behavioral consequences than do more context-specific emotions (Forgas, 2002, 2006). We may define moods as low-intensity, diffuse and relatively enduring affective states without a salient antecedent cause and therefore little conscious cognitive content. In contrast, emotions are more intense, short-lived and usually have a definite cause and conscious cognitive content (Forgas, 1995, 2002). In addition to serving as specific feedback signals (see Carver & Scheier, 2001), this chapter will argue that moods also have a more general and universal regulatory function. We will survey a range of experimental studies providing convergent, and somewhat counterintuitive evidence demonstrating the often useful and adaptive regulatory consequences of mild positive and negative affective states in the performance of cognitive, judgmental, motivational and interpersonal tasks. The chapter begins with a brief review of theoretical approaches linking affect, motivation and cognition. We will then review a number of experiments demonstrating the regulatory effects of positive and negative affective states for cognition, motivation and interpersonal behavior. The role of different information processing strategies in mediating these effects will receive special attention.

Affect and Mood: Hedonistic Experience and Regulatory Functions

Although the search for positive affect seems a universal human characteristic, our affective repertoire as a species nevertheless remains heavily skewed towards negative emotions. Most of our basic emotions are negative—fear, anger, disgust and sadness (see also Denson, this volume). Why should this be so? Fear, anger and disgust were clearly adaptive in our ancestral environment, preparing the organism for flight (fear), fight (anger) or avoidance (disgust). But what about sadness, perhaps the most ubiquitous of our negative affective states? Sadness is very common, and dealing with it keeps most applied psychology professionals in business, yet its possible adaptive functions remain puzzling and poorly understood (Ciarrochi, Forgas & Mayer, 2006).

Culture plays an important role in our mental processes (see Kitayama, Tompson, & Chua this volume), and Western culture in particular often considers negative affect as unnecessary and undesirable. In contrast, sadness and melancholia have been accepted as normal in most previous historical epochs (Sedikides et al., 2006). From the classic philosophers through Shakespeare to the works of Chekhov, Ibsen and the great novels of the 19th century, exploring the landscape

of sadness and melancholia has long been considered instructive, and indeed ennobling. Many of the greatest achievements of the human mind and spirit were borne out of sadness, dysphoria and even enduring depression. Many of the classic works of Western culture deal with the evocation of negative feelings and emotions. There are more Greek tragedies than comedies, Shakespeare wrote far more tragedies than comedies, and levity generally comes a distant second to seriousness in most great literature and art. Dealing with negative affect tells us a great deal about the human condition and has been the focus of much art and literature. It is only in the last few decades that a major industry promoting the cult of positivity has emerged, and replaced the earlier and more balanced view of the landscape of human affectivity.

This chapter will present a conceptual argument, and empirical research indicating that in many situations *both* negative and positive mood perform important regulatory functions, automatically triggering information processing strategies that are adaptive in a given situation. Affective states can perform such a regulatory function by operating like domain-specific adaptations, spontaneously and automatically fine-tuning the way we deal with external and internal information (Forgas, Haselton & von Hippel, 2007; Tooby & Cosmides, 1992). This view is also consistent with recent advances in physiology and neuroanatomy, confirming that affect is often an essential and adaptive component of responding to social situations (Adolphs & Damasio, 2001; Forgas, 1995, 2002; Zajonc, 2000). While some tasks can be better solved when in a positive affective state, other tasks are more amenable to the kind of motivational and cognitive strategies recruited by negative affect (Forgas, 1994, 1998a,b, 2002; Forgas & George, 2001; Forgas & Eich, 2012), consistent with evolutionary theories that argue that affective states "exist for the sake of signalling states of the world that have to be responded to" (Frijda, 1988, p. 354).

Linking Affect to Cognition and Behavior

Contemporary theories suggest that affective states may influence cognition and behavior in at least two fundamental ways. *Informational effects* (such as affect congruence) occur when an affective state directly influences the valence and *content* of cognition and behavior, promoting access to affect-congruent constructs and ideas (Bower, 1981; Forgas, 1995).

Secondly, affective states can also influence *how* people think, the *process* of cognition (Clark & Isen, 1982; Forgas, 2002). Such processing effects occur when an affective state influences the information processing style people adopt when dealing with a particular situation. It is this second kind of effect on processing styles that can be considered regulatory in character.

Early theories suggested that positive mood simply leads to more lazy and less *effortful* processing (Clark & Isen, 1982; Sinclair & Mark, 1992), while negative mood promotes effortful and vigilant processing (Schwarz, 1990; Schwarz & Bless, 1991). These motivational accounts suggested that happy people seek

to preserve their good mood by avoiding cognitive effort (mood maintenance), and dysphoric individuals increase effort to improve their mood (mood repair) (Clark & Isen, 1982).

Subsequently, explanations of such processing effects emphasized *functional principles,* suggesting that affect performs a signalling function, indicating the degree of effort and vigilance that is required in more or less demanding situations. Thus, positive affect signals a familiar, non-threatening situation that requires little vigilance, but negative affect functions as an alarm signal, recruiting a more effortful and vigilant processing style (Schwarz, 1990). This "cognitive tuning" account already implied that affective states perform an important regulatory function, but there still remained some questions about the nature of the processing differences triggered by different moods. More recent theories, such as Förster & Dannenberg's (2010) global–local processing model suggest that positive affect promotes a more global thinking style, focusing on abstract, high-level features, and negative mood promotes a more local processing style focusing on specifics and details. Similarly, Fredrickson's (2001) broaden-and-build theory also proposes that positive affect tends to broaden and expand, and negative affect tends to narrow and focus one's attention.

Assimilation versus Accommodation

A more comprehensive explanation was developed by Bless and Fiedler (2006). These authors suggest that rather than simply influencing processing effort, moods perform an evolutionary regulatory function and actually recruit qualitatively different processing *styles*. The model adapts Piaget's distinction between *assimilative* and *accommodative* processing, and suggests that negative moods call for *accommodative,* bottom-up processing focusing on the details of the external world and new stimulus information. In contrast, positive moods recruit *assimilative, top-down* processing and greater reliance on existing schematic knowledge and heuristics (Bless, 2000; Bless & Fiedler, 2006; Fiedler, 2001).

This affectively induced regulatory *assimilative/accommodative processing dichotomy* has received extensive support in recent years, demonstrating that such a processing dichotomy can have significant cognitive and behavioral consequences. For example, Fiedler, Asbeck and Nickel (1991) found that people experiencing a positive mood were more likely to engage in constructive processing and were more influenced by prior priming manipulations, and Koch and Forgas (in press) report that cognitive fluency effects are accentuated by positive mood. Further, negative affect, by facilitating the processing of new external information, can also reduce judgmental mistakes such as the fundamental attribution error (Forgas, 1998b), improve the quality and efficacy of persuasive arguments (Forgas, 2007), and also improve eyewitness memory (Fiedler et al., 1991; Forgas, Vargas & Laham, 2005), as we shall show later.

The theory thus implies that *both* positive and negative mood can perform a regulatory function and produce processing advantages albeit in response to different situational demands. This way of looking at the cognitive consequences of affective states can go some way towards explaining the continuing prevalence of negative moods despite our best efforts to eliminate them: negative affect persists because it continues to fulfil an important and adaptive regulatory function.

We shall now review a range of empirical studies demonstrating the regulatory functions of positive and negative mood on various cognitive, judgmental, motivational and behavioral tasks. These experiments typically employ a two-stage procedure, as participants are first induced to experience an affective state (for example, using exposure to happy or sad movies, music, autobiographic memories, or positive or negative feedback about performance). The effects of induced affect are then explored in subsequent tasks in what participants believe is a separate, unrelated experiment. Experimental evidence for the adaptive benefits of negative affect will be summarized in four sections, discussing (1) memory, (2) judgments, (3) motivation, and (4) strategic interpersonal behaviors.

THE REGULATORY EFFECTS OF MOOD ON MEMORY PERFORMANCE

Memory is perhaps our most fundamental cognitive faculty (Forgas & Eich, 2012) that should benefit from more attentive and externally oriented accommodative processing. Affective states can also regulate perceptual processes (Most, this volume), and several recent experiments also found that more accommodative processing triggered by negative affect can indeed produce memory benefits. Accurately remembering mundane, everyday scenes is a difficult and demanding task, yet such memories can be of crucial importance in everyday life, as well as in forensic and legal practice (Loftus, 1979; Neisser, 1982).

Mood Effects on Memory

Negative mood, by recruiting a more accommodative processing style, should result in improved memory performance. This expectation was investigated in a realistic field experiment, in a small suburban shop (Forgas, Goldenberg & Unkelbach, 2009). We placed a number of small unusual objects (little trinkets, toys, matchbox cars, etc.) near the check-out counter. Mood was induced naturally, by carrying out the experiment on cold, rainy and unpleasant days (negative affect), or bright, sunny, warm days (pleasant affect; Schwarz & Clore, 1988), and mood effects were further reinforced by playing sad or cheerful tunes within the store. We observed customers to make sure that they did see the objects we displayed, and after they left the shop, a young female research assistant asked them to remember as many of the little trinkets they saw in the store as possible (cued recall task) (Forgas et al., 2009). As expected, people in

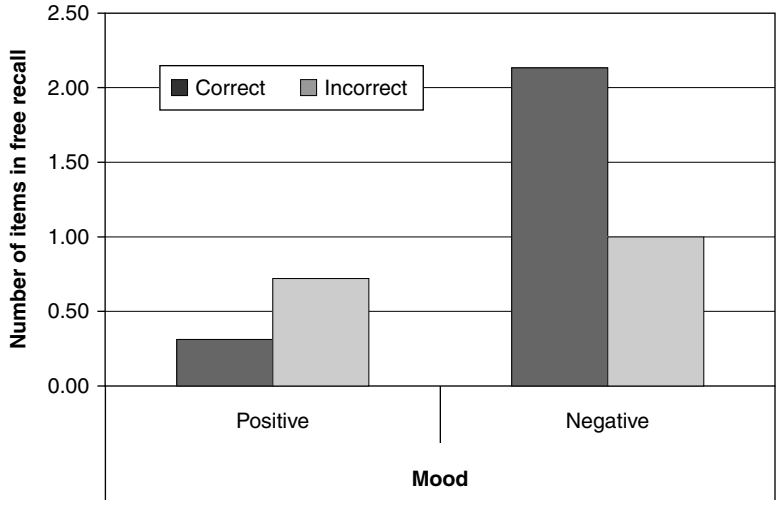

Figure 10.1 The effects of good or bad mood, induced by the weather, on correct and incorrect recall of items casually seen in a shop. (After Forgas et al., 2010)

a negative mood (on rainy days) had significantly better memory for the objects they saw in the shop than did happy people questioned on a bright, sunny day (Figure 10.1).

Mood Effects on Eyewitness Accuracy

Remembering is not only influenced by what people pay attention to, but is also subject to contamination by subsequent incorrect information (Fiedler et al., 1991; Loftus, 1979; Wells & Loftus, 2003). For example, misleading information after the event can produce a false memory later on, the so-called misinformation effect (Loftus, 1979; Loftus, Doyle & Dysert, 2008; Schooler & Loftus, 1993). Affective influences on eyewitness memory distortions have received relatively little attention in the past (cf. Eich & Schooler, 2000; Schooler & Eich, 2000), although Fiedler et al. (1991) suggested over twenty years ago that we need to examine "the mediating role of mood in eyewitness testimony" (p. 376).

We hypothesized that more constructive and assimilative processing in positive moods may *impair* eyewitness accuracy by increasing the likelihood that misleading information will be incorporated into memories (Fiedler, Asbeck & Nickel, 1991). In contrast, negative mood by triggering accommodative processing may constrain such distortions (Forgas & Eich, 2012). In one experiment we showed participants photos of a car crash scene (negative event) or alternatively, a wedding party scene (positive event; Forgas, Vargas & Laham, 2005, Exp. 1). One hour later, while in an induced happy or sad mood they received questions about the target scenes that either did, or did not contain

misleading, false information (e.g. "Did you see the stop sign at the scene?"—there was a give way sign, but no stop sign). After a further 45-minute interval eyewitness memory for the target events was assessed.

As predicted, positive mood increased the assimilation of misleading information into eyewitness memories. In contrast, negative mood almost eliminated this "misinformation effect" (Loftus et al., 2008). A signal detection analysis found that negative mood improved the ability to discriminate between correct and false details.

In the next experiment we staged a highly realistic 5-minute argument between a lecturer and a female intruder in front of unsuspecting students (Forgas et al., 2005, Exp. 2). One week later misleading information was introduced when happy and sad eyewitnesses responded to manipulated questions about the incident that either did or did not contain false, planted information (e.g., "Did you see the young woman in a brown jacket approach the lecturer?"—the intruder wore a black jacket).

Eyewitness memory remained less distorted when witnesses received the misleading information in a negative mood (Figure 10.2), also confirmed by a signal detection analysis. Interestingly, instructions to control this mood effect were ineffective, suggesting that the regulatory function of moods is largely automatic and subconscious. In a third study participants saw videotapes of a robbery or a wedding scene, and later received misleading questions when in positive or negative mood. The misleading information reduced eyewitness accuracy for happy participants, but not for negative mood participants. These results are consistent with moods performing a regulatory function with negative affect improving accommodative processing and reducing the misinformation

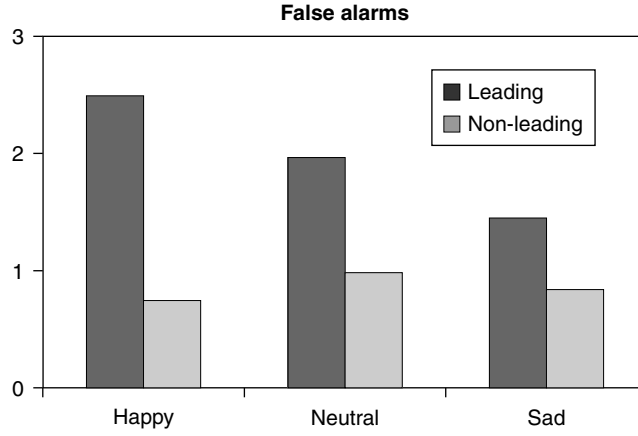

Figure 10.2 Mood effects on the tendency to incorporate misleading information into eyewitness memory (Experiment 2): negative mood reduced, and positive mood increased eyewitness distortions due to misleading information (false alarms; after Forgas, Vargas & Laham, 2005).

effect and positive mood having the opposite effect (Bless, 2001; Fiedler & Bless, 2001; Forgas, 1995, 2002).

THE REGULATORY EFFECTS OF MOOD ON JUDGMENTS

Many judgmental errors occur because judges place insufficient emphasis on external stimulus details and are guided too much by their internal expectations and constructions. For example, judging the truth of second-hand information may be influenced by internal heuristics, such as the "truth effect," when cognitively fluent information is more likely to be judged as true than disfluent information (Unkelbach, 2006). The experience of cognitive fluency itself is determined by a variety of factors, such as the familiarity, complexity and clarity of the target information (Alter & Oppenheimer, 2009). To test the affective regulation hypothesis, we asked happy or sad participants to judge the truth of 30 ambiguous statements presented with high or low visual fluency (against a high or low contrast background; Koch & Forgas, 2012). Those in neutral and positive mood rated fluent claims as more true (Figure 10.3). However, negative affect completely eliminated the fluency effect, consistent with a more externally focused and accommodative processing style (Bless & Fiedler, 2006; Fiedler, 2001).

Primacy Effects

Another judgmental bias, the primacy effect, occurs because judges rely too much on early information and ignore later details (Asch, 1946; Crano, 1977;

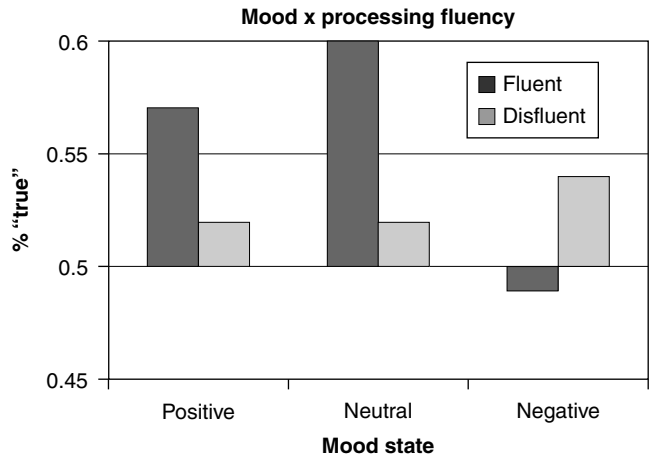

Figure 10.3 The interactive effects of mood and perceptual fluency on truth judgments: negative mood significantly reduced the tendency for people to rely on visual fluency as a truth cue (after Koch & Forgas, 2012).

Luchins, 1958). Such first impressions can be important in many everyday situations such as speed dating, job interviews, political communication, marketing and advertising. Can primacy effects be reduced by negative mood that recruits more attentive, accommodative thinking style (Forgas, 2011a)? In one study, participants first received a mood induction (reminiscing about happy or sad events in their past), and then formed impressions about a target character, Jim, based on two paragraphs describing introverted and extroverted features, with the order of the paragraphs manipulated (Luchins, 1958). There was a significant overall primacy effect. However, consistent with the regulatory prediction, positive mood increased and negative mood eliminated this common judgmental bias compared to the control condition (Figure 10.4).

Halo Effects

Halo effects occur when judges infer that a person having some positive features is likely to have others as well. For example good-looking people are often judged to have more desirable personalities (Dion, Berscheid & Walster, 1972), or a young unorthodox-looking female may be seen as less likely to be a competent philosopher compared to a middle-aged male. In a recent experiment (Forgas, 2011b) we asked happy or sad judges to read a short philosophical essay, with a photo of the writer attached showing either a casually dressed young female, or a tweedy, bespectacled older male. The appearance of the

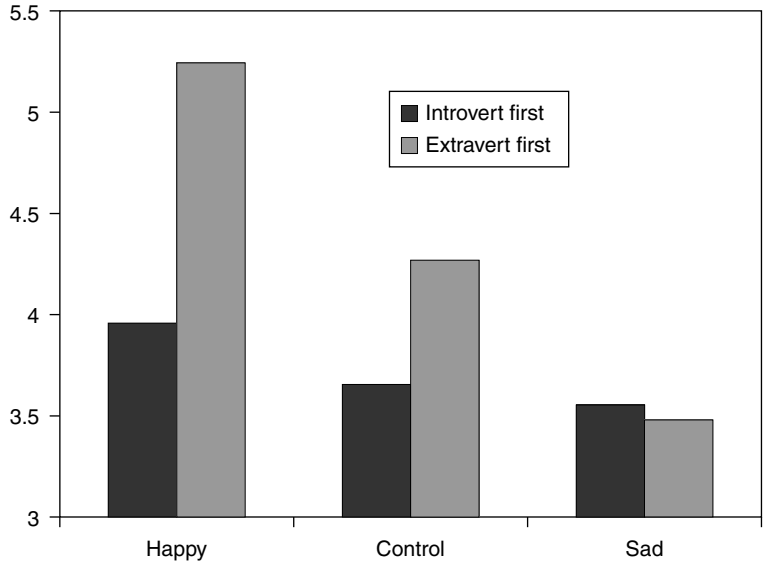

Figure 10.4 The effects of mood and primacy on the evaluation of a target person: positive mood increases, and negative mood reduces the primacy effect on evaluative judgments (vertical axis; after Forgas, 2011).

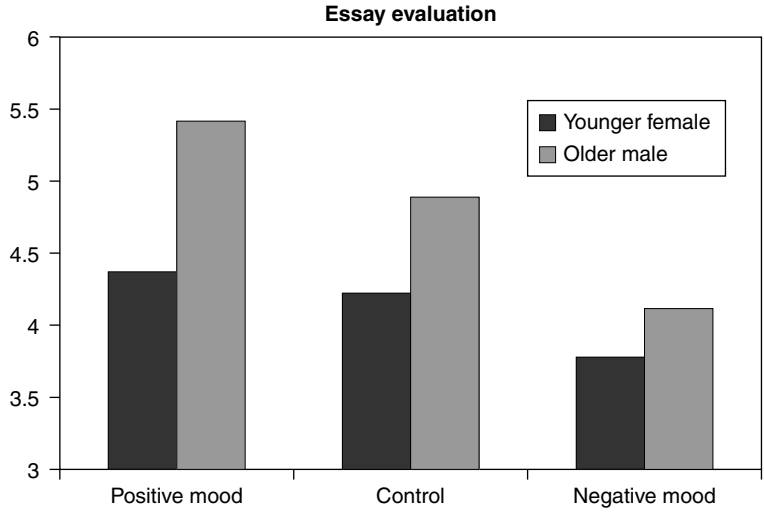

Figure 10.5 Mood moderates the incidence of halo effects on the evaluation of an essay: positive mood increased, and negative mood eliminated the halo effect associated with the appearance of the writer (after Forgas, 2011b).

'writer' indeed exerted a significant halo effect on judgments. However, those in a negative mood were less influenced by the appearance of the writer than were judges in a positive mood, consistent with the predicted regulatory effect (Figure 10.5.)

Inferential Errors

The fundamental attribution error (FAE) or "dispositional bias" occurs when judges infer internal causation and ignore situational causes. By promoting more accommodative processing, negative affect could reduce the FAE by directing greater attention to external, situational information (Forgas, 1998b). In one experiment happy or sad participants read and make inferences about the writers of essays advocating popular or unpopular positions (e.g., for or against nuclear testing), a position that was allegedly either assigned, or freely chosen by the writer (e.g., Jones & Davis, 1965). Mood did have a regulatory effect, with negative mood reducing and positive mood increasing the FAE. These effects were confirmed in a follow-up field study; again, those in a negative affective state were less likely to make incorrect, dispositional inferences based on assigned, coerced essays. An analysis of recall data provided direct evidence for the predicted regulatory effects, as those in a negative mood also had better memory for essay details (Forgas, 1998b, Exp. 3), consistent with their more accommodative processing style. A mediational analysis confirmed that processing style was a significant mediator of mood effects on judgmental accuracy.

Gullibility versus Scepticism

Social knowledge is often untested and potentially misleading, yet rejecting valid information as false (excessive scepticism) is just as dangerous as accepting invalid information as true (excessive gullibility). Negative affect may sometimes have a beneficial regulatory influence by reducing gullibility and increasing scepticism. For example, when happy or sad participants were asked to judge the likely truth of a number of urban legends and rumors (Forgas & East, 2008a), we found that negative mood increased scepticism and reduced gullibility, especially for new and unfamiliar claims. In another study we manipulated the familiarity of ambiguous claims taken from trivia games. Positive mood again increased gullibility, and negative mood again increased scepticism. In a further study, only participants in a negative mood could correctly distinguish between true and false claims. Thus, negative mood conferred a clear adaptive advantage by promoting a more accommodative, systematic processing style (Fiedler & Bless, 2001), and the more accurate discrimination between true and false claims.

Detecting Deception

Can negative affect also improve people's ability to detect deception (e.g., Lane & de Paulo, 1999)? For example, when happy or sad participants were asked to detect deception based on the videotaped interrogation of people accused of theft (Forgas & East, 2008b), those in a negative mood were more likely to make guilty judgments, but they were also significantly better at *correctly distinguishing* between truthful and deceptive targets (Figure 10.6). Negative affect, by regulating processing styles, enhanced people's ability to discriminate between deceptive and truthful targets according to a signal detection analysis (Forgas & East, 2008b).

Deception is particularly difficult to detect in interpersonal communication, and nonverbal expressions are notoriously hard to judge (Ekman & O'Sullivan, 1991; Jones, 1964). Mood may regulate processing style when interpreting nonverbal signals. For example, when judging the genuineness of positive, neutral and negative facial expressions, those in a negative mood were significantly less likely to accept facial displays as genuine than were people in the neutral or happy condition. Judgments of the genuineness of the six basic emotions (i.e., anger, fear, disgust, happiness, surprise and sadness) showed a similar effect. Consistent with affective regulation, negative mood increased and positive mood reduced processing vigilance and people's tendency to accept the facial displays as genuine (Forgas & East, 2008a).

Affective Regulation of Stereotyping

We also explored the regulatory effects of mood on the implicit use of stereotypes using the shooter's bias paradigm. In this task, when individuals have to shoot only at targets who carry a gun, US participants show a strong implicit bias to shoot more at Black rather than White targets (Correll et al., 2002; Correll et al., 2007). We modified this task by asking people in positive and

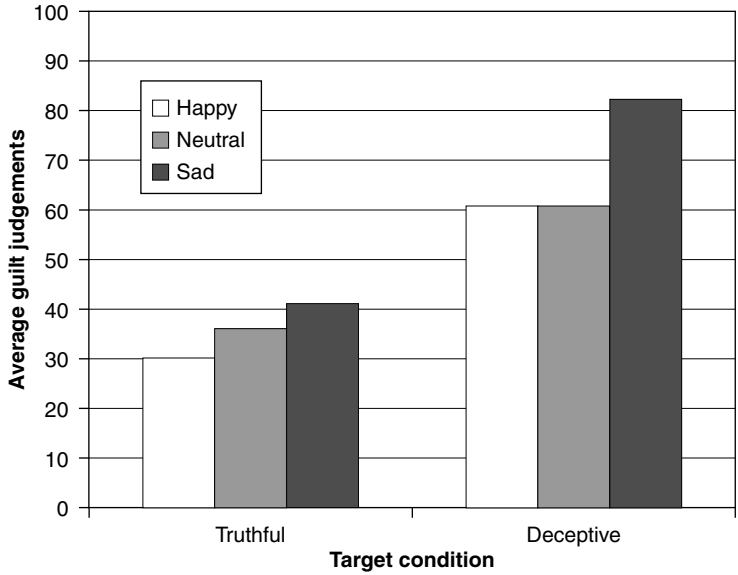

Figure 10.6 The effects of mood and the target's veracity (truthful, deceptive) on judgments of guilt of targets accused of committing a theft (average percentage of targets judged guilty in each condition) (after Forgas & East, 2008b).

negative moods to shoot only at targets who held a weapon, and who did, or did not appear to be Muslims (visually identifiable by wearing a turban: Unkelbach, Forgas & Denson, 2008). Such disguised measures of stereotyping are more reliable than other implicit measures such as the IAT that suffers from serious shortcomings (Fiedler, Messner & Blümke, 2006). We expected that Muslims may elicit a subliminal bias in a shooter's task, and consistent with the regulatory prediction positive mood should increase, and negative mood reduce this stereotype effect. We used morphing software to create targets who did, or did not appear Muslim (wearing or not wearing a turban or the hijab), and who either held a gun, or held a similar object (e.g., a coffee mug; see Figure 10.7). There was a significantly greater tendency overall to shoot at Muslims, but positive affect produced a further significant selective bias against Muslims, consistent with recent theories suggesting that positive affect promotes top-down, assimilative processing that facilitates the influence of stereotypes on responses (Bless & Fiedler, 2006; Forgas, 1998a,b, 2007).

AFFECTIVE REGULATION OF MOTIVATION

Affect can also have an important regulatory influence on motivation. In an early discussion of these effects Clark and Isen (1982) thought that positive affect can reduce the motivation to engage in effortful activity in order to maintain a

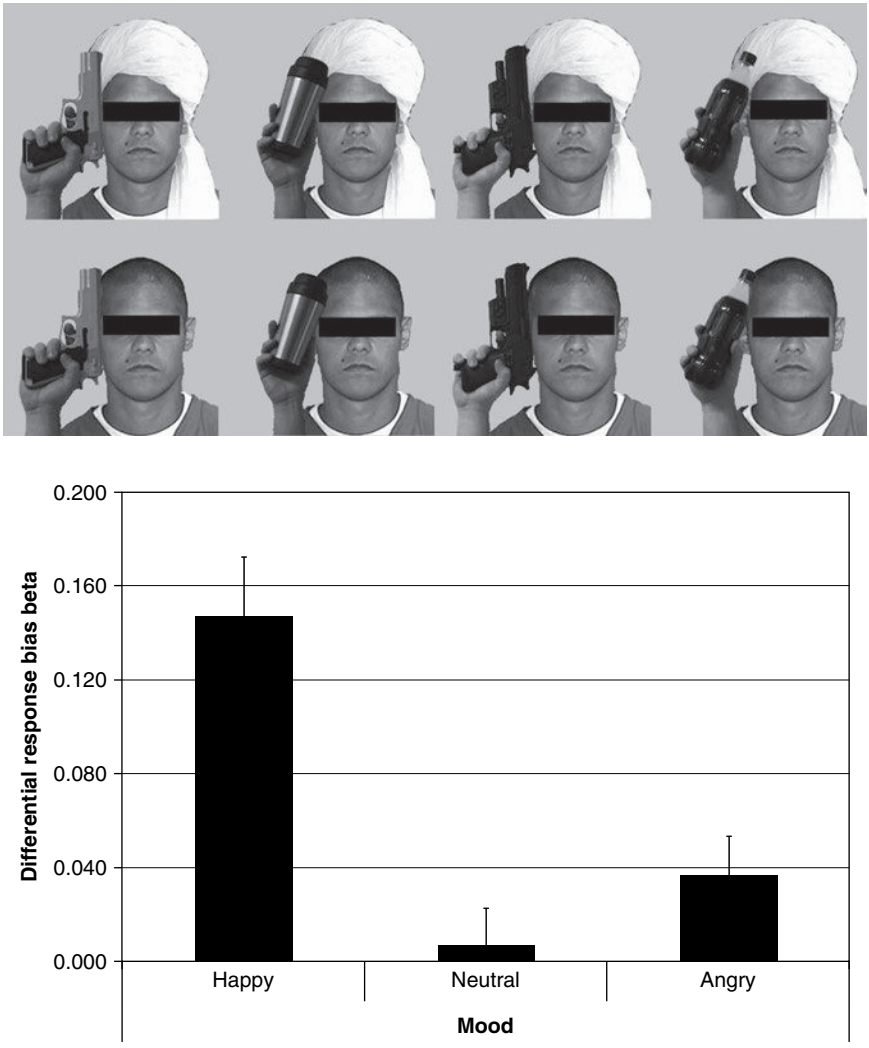

Figure 10.7 The turban effect: Stimulus figures used to assess the effects of mood and wearing or not wearing a turban on subliminal aggressive responses. Participants had to make rapid shoot/don't shoot decisions in response to targets who did or did not hold a gun, and did or did not wear a Muslim head-dress (a turban). Those in a positive mood were more likely, and those in a negative mood were less likely to selectively shoot at targets wearing a turban.

pleasant state—the *mood maintenance* hypothesis. In contrast, negative affect can motivate increasing effort to improve mood—the *mood repair* hypothesis (Frijda, 1986). Schwarz's (1990) "*cognitive tuning*" model suggests a similar outcome. A conceptually related idea was developed by Carver and Scheier (2001; see also Carver, this volume) who argue that positive and negative affects

function as feedback signals about goal achievement: positive affect signals progress and triggers reduced effort, while negative affect signals lack of progress and the need for greater effort. Several experiments now support these regulatory effects.

Regulating Perseverance

Exerting effort is costly in the short term, yet is necessary for long-term success. In terms of Atkinson's (1957) Expectancy-Value model, people should only engage in effortful achievement-orientated actions when both the subjective probability of success (*expectancy*) and the incentive value of success (*value*) are high. Thus, the incentive value of the goal and the motivation to act partly depend on the perceived value of the desired end states (Feather, 1988; 1992).

Hedonistic Discounting

When a person is already in a positive affective state, this may result in the *discounting* of the hedonistic value of expected future success, reducing perseverance and motivation (the *hedonistic discounting hypothesis).* In contrast, present negative affect may result in a higher evaluation of the hedonistic benefit of future success, improving effort and motivation. We tested this hypothesis by instructing happy and sad participants to work on a demanding cognitive abilities task comprising a number of difficult questions for as long as they liked (Goldenberg & Forgas, 2013). Perseverance was assessed by measuring the total *time spent* on the task, total *number of questions attempted* and total number of questions *correctly answered*. Expectancy-related and task-value beliefs were also assessed.

As predicted, affect had a regulatory influence on perseverance. Happy participants spent much less time working on the task, attempted fewer items and scored fewer correct answers than those in negative mood (Figure 10.8). A mediational analysis supported the hedonistic discounting hypothesis, as it

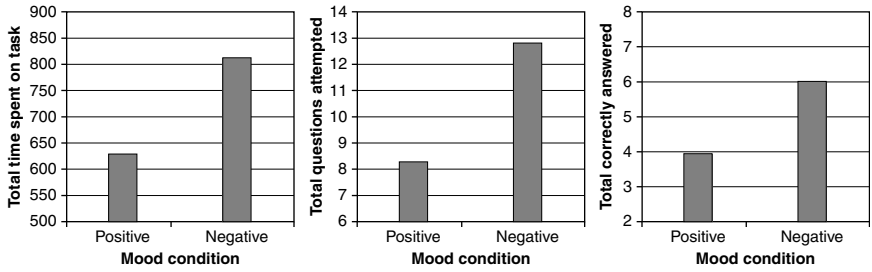

Figure 10.8 Positive affect reduces perseverance: The effects of induced mood on (a) the time spent (in seconds) on persevering with a cognitive abilities task, (b) the number of tasks attempted, and (c) the number of questions correctly answered (after Goldenberg & Forgas, 2013).

was mood-induced differences in task-value beliefs that mediated mood effects on perseverance. Thus, current affect can produce a regulatory effect on perseverance, by influencing the perceived value of future achievement.

Affective Influences on Self-Handicapping

Finding or creating spurious reasons for non-achievement is a particularly intriguing case of self-regulation failure (see also Koole; Inzlicht & Legault, this volume). Such self-handicapping occurs when people create artificial handicaps for themselves as a means of protecting the self from damaging attributions due to expected failure (Rhodewalt et al., 1991). We hypothesized that self-handicapping might also serve a second regulatory purpose: to preserve a pleasant affective state. In one study (Alter & Forgas, 2007) we predicted that positive mood should increase, and negative mood decrease self-handicapping behaviors. Participants received manipulated feedback about their performance on a task of "cognitive abilities," leading some of them to doubt their ability to do well on this task that they expected to perform again later in the experiment. After a positive, neutral, or negative mood induction using films, self-handicapping was assessed in an "unrelated" task by assessing their preference to (a) drink a performance-enhancing, or performance-inhibiting herbal tea, and (b) engage or not engage in performance-enhancing practice.

Positive affect increased self-handicapping when future performance was uncertain. Happy persons preferred the performance-inhibiting tea, and engaged in less task-relevant practice (Figure 10.9). Negative affect in contrast

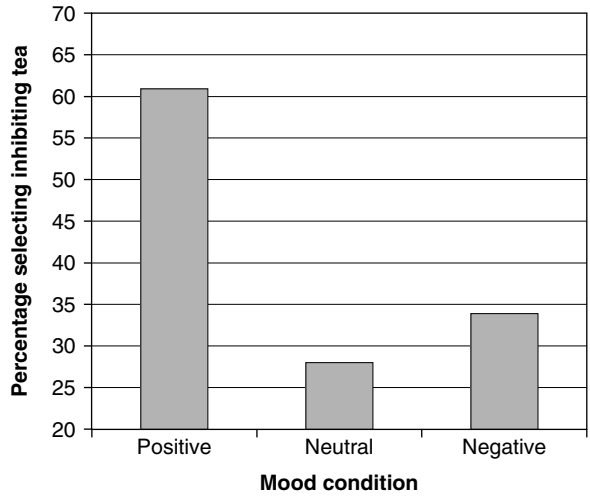

Figure 10.9 The effects of induced mood on self-handicapping: Percentage of participants who selected the performance-impairing tea as a function of mood condition (after Alter & Forgas, 2007).

reduced self-handicapping. These little recognized beneficial regulatory effects of negative mood—increasing perseverance and reducing self-handicapping—may be important in organisational settings as they may promote perseverance and reduce self-handicapping (Alter & Forgas, 2007; Goldenberg & Forgas, 2013).

THE AFFECTIVE REGULATION OF INTERPERSONAL STRATEGIES

Affective reactions represent probably the primary dimension of relating to others (Zajonc, 1980), and it seems that social relationships cannot be properly managed without affective input. Evolutionary psychologists have also speculated affect may automatically regulate the manner and intensity of our relations with others (Forgas, Haselton & von Hippel, 2007; Tooby & Cosmides, 1992; see also Maner, this volume).

More recent work demonstrated several specific regulatory effects associated with mood. According to the Affect Infusion Model (Forgas, 1995), mood states should produce a mood-congruent effect on many interpersonal behaviors, with positive mood selectively priming more optimistic, positive, confident and assertive behaviors, while negative affect should prime more pessimistic, negative interpretations and produce more cautious, polite and considerate interpersonal strategies (Bower & Forgas, 2001; Forgas, 1995; 2002). Thus, in situations calling for self-confidence and assertiveness (such as negotiation, or self-disclosure) positive affect may confer distinct regulatory benefits (Forgas, 1998a, 2011a,b). However, in situations where more cautious and attentive processing is required, it may be negative affect that produces real interpersonal benefits.

Requesting

Making a request is a complex communicative task that requires careful regulatory strategies. Requests must be formulated with just the right degree of assertiveness vs. politeness so as to maximize compliance without giving offence. While positive mood may prime a more optimistic and confident interpretation of the request situation, and thus produce a more assertive and less polite requesting style, negative mood should lead to more polite and considerate requests, a prediction now supported in several experiments (Forgas, 1999a). When happy or sad persons were asked to produce requests they would use in easy or difficult social situations (Forgas, 1999a), sad persons used more polite formulations and happy participants preferred more assertive and impolite formulations. These mood effects were greater when requests were generated in difficult situations and thus required more elaborate, substantive processing. For example, in one unobtrusive experiment (Forgas, 1999b, Exp. 2), we unexpectedly asked happy or sad participants to get a file from a neighboring office. Their words when making the request were more polite and elaborate

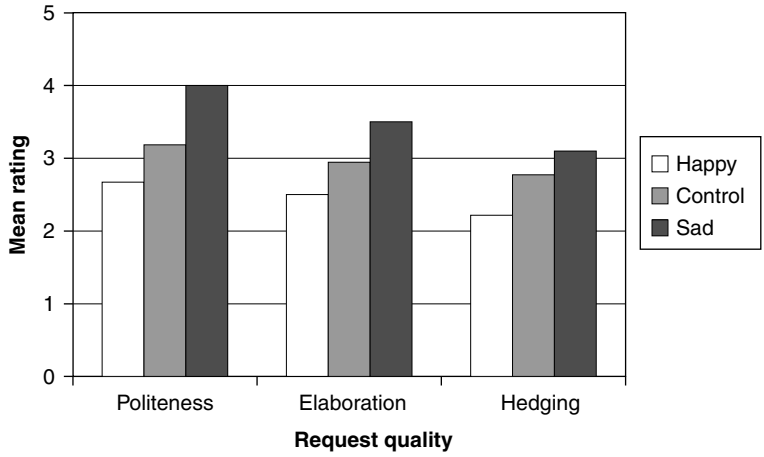

Figure 10.10 Mood effects on naturally produced requests: Positive mood increases, and negative mood decreases the degree of politeness, elaboration and hedging in strategic communications (after Forgas, 1999b).

in negative mood, whereas positive mood produced more direct and less polite strategies (Figure 10.10). These effects occur because mood states selectively prime access to more affect-congruent interpretations and thus have a subconscious regulating effect on interpersonal strategies.

Persuasion

Affect may also regulate our social influence strategies such as persuasion. As negative affect triggers closer attention to external information, this may also improve the effectiveness of social influence strategies such as persuasion. Despite much interest in how persuasive messages are responded to by *recipients* (e.g., Bless, Mackie & Schwartz, 1996; Eagly & Chaiken, 1993; Sinclair, Mark & Clore, 1994), affective influences on the *production* of persuasive messages attracted far less attention (but see Bohner & Schwarz, 1993). We predicted that accommodative processing promoted by negative affect should result in more concrete and factual thinking and more effective persuasive messages (Forgas, 2007). We asked happy and sad participants to write persuasive arguments for or against an increase in student fees, and Aboriginal land rights. Those in a negative mood produced more concrete, higher quality and more effective persuasive arguments. Similar results were obtained in other experiments using different mood inductions and different attitude issues (see Figure 10.11), consistent with negative mood promoting a more concrete processing style (Bless, 2001; Bless & Fiedler, 2006; Fiedler, 2001; Forgas, 2002).

The regulatory effectiveness of moods was further tested by presenting the persuasive arguments produced by happy or sad participants to a naive audience

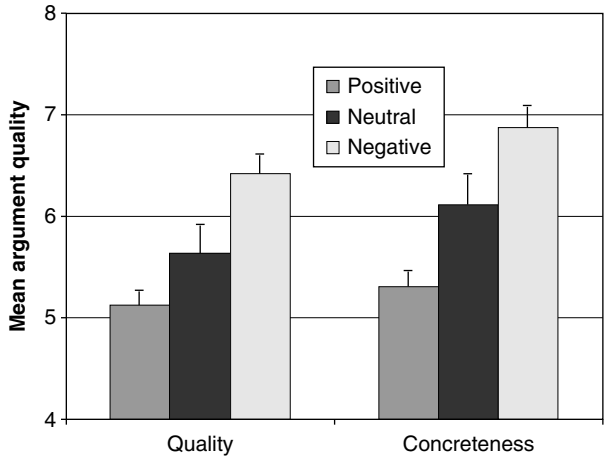

Figure 10.11 Mood effects on the quality and concreteness of the persuasive messages produced: negative affect increases the degree of concreteness of the arguments produced, and arguments produced in negative mood were also rated as more persuasive (after Forgas, 2007, Experiment 2).

of students whose attitudes on the target issues were previously assessed. Arguments written in negative mood were significantly more effective in producing real attitude change than were arguments produced by happy participants. Affect exerted a similar influence when happy and sad people were asked to write persuasive arguments for a "partner" to volunteer for a boring experiment using e-mail exchanges (Forgas, 2007). Negative mood again resulted in higher quality persuasive messages than did positive affect. A mediational analysis showed that negative mood recruited more accommodative processing, and led to more concrete and specific arguments, consistent with negative affect triggering more concrete, accommodative and externally focused information processing styles (Forgas, 1998a; Forgas et al., 2005).

Selfishness versus Fairness

One recurring conflict in interpersonal behavior is to balance self-interest against the interests of others. Economic games such as the dictator game and the ultimatum game allow an investigation of such strategies. For example, if your job was to divide hundred dollars between yourself and another person any way you like, what would you do? How much would you keep for yourself? Classical economic theories predict that rational actors should always maximize benefits to the self. In reality, instead of rational selfishness, proposers often offer a fair and sometimes an even split to others. A series of our experiments looked at mood effects on the level of selfishness vs. fairness people display in strategic interactions such as the dictator game and the ultimatum game.

We predicted that negative mood might increase, and positive mood might reduce concern with the external norm of fairness in allocations. In the *dictator game* the allocator has the power to allocate a scarce resource (e.g., money, etc.) between himself and another person in any way they see fit. In the *ultimatum game*, proposers face a responder who has a veto power to accept or reject the offer. If rejected, neither side gets anything.

Moods may regulate such strategies in two ways. In terms of affect priming, negative mood might prime more careful, cautious, pessimistic and socially constrained responses and reduced selfishness. Positive affect in turn should prime more confident, assertive, optimistic and ultimately, more selfish decisions. Affect can also influence *processing tendencies*. As Bless and Fiedler (2006) suggested, negative affect may recruit more *accommodative,* externally focused processing and greater attention to the needs of others, and positive affect facilitates more internally focused, *assimilative* thinking and greater selfishness.

In the dictator game (Tan & Forgas, 2010) we found that happy players were significantly more selfish and kept more scarce resources (such as raffle tickets) to themselves than did sad players. Those in a sad mood were more fair and gave more resources to their partners, supporting our main hypothesis (Figure 10.12).

These regulatory mood effects on fairness also endured in the more complex decisional environment of the ultimatum game, where proposers must consider the willingness of responders to accept or reject their offers (Forgas & Tan, 2013). Again, those in a negative mood allocated significantly more resources to others than did happy individuals. These mood effects were directly linked to differences in processing style, as sad individuals took longer to make allocation decisions than did happy individuals, consistent with more accommodative

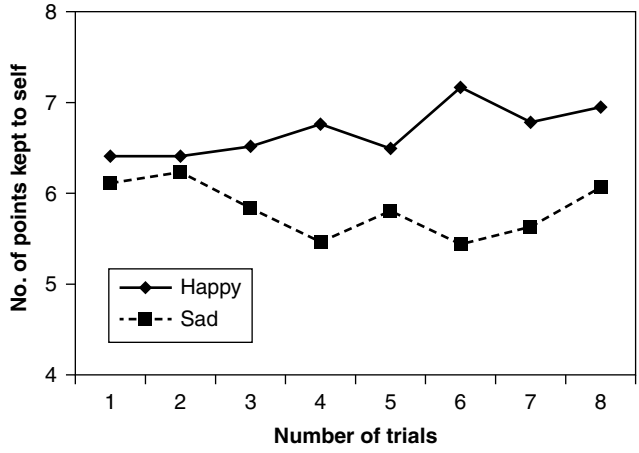

Figure 10.12 The effects of mood on selfishness vs. fairness: happy persons kept more rewards to themselves, and this effect is more pronounced in later trials.

processing. When we looked at mood effects on the behavior of responders (*rejections;* Forgas & Tan, 2013), we again found evidence for greater concern with external fairness norms in negative mood. Overall, 57% of those in negative mood *rejected* unfair offers compared to only 45% in the positive condition. This pattern is conceptually consistent with other results demonstrating the regulatory effects of negative mood, increasing attention to external information. As we have seen, negative affect was found to improve eyewitness memory, reduce stereotyping, increase politeness, and reduce judgmental errors (Forgas, 1998b, 1999a,b; Forgas et al., 2009; Unkelbach, Forgas & Denson 2008). Such results challenge the common assumption in much of applied, organisational, clinical and health psychology that positive affect has universally desirable cognitive and social consequences. Managing personal relationships in particular involves a great deal of elaborate strategic information processing, and it is an intriguing possibility that mild affect may play a regulatory role in promoting more or less assimilative versus accommodative processing styles.

SUMMARY AND CONCLUSION

The evidence reviewed here shows that everyday moods can perform an important regulatory function in triggering more or less assimilative or accommodative processing strategies, and so can provide distinct adaptive advantages in many everyday social situations. Overall, these results are consistent with evolutionary theories that suggest that the affective repertoire of our species has been largely shaped by processes of natural selection, and all of our affective states—including the unpleasant ones—can function as "mind modules" and can produce functional benefits in some circumstances (Tooby & Cosmides, 1992). This way of looking at mood effects stands in stark contrast with the overwhelming and unilateral emphasis on the benefits of positive affect in the recent literature, as well as in contemporary popular culture (Forgas & Eich, 2012; Forgas & George, 2001).

Such a functionalist perspective implies that positive affect is *not* universally desirable, and negative affect is not always harmful. We mostly looked at the cognitive, motivational and interpersonal consequences of mild, temporary mood states here, of the kind that we all regularly experience in everyday life. As we have seen, people in a negative mood are less prone to judgmental errors (Forgas, 1998b), are more resistant to eye-witness distortions (Forgas et al., 2005), are more motivated (Goldenberg & Forgas, 2013), are more sensitive to social norms (Forgas & Tan, 2013) and are better at producing high-quality and effective persuasive messages (Forgas, 2007). These findings are broadly consistent with the notion that over evolutionary time, affective states became adaptive, regulatory devices that promote motivational and information processing strategies that are appropriate in a given situation. We have only begun to explore the regulatory effects of mood on memory, thinking and judgments; this intriguing area deserves further experimental investigation.

AUTHOR'S NOTE

Support from the Australian Research Council is gratefully acknowledged. Please address all correspondence to Joseph P. Forgas, at School of Psychology, University of New South Wales, Sydney, NSW 2052, Australia; email: jp.forgas@unsw.edu.au. For further information on this research program see also websites at: www.forgas.socialpsychology.org and www2.psy.unsw.edu.au/Users/JForgas.

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11

Psychological and Biological Mechanisms Underlying Control over Anger and Aggression

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Mean people suck. We have probably all seen the novelty bumper stickers and t-shirts. Some of us may have even voiced the notion from time to time. Mean people, almost by definition, intentionally hurt us, which is the hallmark of aggressive behavior (Anderson & Bushman, 2002). Aggressive people are often characterized as socially reckless and unconcerned about controlling anger-driven impulses or the consequences of their aggressive actions.[1] This chapter examines an alternative possibility. Perhaps mean people are usually motivated to control their aggressive behavior, but are unable to effectively do so.

This chapter is concerned with aggressive behavior that is motivated by anger. This type of aggression is known as affective, impulsive, hostile, or reactive aggression. Reactive aggression stands in contrast to instrumental (also called proactive) aggression, in which harm is secondary to a primary goal (e.g., hitting someone to take her purse). Nearly everyone can recall a time in which they have acted on anger, hurt someone, and later regretted it. What makes "normal people" different from "mean people" may simply be a matter of frequency of such control failures.

In the first section of this chapter, I discuss why what we think about aggressive people is important for how we think about reducing aggression. In the second section, I present empirical evidence drawing largely from social neuroscience that demonstrates that, in many instances, aggressive people may try to control

themselves, but ultimately lack the ability to do so. In the third section of this chapter, I describe experiments showing that increasing self-control capacity reduces aggression in people high in trait aggressiveness. In other words, when self-control capacity is increased, mean people do not behave as maliciously as might be expected. In the final section, I discuss future research avenues and some further implications of the research presented in this chapter.

WHAT WE THINK ABOUT AGGRESSIVE PEOPLE IS IMPORTANT FOR HOW WE DEAL WITH THEM

Lay theories are people's "fundamental assumptions. . .about the nature of the self and the social world" (Molden & Dweck, 2006, p. 193). Lay theories of aggressive individuals play an important role in how scientists and members of the general public think about rehabilitation and preventing aggression. For instance, people who believe that moral character is fixed (versus malleable) believe that the purpose of imprisonment is primarily to punish (rather than to rehabilitate) (Gervey et al., 1999). Moreover, when the harm caused by a perpetrator is perceived as intentional, harm-doers are punished more severely than when the harm is perceived as less intentional (Darley & Pittman, 2003). Lay people typically show a preference for this "just deserts" approach in which offenders are punished in accordance with the harm they have committed (Carlsmith & Darley, 2008).

If mean people are thought to intentionally hurt others due to a fixed unwillingness to control an aggressive outburst, then a "just deserts" approach to justice may be appropriate in some circumstances. Punishment should potentially deter future acts of aggression in an attempt to avoid future punishment; however, a just deserts approach should not alter the fundamental moral character of the aggressor. By contrast, if one thinks of mean people as intentionally unwilling to control their behavior, but malleable in terms of character, attempts could be made to increase empathy and the awareness of the harm inflicted by unrestrained aggressive actions. Presumably, these types of interventions should lower aggression by increasing motivation to restrain anger-driven aggressive impulses.

In contrast to the just deserts approach, if the harm done was an unintentional act of poor impulse control, retributive justice may not deter future acts of aggression. Enhancing empathy or awareness of the consequences of aggressive behavior may also prove largely ineffective (although one study found that inducing empathy reduced an electrophysiological indicator of approach motivation and hostile attitudes following an insult, but not anger; see Harmon-Jones et al., 2004). If poor self-control is the proximal cause of aggression, improving self-control capacity should be a highly effective way to reduce future aggressive episodes. In the following sections, I describe evidence suggesting that aggressive people may be typically motivated to control aggressive impulses. Moreover, improving self-control capacity may be an effective strategy for reducing reactive aggression.

MOTIVATION AND BRAIN MECHANISMS IN AGGRESSION-PRONE PEOPLE

This section reviews the empirical literature on motivation to control anger-driven aggression and the neuroscience underpinning anger control. Aggression and violence (i.e., extreme acts of aggression) have been on the decline in Western societies since the Middle Ages. In his book on the decline of violence, Pinker (2011) attributes much of this reduction to changing social norms that proscribe aggressive behavior. As examples, in contemporary times, these changing norms have produced fewer and less deadly wars, lower homicide rates, lower tolerance for aggressive sports, and improved treatment of women, children, and animals (Pinker, 2011). Indeed, in many societies, one's chances of being murdered are the lowest they have ever been. Because non-aggressive behavior has become normative, one implication is that people are typically motivated to resolve conflict without resorting to aggression and violence.

Perhaps one of the earliest investigations into the possibility that violent individuals are motivated to control anger-driven aggression comes from the literature on overcontrolled hostility (Megargee, Cook, & Mendelsohn, 1967). Overcontrolled hostility occurs when individuals attempt to control aggressive behavior, yet subsequently fail to do so. Overcontrolled hostility is a component of the Minnesota Multiphasic Personality Inventory and has been observed in prison populations (Verona & Carbonell, 2000). This loss of self-control is notable given the much sought-after rewards for effectively controlling aggressive urges (e.g., early release, access to visitors).

Baumeister and colleagues' strength model of self-control provides an explanatory framework for understanding why overcontrolled hostility might lead to failed self-control (Baumeister & Alquist, 2009; Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000). According to the strength model, engaging in an initial act of self-control tends to temporarily impair a subsequent act of self-control. Individuals high in overcontrolled hostility may become depleted due to effortful anger regulation, which heightens aggression. Indeed, research shows that engaging in one self-regulatory process can heighten subsequent aggression (DeWall et al., 2007; Finkel et al., 2009; Stucke & Baumeister, 2006; for reviews, see Denson, DeWall, & Finkel, 2012 and DeWall, Finkel, & Denson, 2011; for a thoughtful discussion on how executive control contributes to emotion regulation, see Schmeichel & Tang, this volume).

There are problems with asking violent offenders and other aggressive individuals about their degree of motivation to control aggressive behavior. One obvious problem is that they may not be truthful. Violent individuals may also wish to appear more motivated than they actually are. Aggressive people may also lack insight into actual levels of motivation.

A fruitful alternative to relying on self-report measures may be to examine brain responses to anger-inducing situations. During the past decade, cognitive and social neuroscientists have made great progress in mapping the neural regions responsible for self-control (Hassin, Ochsner, & Trope, 2010). Much of

this work has identified the neural substrates of basic executive functions such as inhibition, working memory, and attentional control that support self-regulatory goals (see also Carver, this volume; and Schmeichel & Tang, this volume). This self-regulatory circuit partially consists of the dorsal anterior cingulate, medial prefrontal, orbitofrontal, and lateral prefrontal cortices. Brain responses in this circuit should presumably be less influenced by social desirability concerns than self-reports.

The dorsal anterior cingulate cortex is thought to monitor discrepancies between actual and expected states in the environment (Botvinick, Cohen, & Carter, 2004). The dorsal anterior cingulate also monitors the emotional salience of stimuli and is activated in response to challenging situations (Gasquoine, 2013). Within the context of anger provocation, the dorsal anterior cingulate might be involved in detecting a discrepancy between one's expected state of being treated fairly and one's actual state of being unduly harmed. Once a discrepancy is detected, the dorsal anterior cingulate cortex is thought to recruit brain regions in the prefrontal cortex that support higher order executive functions. For this reason, the dorsal anterior cingulate cortex has been called a "neural alarm system" (Eisenberger & Lieberman, 2004). Relevant prefrontal regions recruited by this alarm system include those implicated in emotion regulation (medial, dorsolateral, and ventrolateral prefrontal cortices, orbitofrontal cortex), inhibition (dorsolateral prefrontal and ventrolateral prefrontal cortices), and social cognition (medial prefrontal cortex; Amodio & Frith, 2006; Lieberman, 2007; Ochsner & Gross, 2008; van Gaal et al., 2010).

Eisenberger et al. (2007) investigated the effect of social exclusion on activation in the dorsal anterior cingulate. Social exclusion increases anger and aggression in the laboratory and real world (Leary, Twenge, & Quinlivan, 2006; Twenge et al., 2001). The sample consisted of 32 healthy men and women who varied in a genetic predisposition toward aggression. Specifically, participants possessed either the low expression allele of the monoamine-oxidase A (MAOA-L) gene, the high expression allele (MAOA-H), or a combination of the low and high expression alleles (MAOA-LH). MAOA-L individuals are at heightened risk for developing antisocial behavior such as engaging in reactive aggression and violence (Caspi et al., 2002). After a time, participants were socially excluded from a computerized ball-tossing game. The authors hypothesized that individuals at risk for aggression may have a heightened threat detection system accompanied by poor emotion regulation capacity. If so, the dorsal anterior cingulate cortex should be most active among MAOA-L individuals as this neural alarm system should be highly responsive to interpersonal provocation. Results confirmed this notion. Specifically, of the three groups of participants, MAOA-L individuals showed the greatest activation in the dorsal anterior cingulate in response to social exclusion. Moreover, MAOA-L individuals reported being highest among the three groups in trait aggressiveness and interpersonal hypersensitivity.

The intriguing contribution of this study is that individuals genetically predisposed toward aggressiveness showed more activation rather than less activation in the dorsal anterior cingulate cortex. This finding does not allow us

to determine whether the MAOA-L participants intended to harm others or control themselves. However, it does document that aggression-prone people showed hyper-responsiveness in a region responsible for the recruitment of brain regions implicated in self-regulation. Presumably, if aggressive individuals did not care about regulating their responses to interpersonal mistreatment, they would show no change in activation or even deactivation in the neural circuitry underlying self-control.

A second study conceptually replicated the results of Eisenberger and colleagues' (2007) findings using a different anger provocation. Participants were 20 healthy men and women undergraduates who varied in trait aggressiveness (Denson et al., 2009). During an initial laboratory session, participants completed the Aggression Questionnaire (Buss & Perry, 1992), which measures individual differences in self-reported trait aggressiveness. Approximately two weeks later, participants returned for a neuroimaging study, ostensibly about cognitive ability and mental imagery. During scanning, participants were rudely insulted by the experimenter, which increased anger from baseline. Results showed strong positive correlations among self-reported trait aggressiveness, state anger, and activation in the dorsal anterior cingulate cortex following provocation. Thus, aggressive individuals were the most angry and showed the greatest activation in the dorsal anterior cingulate cortex. In other words, greater anger induced by the insult likely increased dorsal anterior cingulate cortex activation, presumably to recruit prefrontal regions implicated in self-regulatory processes. These findings converge with those of Eisenberger et al. (2007) in showing heightened responsiveness in the neural circuitry of self-control for people at risk for aggression.

In addition to genes and traits, another way of identifying aggression-prone individuals is by examining hormone concentrations. Recent work suggests that there is a specific hormone profile, which confers risk for aggression. Basal concentrations of the hormones testosterone and cortisol have been implicated in aggression-dominance and avoidance-submissiveness, respectively (Denson, Spanovic, & Miller, 2009; Eisenegger, Haushofer, & Fehr, 2011). However, meta-analysis suggests only weak and inconsistent effects of testosterone on aggression in humans (Archer, Graham-Kevan, & Davies, 2005). In order to account for these inconsistencies, recent theorizing suggests that the effect of testosterone may be dependent on concentrations of cortisol (Carre & Mehta, 2011; Mehta & Josephs, 2010). In support of this *dual-hormone hypothesis,* endogenous testosterone was positively correlated with severity of violent crimes among male offenders, but only when cortisol was low (Dabbs, Jurkovic, & Frady, 1991). The same endogenous dual-hormone interaction was found when correlating testosterone with reactive aggression in delinquent male adolescents (Popma et al., 2007). These studies suggest that "trait" levels of testosterone and cortisol may jointly determine risk for aggression (however, for a reversal of this dual-hormone pattern in undergraduate women, see Denson, Mehta, & Ho Tan, 2013).

In a functional magnetic resonance imaging (fMRI) study, 19 healthy men provided saliva samples to assess testosterone and cortisol (Denson, Ronay, von Hippel, & Schira, 2013). In order to examine neural activation specifically

during anger control, a female research assistant took participants aside and informed them that the experimenter was getting upset with participants for not doing the task properly. The assistant emphasized that the study was part of her Ph.D. thesis and limited funding was available. It was therefore extremely important that participants remain calm even if angered by the experimenter. Participants were subsequently insulted during scanning. Results showed that induced anger control activated the dorsal anterior cingulate cortex as well as other regions implicated in emotion regulation. Self-reported anger control was positively correlated with activation in the dorsal anterior cingulate cortex. This finding provides converging evidence for the role of this region in recruiting regions implicated in self-control processes.

In support of the dual hormone hypothesis, additional analyses showed that testosterone was positively correlated with bilateral activation in the dorsolateral prefrontal cortex, which is a key region implicated in emotion regulation, but only among men with low levels of cortisol. This same pattern of data was observed for activation in the thalamus, which is involved in regulating arousal and emotional processing. Thus, individuals with a hormonal predisposition toward aggression showed the greatest responses in the neural circuitry underlying self-control and emotional arousal.

In summary, these three fMRI studies suggest that when angered, aggressive people are characterized by inefficient neural responses in brain regions implicated in self-regulation. The hyper-responsiveness occurred regardless of whether the study participants were (a) genetically predisposed toward aggression; (b) high in trait aggressiveness; or (c) hormonally at risk for aggression. One implication of these three fMRI studies is that some aggressive people may try to exert control over anger and aggression, but may lack the ability to do so. If poor self-control is the problem, boosting self-control capacity should lower aggression in aggressive people.

Before proceeding, a caveat is in order. The idea that altered functioning in prefrontal brain regions may be responsible for aggressive behavior is not new. Several reviews have highlighted the notion that self-regulatory functions supported by the prefrontal cortex are critical in controlling violence and aggression (Blair, 2004; Davidson, Putnam, & Larson, 2000; Denson, 2011; MacDonald, 2008; Raine, 2008; Raine & Yang, 2007; Siever, 2008; Wilkowski & Robinson, 2007). During (what some may describe as boring) cognitive tasks, much prior research with clinical populations (e.g., people with antisocial personality disorder, murderers) discovered hypoactivation in the prefrontal cortex of antisocial people relative to healthy controls (e.g., Raine, Buchsbaum, & LaCasse, 1997). In contrast to this prior research, the fMRI studies described here examined relatively high-functioning groups of university students exposed to anger-inducing situations such as social rejection and insult. The intriguing aspect of the emerging body of neuroscience research described here is that it specifies the form of this dysfunction in "normal" people. Dysfunction may take the form of hypoactivation, hyperactivation, and abnormal connectivity between regions. Thus, the novel aspect of these three fMRI studies is the observation of

hyperactivation in the neural circuitry of self-control among aggression-prone individuals when exposed to anger-inducing social situations.

Interestingly, one subgroup of antisocial people—psychopaths—tend to show increased neural activation during emotional tasks (for a review, see Raine & Yang, 2007; see also Contreras-Rodríguez et al., 2013). Because of emotional deficits in psychopathy, Raine and Yang (2007) hypothesized that psychopathic individuals may require increased effort to achieve the same level of performance as controls. This notion is very similar to the observation that aggression-prone undergraduates are characterized by increased activation in the neural circuitry of self-control. Specifically, when angered, people high in trait aggressiveness likely require increased recruitment of prefrontal control.

BOOSTING SELF-CONTROL CAPACITY REDUCES AGGRESSION FOR AGGRESSIVE PEOPLE

Baumeister and colleagues' influential strength model of self-control (Baumeister & Alquist, 2009; Baumeister et al., 2007; Muraven & Baumeister, 2000) provided the theoretical basis for experimental work on self-control and aggression (for reviews of the aggression research, see Denson et al., 2012; DeWall, Finkel, & Denson, 2011). The strength model specifies two means of augmenting self-control capacity. The first is by practicing self-control over an extended period of time. This extended practice is often referred to as self-control training (SCT). Practicing self-control in one domain (e.g., practicing better posture) for a minimum of two weeks can improve self-controlled behavior in a variety of additional domains (e.g., healthy eating, preventing smoking relapse) (Muraven, 2010; Muraven, Baumeister, & Tice, 1999; Oaten & Cheng, 2006a; 2006b; 2007).

The second method of improving self-control capacity in the strength model is by consuming glucose (Gailliot & Baumeister, 2007). Glucose improves self-controlled behavior in a variety of domains (DeWall et al., 2008; Dvorak & Simons, 2009; Gailliot et al., 2007; Masicampo & Baumeister, 2008), although the exact mechanism remains enthusiastically debated (Beedie & Lane, 2012; Hagger & Chatzisarantis, 2013; Inzlicht & Schmeichel, 2012; Kurzban, 2010; Molden et al., 2012; Niven et al., 2013; Sanders et al., 2012). Meta-analytic evidence shows that both SCT and glucose consumption exert large effects on enhancing self-control (Cohen's *d*s = 1.07 and 0.75, respectively); however, the number of studies included in the meta-analysis was relatively small (k_{SCT} = 9 and $k_{glucose}$ = 5; Hagger et al., 2010).

Self-Control Training (SCT)

There are only two studies examining the effects of SCT on aggressive urges and behavior. In one of these studies, 40 female and male undergraduates participated in a two-session study two weeks apart (Finkel et al., 2009, Study 5). At the first session, participants were depleted of self-control capacity via an attentional control task. They subsequently completed a self-report measure of the likelihood

that they would act aggressively toward their romantic partner if provoked. Participants were then randomly assigned to one of three conditions. In two of the conditions, participants practiced self-control by either using their non-dominant hand for everyday tasks (e.g., using a computer mouse) or regulating habitual speech patterns (e.g., saying "yes" instead of "yeah"). In a third control group, participants did not practice self-control. At the conclusion of the two weeks, participants returned to the laboratory, were again depleted, and completed the aggressive inclination measure. Results showed that participants in both SCT conditions reported a decrease in aggressive inclinations toward their romantic partner.

Although this study did not assess aggressive behavior per se, it does suggest that SCT may be helpful for reducing actual aggression. A recent experiment confirmed the effectiveness of SCT for lowering aggressive behavior in aggression-prone people (Denson et al., 2011). At an initial laboratory session, 70 female and male undergraduates completed a measure of trait aggressiveness (Buss & Perry, 1992). They were then either randomly assigned to the SCT condition or the control condition. As in Finkel et al. (2009, Study 5), in the SCT condition, participants used their non-dominant hand for everyday tasks for two weeks. The undergraduates in the control condition answered simple math problems during the two-week interim. In the second laboratory session, participants listened to a two-minute speech via webcam about another participant's life goals and subsequently presented a speech of their own. In reality, the speech partner was a prerecorded actor. Participants were then given the opportunity to evaluate their partner's speech. All participants were insulted by the bogus participant (i.e., "what a waste of my time listening to you"). Next, under the guise of a competitive reaction time task (cf. Bushman, 1995; Giancola & Chermack, 1998; Taylor, 1967), participants were given the opportunity to aggress by blasting the provocateur with loud bursts of white noise. The noise blast intensity and duration served as the measure of reactive aggression. Finally, participants reported how angry the provocation made them feel.

Unlike Finkel et al. (2009, Study 5), there was no main effect of SCT. However, results did show an interaction, such that SCT was most effective in reducing aggression among participants high in trait aggressiveness (Denson et al., 2011). Specifically, in the control condition, we observed the typical positive relationship between trait aggressiveness and heightened aggressive behavior. However, in the SCT condition, this relationship was reduced to zero. As is evident in Figure 11.1, participants high in trait aggressiveness who completed two weeks of SCT were no more aggressive in response to provocation than participants low in trait aggressiveness. Thus, SCT was most effective for people considered to have the strongest urge to aggress (i.e., those high in trait aggressiveness) but provided no added benefit for those considered to have minimal aggressive urges (i.e., those low in trait aggressiveness). Moreover, participants in the SCT condition reported lower anger as a result of the provocation than those in the condition that did not receive SCT. This latter effect did not interact with trait aggressiveness. In sum, this study found that boosting self-control capacity can help aggressive people control their behavior.

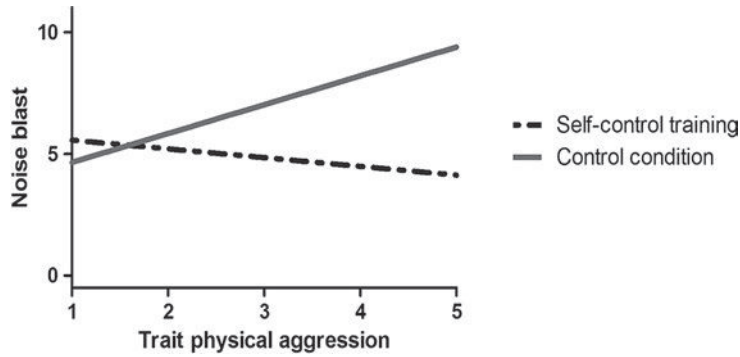

Figure 11.1 Aggressive behavior as a function of trait aggressiveness and SCT. Adapted from Denson et al. (2011).

Glucose

A series of studies investigated the notion that low levels of glucose may be responsible for heightened aggression (DeWall et al., 2011). Two correlational studies showed that diabetic symptoms and state-wide rates of diabetes were positively associated with trait aggressiveness and violent crime, respectively. Moreover, in a third study investigating a sample of 122 countries, the proportion of people who lacked an enzyme for glucose metabolism correlated with higher rates of violence. These findings link low glucose and poor glucose metabolism to heightened aggression.

A recent experiment examined the effect of consuming glucose on aggressive behavior (DeWall et al., 2011). Sixty-two male and female undergraduates consumed either lemonade sweetened with sugar or an artificially sweetened placebo beverage. Participants then played a competitive reaction time task in which they were given the opportunity to blast a fictitious opponent with loud white noise. Participants who consumed the glucose drink blasted their opponent with less intense noise than participants who consumed the placebo.

Another two experiments examined the extent to which consuming glucose might be most effective in reducing aggression for those high in trait aggressiveness (Denson et al., 2010). Presumably, people low in trait aggressiveness lack strong impulses to harm others or are effective at controlling the impulses when they occur. If so, bolstering self-control capacity should be most beneficial for those high in trait aggressiveness, but provide no added benefit for people low in trait aggressiveness.

In the first of these experiments, 80 female and male undergraduates were told that they would consume a sugar drink in a study of glucose and performance on laboratory tasks (Denson et al., 2010, Experiment 1). Participants first completed a measure of trait aggressiveness (Buss & Perry, 1992) and were depleted (or not) by having to cross out the letter *e* in a page of text with 398

instances of the letter *e*, but only under certain circumstances (e.g., when *e* appeared in a word with a vowel appearing two letters before the *e*). Next, participants consumed 40 grams of sugar in a lemon drink or a placebo containing 2 grams of sugar. The experimenter was blind to the actual drink condition. Participants were then provoked via the webcam procedure used in Denson et al. (2011; i.e., "what a waste of my time listening to you") and given the opportunity to aggress by blasting the provocateur with loud bursts of white noise.

The analyses revealed main effects of glucose and depletion. Participants who consumed the glucose drink were less aggressive than those who consumed placebo. Conversely, replicating prior work (DeWall et al., 2007; Finkel et al., 2009; Stucke & Baumeister, 2006), depleted participants were more aggressive than non-depleted participants. However, these results were qualified by a two-way interaction between glucose condition and trait aggressiveness. Specifically, as expected, there was a significant relationship between trait aggressiveness and aggressive behavior for participants in the placebo condition, but not in the glucose condition. Figure 11.2 shows these results. These data suggest that glucose was most beneficial for those who were expected to have the strongest aggressive urges: people high in trait aggressiveness. Moreover, glucose was effective for reducing aggression among those high in trait aggressiveness even when depleted. There was no added benefit for participants low in trait aggressiveness as they displayed low levels of aggression regardless of whether they consumed glucose or the placebo.

Because the depletion manipulation in the first experiment did not moderate the interaction between trait aggressiveness and glucose, the second experiment replaced the depletion manipulation with a provocation manipulation (Denson et al., 2010, Experiment 2). Participants in the provocation condition received the same insulting feedback as in the first experiment. In the no-provocation condition, participants received a neutral evaluation of their speech (i.e., "nice speech, your life goals sound pretty reasonable"). The pattern of data for the

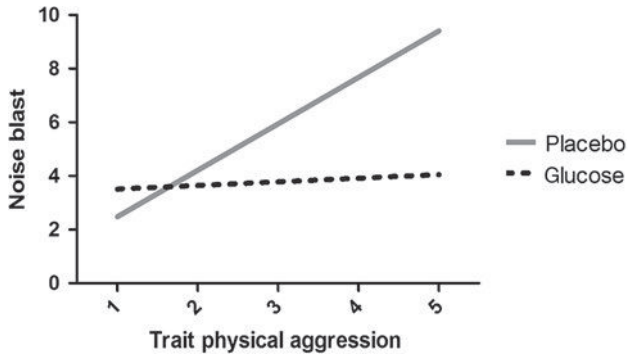

Figure 11.2 Aggressive behavior as a function of trait aggressiveness and glucose. Adapted from Denson et al. (2010, Experiment 1).

provocation condition replicated that observed in the first experiment. Specifically, trait aggressiveness predicted aggressive behavior for participants in the placebo condition, but not for those in the glucose condition (see Figure 11.3). These results show that glucose can help people high in trait aggressiveness control the urge to harm another person when provoked.

Two of the findings from the Denson et al. (2010) glucose experiments could not have been derived from the strength model of self-control (Baumeister & Alquist, 2009; Baumeister et al., 2007). The first is that among participants in the no-provocation condition, the observed pattern of data was opposite to that observed in the provocation condition (Denson et al., 2010, Experiment 2). Specifically trait aggressiveness predicted aggressive behavior for participants in the glucose condition, but not for those in the placebo condition (see Figure 11.4).

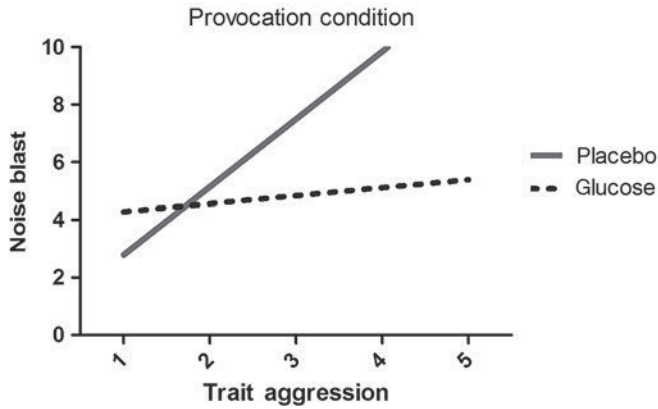

Figure 11.3 Aggressive behavior as a function of trait aggressiveness and glucose in the provocation condition. Adapted from Denson et al. (2010, Experiment 2).

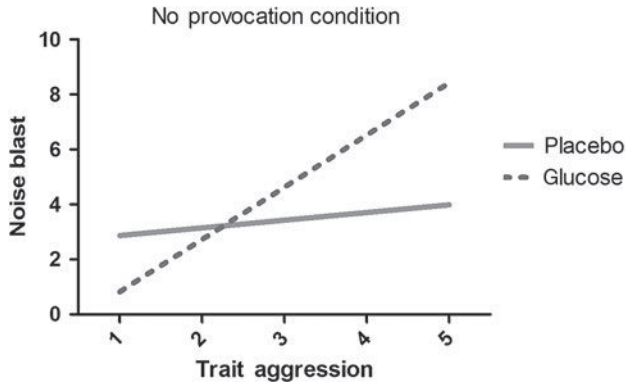

Figure 11.4 Aggressive behavior as a function of trait aggressiveness and glucose in the no-provocation condition. Adapted from Denson et al. (2010, Experiment 2).

It is possible that glucose may have motivated aggressive individuals to harm others in the absence of instigation to do so. A second aspect of the data that would not have been predicted by the strength model is that glucose did not lower anger in either experiment (and was not assessed in DeWall et al., 2011). The strength model suggests that glucose is a common energy source underlying diverse forms of self-regulation. A prediction derived from the model would be that glucose should have improved emotion regulation, which should have been observed as less self-reported anger among participants who consumed glucose than those who consumed placebo.

The inconsistencies of the results of the glucose experiments with the strength model are part of a growing discussion on the underlying mechanisms of the effects of glucose on behavior. For instance, simply rinsing the mouth with glucose is sufficient to augment self-controlled behavior (Molden et al., 2012; Niven et al., 2013). Moreover, glucose may not be depleted to a measurable extent by acts of self-control (Beedie & Lane, 2012; Kurzban, 2010) as previously thought (Gailliot et al., 2007; Gailliot & Baumeister, 2007; but see Sanders et al., 2012 for a depletion effect on blood glucose levels). More research is required to determine the roles of glucose in reducing and increasing aggressive behavior and the individual differences and situational contexts that moderate these effects.

SUMMARY AND FURTHER CONSIDERATIONS

The literature reviewed here suggests that at least some mean people may not be as mean as is often assumed. Social norms proscribing aggression and violence are widespread (Pinker, 2011). It is thus probable that aggressive people would be aware of these norms and seek to abide by them. Moreover, there is some evidence to suggest that aggressive people may often be motivated to refrain from lashing out at others. For instance, the social neuroscience evidence suggests that aggressive people are characterized by neural hyper-responsiveness in the circuitry underlying self-regulation. However, perhaps the strongest impetus for rethinking how we think about aggressive people is the fact that when their self-control capacity increases, they become much less aggressive. Although the exact mechanisms remain unclear (Inzlicht & Schmeichel, 2012), treatments designed to boost self-control capacity can help aggressive individuals control themselves (Denson et al., 2010, 2011; DeWall et al., 2011; Finkel et al., 2009). For instance, when provoked, relatively highly aggressive undergraduates who practiced self-control in a very simple way for just two weeks or consumed a glucose beverage were less aggressive than those who did not practice self-control or consumed placebo (Denson et al., 2010, 2011). As predicted by the strength model, the self-control capacity manipulations were effective for aggressive people but not for less aggressive people. In other words, we may wish to consider the serious possibility that aggressive individuals wish to behave non-aggressively and will do so with one caveat: they must have sufficient self-control capacity.

In some sense, the fact that boosting self-control capacity in aggressive individuals can lower aggression may not be surprising to many in the scientific community. For instance, if self-control is experimentally *lowered* through alcohol intoxication, not everyone behaves aggressively. Alcohol-induced aggression is primarily perpetrated by people who are predisposed to aggression in the first place (e.g., Borders & Giancola, 2011; Denson, White, & Warburton, 2009; Miller, Parrott, & Giancola, 2009). Boosting self-control among aggression-prone people is the flip side of the coin. Future research could even examine the possibility that SCT could reduce alcohol-induced aggression among those most at risk.

Based on the research reviewed here, bolstering self-control capacity might eventually be incorporated into interventions designed to reduce aggressive behavior. Some thought should be given to who might benefit most from bolstering self-control capacity. The experiments reviewed here suggest that such interventions should help reactive aggressors better control themselves in response to provocation. However, caution is warranted. When not provoked, consuming glucose augmented aggression relative to placebo among university students high in in trait reactive aggression (Denson et al., 2010, Experiment 2). Thus, depending on who receives the treatment and the social context, it is entirely possible that boosting self-control capacity might have unintended or adverse consequences.

There are instances in which self-control may be required to aggress. For instance, engaging in instrumental aggression may require exertion of self-control in order to overcome the inhibition to harm another person (Cushman et al., 2012; Grossman, 1995; Rawn & Vohs, 2011). Thus, boosting self-control may help military combat personnel or members of law enforcement fulfill their roles. However, one implication is that for people predisposed to engaging in instrumental aggression (e.g., bullies, organized criminals, psychopaths; Glenn & Raine, 2009), boosting self-control capacity could make them even more likely to do so. Similarly, boosting self-control capacity might increase the likelihood that people who become anxious and avoidant when provoked may "stick up for themselves" by engaging in reactive aggression. In sum, more research with a wide variety of aggression-prone populations is required.

CONCLUSION

This chapter began by proposing the notion that mean people may not be as mean as we often think they are. I hope that the review and interpretation of the data presented here might facilitate a reconsideration of how we think about and treat aggressive individuals. Healthy people relatively high in reactive aggressiveness have inefficient brain responses to anger provocation. Moreover, when given the ability to control themselves, they do. In conjunction with more research, reconsidering how we think about aggressive people might eventually lead to an even more peaceful planet than the one we currently live on.

NOTES

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1 There are indeed some people that engage in aggressive behavior intentionally (e.g., some psychopathic individuals), but I suggest that they are a small majority of aggressive people.

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Part III

Approach and Avoidance Processes in Social Motivation

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12

The Embodiment of Approach Motivation

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Emotion and motivation are fundamental to physical movement. This idea is not only captured in scientific research on emotion and motivation but also reflected in the English language. The word "emotion" is derived from the French word "émouvoir," which is based on the Latin word "emovere," where e-(variant of ex-) means "out" and movere means "move." The word "motivation" is also derived from "movere." Thus, the meaning of the English words, emotion and motivation, are derived from words that mean to move and movement requires the body for its enactment or expression.

Often, laypersons and scientists alike conceive of our perceptions or cognitions of psychobiologically significant stimuli as the sole cause of our motivational states. But is this accurate? Is motivation fundamentally traced back only to our perceptions or cognitions of stimuli? Tomkins (1981, p. 316) suggested otherwise:

> There are today a majority of theorists who postulate an evaluating, appraising homunculus (or at the least, an appraising process) that scrutinizes the world and declares it as an appropriate candidate for good or bad feelings. Once information has been so validated, it is ready to activate a specific affect. Such theorists, like Everyman, cannot imagine feeling without an adequate "reason," but it need not be . . . Even more problematic for such theory is infantile affect. It would imply a foetus in its passage down the birth canal collecting its

> thoughts, and upon being born emitting a birth cry after having appraised the extrauterine world as vale of tears.

In line with this view (see also, Zajonc, 1980), might our actions or behaviors influence our motivational states? Although evidence exists supporting the idea that facial expressions influence emotional experience, far less evidence has tested whether bodily movement influences motivation. In this chapter, we review a program of research that provides support for the notion that body posture influences motivation.

BRIEF REVIEW OF INFLUENCE OF FACIAL AND BODILY EXPRESSIONS ON EMOTIVE STATES

The majority of research on the role of bodily expressions influencing processes related to motivation comes from work on facial expressions and emotions. Over 100 years ago, Darwin (1872) and James (1890) posited that facial expressions are connected with emotions. Building upon these ideas, Laird (1974) proposed the facial feedback hypothesis that posited that manipulated facial expressions of emotion cause changes in emotional feelings (for a review, see Adelmann & Zajonc, 1989).

This hypothesis is typically tested by manipulating participants' facial expressions with specific muscle configuration instructions or through non-obtrusive methods. For example, participants held a pen between their teeth to facilitate smiling or held a pen with their lips to inhibit smiling (Strack, Martin, & Stepper, 1988). Once the facial expression manipulation is in place, participants are presented with stimuli and give their emotional reactions to them. Experiments have revealed that when smiling is facilitated as compared to inhibited, participants respond more positively to cartoons (Strack et al., 1988). Other methods have revealed conceptually consistent results. For instance, when the responsiveness of facial muscles has been reduced by administration of botulinum toxin-A (BTX), individuals are slower at reading of emotional passages (Havas et al., 2010).

One mechanism by which facial expressions influence emotional feelings is that the movement of facial muscles influences other physiological processes (Zajonc, Murphy, & Inglehart, 1989). Zajonc et al. (1989) posited that the furrowing of the brow (downward movement of the corrugator supercilii muscle) that often occurs during expressions of negative emotions might reduce air-intake into the nasal cavity, cause more mouth- as compared to nose-breathing, and raise the temperature of blood entering the brain. This rise in facial temperature would cause the experience of negative affect. In contrast, activation of the muscles involved in smiling (contraction of the zygomatic major muscle) should open the nasal cavity, improve nose breathing, and reduce the temperature of blood entering the brain. This reduction in facial temperature due to smiling would cause the experience of positive affect. These predictions were based on the idea that thermoregulation of brain areas such as the hypothalamus could influence hedonic states and associated neurotransmitter (e.g., norepinephrine) activity.

Zajonc and colleagues (1989) tested these ideas by having participants recite sounds that caused greater or lesser brow furrowing. They found that greater brow furrowing caused higher facial temperatures and more negative evaluations of information. Subsequent research directly manipulated hypothalamic cooling vs. heating in rats, and found that cooling caused more eating but not more hedonic reactions to taste (Berridge & Zajonc, 1991). These results suggest that facial expressions influence thermoregulation of the hypothalamus which, subsequently, influences an organism's emotional state (see also McIntosh et al., 1997).

Other mechanisms for the facial feedback responses have been suggested. These mechanisms may be in addition to rather than instead of the ones proposed above. In other words, facial feedback responses are likely caused by multiple mechanisms. Facial expressions of emotion cause innate, parallel changes in autonomic nervous system activity (Ekman, Levenson, & Friesen, 1983). Levenson, Ekman, and Friesen (1990) instructed participants to move individual facial muscles to form facial expressions of discrete emotions such as anger and fear. Once the facial expressions were fully created, participants' heart rate, skin conductance, finger temperature, and forearm muscle tension were recorded. Levenson et al. (1990) found that facial expressions of discrete emotions caused discrete patterns of autonomic nervous system activity. For example, facial expressions of anger, sadness, or fear caused greater heart rate acceleration than expressions of disgust. Facial expressions of anger caused higher finger temperature than expressions of fear. Subsequent studies replicated these original results, which were obtained with American samples, with men of the Minangkabau from West Sumatra (Levenson et al., 1992).

Taken together, these results suggest that facial expressions have direct effects on thermoregulation of certain brain structures and autonomic nervous system activity. But how does the brain/body transform these signals into subjective emotional states? Some researchers have proposed that projections from the brainstem, which carries sympathetic and parasympathetic bodily signals, to nuclei within the anterior insular cortex and the anterior cingulate cortex are involved in this process (for a review, see Craig, 2002, 2009). Another critical region in these processes is the somatosensory cortex (Damasio, 1994).

Although the majority of research has focused on manipulations of facial expressions of emotions, other bodily manipulations have been used in a few studies. Some studies found that when individuals nod their heads up and down, as compared to shake their heads from side to side, they have more positive attitudes toward neutral stimuli (Tom et al., 1991) and agree more with persuasive messages (Wells & Petty, 1980).

Other research has found that flexing the arm, a movement associated with acquiring desired stimuli, causes individuals to form more positive attitudes toward neutral stimuli. In contrast, extending the arm, a movement associated with avoiding undesirable stimuli, causes individuals to form more negative attitudes toward neutral stimuli (Cacioppo, Priester, & Berntson, 1993). Subsequent research has identified some moderators of these effects (Centerbar & Clore, 2006; Eder & Rothermund, 2008).

BRIEF REVIEW OF ASYMMETRIC FRONTAL CORTICAL ACTIVITY AND EMOTIVE STATES

One neural variable that has received considerable attention is asymmetric frontal cortical activity. Observational studies dating back to the 1930s suggested that damage to the left versus right frontal cortex yielded different emotive consequences. That is, damage to the right frontal region is associated with the onset of mania symptoms (Starkstein, Boston, & Robinson, 1988). In contrast, damage to the left frontal region is associated with depression symptoms (Robinson et al., 1988). One interpretation of these results is that lesions to the left frontal region reduce the organism's capability to experience and express positive affect and/or approach motivation. The converse would be the case for the right frontal region. Another interpretation is that with the left frontal region's functioning reduced, the right frontal region's functioning is over-expressed and thus more negative affect (e.g., depression) is presented, and vice versa. This latter interpretation assumes there is a reciprocal connection between activities in the left versus right frontal cortical regions, such that when one hemisphere is taken off-line, the other becomes over-active (for a review, see Schutter & Harmon-Jones, 2013).

The emotive functions of asymmetric frontal cortical activity have been tested with several neuroscience techniques, including functional magnetic resonance imaging (Berkman & Lieberman, 2010), event-related brain potentials (Cunningham et al., 2005; Peterson, Gable, & Harmon-Jones, 2008), repetitive transcranial magnetic stimulation (van Honk & Schutter, 2006), transcranial direct current stimulation (Hortensius, Schutter, & Harmon-Jones, 2012; Kelley, Hortensius, & Harmon-Jones, 2013), and electroencephalographic (EEG) recordings (Harmon-Jones, 2003; Harmon-Jones, Gable, & Peterson, 2010).

Relative right frontal activity has been associated with withdrawal-oriented emotions, such as fear and disgust (Davidson et al., 1990; Jones & Fox, 1992), and relative left frontal activity has been associated with approach-oriented emotions, such as joy (Davidson & Fox, 1982) and anger (Harmon-Jones, 2004; Harmon-Jones & Allen 1998; Harmon-Jones & Sigelman, 2001; Harmon-Jones et al., 2004; Verona, Sadeh, & Curtin, 2009). Research has also been conducted with bodily manipulations to further test the emotive functions of asymmetric frontal cortical activity.

THE INFLUENCE OF FACIAL EXPRESSIONS AND UNILATERAL BODY MOVEMENTS ON ASYMMETRIC FRONTAL CORTICAL ACTIVITY AND APPROACH MOTIVATION

Facial Expressions

In one experiment testing whether manipulated facial expressions of emotion would influence asymmetric frontal cortical activity, Ekman and Davidson (1993)

instructed participants to form one of two smiles while EEG was recorded. Some participants were instructed to contract their zygomatic major (cheek) and orbicularis oculi (underneath the eye) muscles. This was done to create genuine smiles that involve Duchenne's marker, activation of the orbicularis oculi muscles. Other participants were instructed to contract their zygomatic muscles only to form less genuine smiles. Ekman and Davidson (1993) found that participants who formed Duchenne's smiles had greater relative left frontal cortical activity than participants who formed smiles without this marker.

Another experiment tested the effect of manipulated facial expressions of the discrete emotions of anger, joy, fear, sadness, and disgust on asymmetric frontal cortical activity. Consistent with the idea that asymmetric frontal cortical activity is associated with the motivational direction (approach vs. avoidance) of emotion, facial expressions of joy and anger, approach-oriented emotions, increased relative left frontal cortical activity, whereas facial expressions indicative of fear and disgust, withdrawal-oriented emotions, reduced relative left frontal activity (Coan, Allen, & Harmon-Jones, 2001).

Price, Hortensius, and Harmon-Jones (2013) extended this work by testing how facial expressions of positive emotions that differ in approach motivational intensity influence relative left frontal cortical activity. Positive emotions vary in approach motivational intensity (Gable & Harmon-Jones, 2008). If relative left frontal cortical activity is indeed associated with approach motivational intensity, then positive emotions higher in approach motivational intensity should evoke greater relative left frontal activity than positive emotions lower in approach motivational intensity. Based on research demonstrating that determination is an emotion that is positive in valence and high in approach motivation (C. Harmon-Jones et al., 2011) and other evidence that satisfaction is an emotion that is positive in valence and lower in approach motivation, participants were instructed to make facial expressions of determination, satisfaction, or neutrality. That is, they were simply requested to make their face appear as though they were feeling determined, satisfied, or neutral. This was done because the specific muscles involved in these expressions have yet to be quantified. In addition, this was done because determination facial expressions and angry facial expressions are perceptually confused (C. Harmon-Jones et al., 2011). Thus providing muscle-by-muscle instructions for facially expressing determination may instead cause one to feel angry. Results from the experiment revealed that when individuals expressed determination, their relative left frontal activity increased as compared to baseline. In contrast, when individuals expressed satisfaction or neutral affect, their relative left frontal activity did not increase as compared to baseline. In addition, within the determination facial expression condition, relative left frontal cortical activity was correlated with more task persistence on an impossible task, suggesting that determination-related left frontal cortical activity was associated with more behavioral persistence.

In sum, studies suggest that approach-related facial expressions cause greater relative left frontal activity. It is important to note that these effects occurred in relatively neutral situations, in the absence of external cues impelling approach

motivation. As such, they suggest that bodily expressions per se can serve as stimuli that cause neural activations associated with approach motivation. But do other body movements also influence indices of approach motivation?

Unilateral Body Movements

Based on research suggesting close connections between the motor cortex and frontal cortex (Harmon-Jones, 2006; Schiff & Lamon, 1989, 1994), research has tested whether moving one side of the body—a unilateral body movement—would activate the contralateral motor cortex and frontal cortex. That is, because many motor actions–brain hemisphere pathways are crossed (Rinn, 1984), unilaterally moving the right side of the body should cause an increase in left hemispheric motor cortex activation, whereas moving the left side of the body should cause an increase in right hemispheric motor cortex activation. These increases in contralateral motor cortex activation may, through spreading of activation, increase activity in frontal areas. Indeed, EEG research has supported these ideas (Peterson, Shackman, & Harmon-Jones, 2008).

Beyond these neural effects, we have tested whether unilateral body movements influence emotive states. That is, right-sided body movements should increase activity in the left motor cortex and left frontal cortex, which would then prime one to respond in a more approach-motivated manner. In one experiment (Harmon-Jones, 2006), right-handed participants squeezed a ball with either their right or left hand for two 45 second periods while they listened to a mildly positive, approach-oriented pilot radio broadcast that concerned apartment living options. As expected, right-hand contractions compared to left-hand contractions caused greater relative left frontal activation (and activation over the left motor cortex). Moreover, right-hand contractions caused greater self-reported approach affect as measured by scores on the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988).

Peterson, Shackman, and Harmon-Jones (2008) extended this work to test whether unilateral hand contractions would influence behavioral responses associated with approach motivation. In this experiment, right-handed participants first wrote an essay on a controversial topic. Then, they received insulting feedback on their essays from another ostensible participant. Immediately prior to receiving the feedback, participants squeezed a ball with either their right or left hand in order to increase relative left or right frontal cortical activity, respectively. Participants were then told they would play a reaction time game against the other participant who had given them insulting feedback. In this modified version of Taylor's (1966) aggression game, participants could aggress against the other player with blasts of noise. Results revealed that, compared to participants who made left-hand contractions, participants who made right-hand contractions gave longer and louder noise blasts during the reaction time game. Moreover, within the right-hand contraction condition, greater relative left frontal cortical activity correlated with more aggressive behavioral responses.

The results from these experiments reveal that unilateral movements of the body influence asymmetric frontal brain activity as well as approach-related affective experiences and behavior. These findings suggest one neural mechanism by which unilateral body movements might influence motivational processes.

THE INFLUENCE OF WHOLE BODY POSTURE MANIPULATIONS ON PHYSIOLOGICAL INDICES OF APPROACH MOTIVATION

One area that has received only a little research attention is the role of whole body postures on psychological processes. This is surprising, given that whole body displays often communicate psychological states to others (e.g., Mehrabian, 1969). We believe that others are interested in hearing our stories when they lean toward us. We suspect that someone is depressed when she is slumped down, and we surmise that she is particularly at ease with life when she is reclined backward. However, to our knowledge, relatively little research has tested whether whole body postures such as these influence psychological processes such as approach motivational states. In one set of two experiments, Riskind and Gotay (1982) assigned participants, under the guise of a biofeedback study, to adopt a slumped/helpless posture or an upright/expansive posture. Then, participants completed insolvable puzzle tasks as a measure of task persistence. Participants who were assigned to adopt the slumped posture persisted less on the insolvable tasks as compared to participants who were assigned to adopt the upright posture.

Based on these results and our intuitions about body postures and approach motivation, we have conducted experiments to test whether another whole body posture would influence approach motivation. In particular, we reasoned that a supine or reclining posture, compared to an upright posture, would reduce approach motivation, as supine, reclining postures are often associated with relaxation and goal accomplishment. That is, reclining backward often occurs following the acquisition of a desired goal, such as after eating a delicious meal.

Influence of Whole Body Posture on Asymmetric Frontal Activity to Emotive Stimuli

In our first test of this idea, we predicted that a reclining posture would reduce relative left frontal cortical activation associated with approach-motivated anger (Harmon-Jones & Peterson, 2009). In the experiment, participants wrote an essay on a controversial topic and were led to believe that another ostensible participant would evaluate it. Immediately prior to receiving feedback on their essay, participants were instructed to remain upright in their chair or to be in the reclined position. All participants in the reclining condition and half the participants in the upright condition received insulting feedback; the other half of the participants in the upright condition received neutral feedback. Results

revealed participants in the insult-upright condition had greater relative left frontal cortical activity compared to participants in the neutral-upright condition, replicating the results of past experiments (e.g., Harmon-Jones & Sigelman, 2001). More importantly, participants in the insult-reclined condition had less relative left frontal cortical activity than participants in the insult-upright condition. These results suggest that being in a supine body position reduces brain activity associated with approach-motivated anger. Interestingly, these results were predicted in a statement made over 1400 years ago by the Prophet Mohammad: "When one of you becomes angry while standing, he should sit down. If the anger leaves him, well and good; otherwise he should lie down" (Abu Daud; Book 41, No. 4764).

Price and Harmon-Jones (2010) extended this experiment with multiple postures. As in the previous experiment, reclining backward was hypothesized to be associated with lower approach motivation. A new condition, leaning forward, was added to evoke higher approach motivation. Leaning was used because it often occurs during goal acquisition, such as leaning towards a delicious meal. A third body posture was included—sitting upright—and it was hypothesized to be associated with a level of approach motivation between reclining backward and leaning forward. In this experiment, participants were in one of these three postures while EEG was recorded for one minute. Results revealed that reclining backward caused participants to have less relative left frontal cortical activity as compared to leaning forward. Moreover, sitting upright caused a level of relative left frontal activity that was between these two conditions, as predicted.

To test whether this whole body posture manipulation would influence responses to desirable, appetitive stimuli, we next conducted an experiment in which participants leaned forward or reclined backward while viewing appetitive dessert and neutral rock pictures (Harmon-Jones, Gable, & Price, 2011a). As expected, when participants were leaning forward, they had greater relative left frontal activity to desirable dessert as compared to neutral rock pictures. In contrast, when they were reclining, they had similar levels of relative left frontal activity to dessert and rock pictures. These results reveal that the whole body posture of reclining versus leaning forward posture influenced relative left frontal cortical activity to appetitive pictures, but not neutral pictures.

This latter result—that the posture manipulation did not influence responses to neutral pictures—could be viewed as inconsistent with the earlier finding that this posture manipulation influences relative left frontal cortical activity during a resting, baseline state or "neutral" state (Price & Harmon-Jones, 2010). We suspect that when one is in a resting, baseline state with no other explicit stimuli to process, such as neutral pictures, the whole body posture itself might have a stronger influence on asymmetric frontal cortical activity. However, when a stimulus is presented, even a neutral one, the stimulus might overwhelm the effect of the body posture. In other words, the effects of body posture observed in a resting, baseline state might be somewhat subtle.

The results from the experiments reviewed in this section have revealed that the embodiment of approach motivation through a whole body manipulation

influences relative left frontal cortical activity. In addition to examining this neural correlate of approach motivation, we have examined how this body posture influences other indices related to approach motivation.

Influence of Whole Body Posture on Late Positive Potentials to Emotional Stimuli

One neural variable that has been extensively examined and related to motivational intensity is the late positive potential (LPP). It is an event-related brain potential (ERP) that starts approximately 300 ms after stimulus onset and lasts for several 100 ms (for a review, see Hajcak et al., 2011). LPPs are larger to erotic images than to positive pictures that are less associated with basic motivational impulses, such as exciting sports scenes (Briggs & Martin, 2009). LPPs are also larger when mothers view pictures of their own children's faces compared to pictures of familiar children, unfamiliar children, familiar adults, and unfamiliar adults (Grasso et al., 2009). These results support the idea that LPP amplitude is associated with approach motivational intensity.

LPP amplitude, however, is not specific to approach motivational intensity, as LPPs are also larger in amplitude to negative affective pictures, such as pictures of mutilation and threat. Moreover, LPPs are larger to these pictures than to pictures of contamination and loss, consistent with the idea that the motivational intensity of the stimulus, regardless of the motivational direction it evokes, determines the amplitude of the LPP (Schupp et al., 2004). The amplitude of the LPP is likely driven by several neural generators, such as the occipitotemporal and parietal cortex, as has been revealed in functional magnetic resonance imaging (fMRI) and EEG studies (Keil et al., 2002; Sabatinelli et al., 2007).

Recently, we tested whether our whole body approach motivation posture would influence this reliable neural measure of motivated attention to emotional stimuli (Price, Dieckman, & Harmon-Jones, 2012). In the experiment, participants viewed appetitive positive (erotic images) and neutral pictures (images of persons) while leaning and reclining in a counterbalanced within-subjects design. Results revealed that compared to reclining backward, leaning forward caused participants to have larger amplitude LPPs to the appetitive pictures. In contrast, posture did not influence LPP amplitudes to neutral stimuli.

Influence of Whole Body Posture on Startle Responses to Emotional Stimuli

Another variable that has been found to relate to approach motivation is the startle eyeblink reflex. It is reliably modulated by the emotive significance of stimuli (Bradley et al., 2001; Lang, Bradley, & Cuthbert, 1990; Vrana, Spence, & Lang, 1988). The startle eyeblink reflex is part of the full startle response that occurs in response to unexpected, aversive events that are presented suddenly to an individual. It is easily evoked in the lab by presenting individuals with loud (100 db) bursts of white noise with instantaneous rise time (Blumenthal et al.,

2005). The startle eyeblink reflex causes the orbicularis oculi muscle around the eye to contract, and it serves the vital function of protecting the eye from harm.

When startle probes are presented during the midst of the viewing of affective pictures, the magnitude of the startle eyeblink is influenced by whether the picture evokes an appetitive or avoidance motivational state. Startle eyeblink responses are potentiated while viewing pictures that evoke avoidance motivation and they are attenuated while viewing pictures that evoke appetitive motivation. These effects are explained by the response-matching hypothesis, which posits that the magnitude of the defensive startle eyeblink is determined by whether the other stimulus (e.g., affective picture) evokes a motivational state that matches or mismatches the aversive motivational state evoked by the startling stimulus. If the motivational state evoked by the other stimulus (e.g., aversive picture) matches the motivational state of the startle, then the startle response is increased. If the motivational state evoked by the other stimulus (e.g., appetitive stimulus) mismatches the motivational state of the startle, then the startle response is decreased. Thus, smaller startle responses indicate more appetitive responses to the stimuli. This motivational modulation of the startle response is driven by nuclei within the amygdala, as revealed in basic animal neuroscience research (Davis, 2006).

Consistent with the idea that decreased startle responses while viewing appetitive stimuli reflects approach motivation, individuals high in trait behavioral approach system sensitivity show smaller startle responses while viewing arousing positive pictures (Hawk & Kowmas, 2003). Other research has revealed that individuals who score high in trait approach emotions (e.g., anger, enjoyment, surprise) show smaller startle responses while viewing arousing positive pictures (Amodio & Harmon-Jones, 2011). Also, startle responses while viewing positive approach-motivated pictures (e.g., erotic images) are smaller than startle responses while viewing positive pictures lower in basic motivational impulses (e.g., sports scenes; Gard et al., 2007).

Returning to our discussion of the effect of body posture on approach motivation, Price et al. (2012) tested whether postures that vary in approach motivation would causally influence startle responses while viewing arousing positive (appetitive) stimuli. In this experiment, participants were assigned to lean forward or recline while they viewed erotic and neutral pictures (both sets consisted of pictures of people; see Maner & Leo, this volume, for evidence linking erotic stimuli with appetitive responses). As is done in startle eyeblink research, startle probes were presented during the viewing of two-thirds of the pictures. Replicating past research, startle eyeblink responses were smaller during the viewing of arousing positive pictures than during the viewing of neutral pictures. In a novel and embodied extension of past research, leaning forward caused even smaller startle responses during arousing positive pictures (compared to reclining). The body posture manipulation did not influence startle responses during neutral pictures. This experiment suggests that leaning forward promotes heightened approach motivational responses at the reflexive level, which are mediated by activations within cells within the sub-cortical amygdala.

THE INFLUENCE OF WHOLE BODY POSTURE MANIPULATIONS ON APPROACH EMOTIVE-COGNITIVE PROCESSES

Breadth of Cognitive Scope

Research conducted in the 1980s and 1990s suggested that positive affect impacts cognitive processes related to broadening or cognitive scope differently than negative affect does (see also Forgas, this volume). One particular cognitive process that had been examined within this line of research was how positive vs. negative affect influenced how individuals categorize related information. That is, positive compared to negative affect broadened basic cognitive categorization, such that individuals in whom positive affect had been induced were more likely to conceptualize categories more widely, so that they were more likely to say, for example, that "camel" fit the category "vehicle" reasonably well (Isen & Daubman, 1984). This research manipulated positive affect by giving participants a gift or having them watch an amusing film (Isen & Daubman, 1984). This manipulation, however, probably induced low-approach positive affect. That is, when one receives a gift or watches an amusing film, one is not motivated to go toward anything; instead, one passively enjoys the gift or the viewing.

Another line of research has revealed that the distinction of low to high approach motivation within positive affect is critical to understanding whether positive affect broadens or narrows cognitive scope. High-approach, pre-goal positive emotions would be expected to narrow attention, as the organism focuses in on the stimulus in order to acquire it. Over 15 published experiments have revealed that whereas positive affect low in approach motivational intensity broadens cognitive scope, positive affect high in approach motivational intensity narrows cognitive scope (for review, see Harmon-Jones, Gable, & Price, 2011a, 2011b, 2013).

We extended this line of research to test whether a body posture associated with low to high approach-motivated positive affect would influence cognitive scope. In this experiment, high approach positive affect was induced by having participants lean forward in a chair and smile. Low approach positive affect was induced by having participants recline backwards in the chair while smiling. Moderate approach positive affect was induced by having participants sit upright and smile. The smile was induced unobtrusively by having participants raise sensors placed on their cheeks up toward their ears, so that the "research could investigate how facial muscle movements influenced EEG activity." While in each posture, participants completed the cognitive categorization used by Isen and Daubman (1984). In this task, participants were presented with common (e.g., car) and uncommon (e.g., camel) examples of a category (e.g., vehicle). Participants rated how much they believed each example belonged to the category. As predicted, breadth of categorization showed a linear trend, with participants in the high approach positive affect condition rating uncommon examples as least fitting of the category (narrowed categorization), followed by the moderate approach positive affect condition and then the low approach positive affect condition.

Cognitive Dissonance Reduction

Accumulating evidence demonstrates that cognitive dissonance reduction is associated with approach motivation, particularly when a commitment to action is involved. In support, experiments have revealed that following difficult decisions, individuals who are primed to be high in approach motivation are more likely to spread the alternatives (i.e., evaluate the chosen alternative more favorably and the rejected alternative less favorably; Harmon-Jones & Harmon-Jones, 2002; Harmon-Jones et al., 2008). Correlational studies have revealed that individuals high in trait approach motivation show more dissonance reduction following commitments to difficult decisions and counterattitudinal behaviors (C. Harmon-Jones et al., 2011). In addition, other experiments have revealed that immediately after individuals commit to a chosen course of behaviour, they show increased relative left frontal cortical activity, a neural variable associated with approach motivation (Harmon-Jones et al., 2008; Harmon-Jones, Gerdjikov, & Harmon-Jones, 2008; Harmon-Jones et al. 2011). See Kitayama, Tompson, and Chua (this volume) for a review of other neural activations involved in dissonance.

These results were predicted by the action-based model of cognitive dissonance (Harmon-Jones, 1999; Harmon-Jones, Amodio, & Harmon-Jones, 2009). According to this conceptual model, once individuals are committed to a course of action, they should be more approach motivated to follow through with their chosen course of action. That is, they should be more motivated to translate their intended behavior into effective action, and this approach motivation should be revealed in changes in attitudes that are supportive of the commitment. For example, individuals who have agreed to eat meat (compared to those who agree to eat fruit), reduce dissonance by denying that animals have minds, after being reminded that animals suffer during butchering (Bastian et al., 2012). This denial reduces negative affect, and presumably would aid in enjoyment of consuming the meat.

We recently extended this line of research by examining whether our body posture manipulation of approach motivation would influence dissonance reduction. According to the predictions derived from the action-based model, body postures associated with lesser approach motivation should undermine the approach motivation that typically occurs to reduce dissonance. A supine body posture should decrease dissonance reduction. This prediction was tested in two experiments, one using the difficult-decision paradigm and one using the effort justification paradigm. In the difficult-decision experiment, participants who sat upright showed the typical spreading of alternatives effect, but this effect was eliminated when participants were in a supine body posture. In the effort justification experiment, participants who sat upright and performed a difficult cognitive task evaluated the task incentive more positively than participants who sat upright and performed an easy cognitive task. This replicates the typical effort justification effect. In contrast, participants in a supine body posture did not show this effort justification effect (Harmon-Jones, Price, & Harmon-Jones, 2013).

Cognitive dissonance reduction may be conceptualized as self-control, which often involves suppressing one action tendency in favor of another (Carver,

this volume; Denson, this volume; Inzlicht & Legault, this volume). That is, as an individual increases the attractiveness of a chosen decision alternative and decreases the attractiveness of a rejected alternative, s/he may be exercising self-control (though it may not always be in a socially desirable way). Consequently, future research should test whether the above whole body posture manipulation influences self-control processes as measured in other ways. Based on the dissonance research, we would suspect that a reclining posture may reduce self-control relative to an upright or leaning forward posture.

QUESTIONS, IMPLICATIONS, AND CONCLUSIONS

Over 20 years ago, Adelmann and Zajonc (1989) asked "What is bodily feedback?" They found that facial expressions influence facial temperature and theorized that this change in facial temperature influenced hypothalamic activity involved in emotional experience. Adelman and Zajonc (1989) recognized that this change was unlikely to be the sole physiological mechanism responsible for facial-feedback effects. The evidence reviewed suggests that bodily movements such as facial expressions (Coan et al., 2001; Ekman & Davidson, 1993), hand movements (Harmon-Jones, 2006; Peterson, Shackman, & Harmon-Jones, 2008), and changes in physical posture (Harmon-Jones & Peterson, 2009; Harmon-Jones et al., 2011; Price & Harmon-Jones, 2010) associated with approach motivation influence relative left frontal cortical activity. Moreover, manipulated body posture also influences sub-cortically driven emotive processes and event-related brain potentials related to motivated attention (Price et al., 2012). Thus, body manipulations along a continuum of approach motivation influence multiple emotion-related physiological processes.

One may question whether this body manipulation continuum that goes from being supine to upright to leaning forward influences avoidance motivation. We have conducted one preliminary test of this idea and found that this body posture manipulation did not influence startle eyeblink and event-related potential reactions to arousing negative pictures.

Another question that has arisen is whether this "approach" motivation body posture is manipulating arousal rather than approach motivation. That is, perhaps the reclining posture is simply reducing general arousal. The available evidence suggests that approach motivation provides a better explanation than "general arousal" for the observed effects. First, the preliminary experiment mentioned above found no evidence that this body posture influences reactions to avoidance-related stimuli. If arousal was the best explanation, then this body posture should have influenced reactions to these stimuli. Second, reclining has not been found to reduce startle responses during neutral stimuli. If reclining were simply reducing general arousal, then it should reduce startle responses during even neutral stimuli, because the startle is an aversive response.

One methodological implication results from this body of work. Functional magnetic resonance imaging (fMRI) studies require individuals to be in a supine body posture. This posture may reduce appetitive motivational responses, and

may explain why some fMRI studies have not found a connection between approach motivation and relative left frontal activity (Tomarken & Zald, 2009) even though studies using other methodologies, which used an upright body posture, have found an association between approach motivation and relative left frontal activity (Carver & Harmon-Jones, 2009; van Honk & Shutter, 2006). Thus, the supine posture required by most fMRI scanners may reduce, but not necessarily eliminate, neural activity associated with approach motivation.

This chapter reviewed evidence suggesting that body postures and movements influence approach motivational responses. These studies serve as a reminder that cognition and emotion are for action, lending support to the idea that the cognitions and responses experienced by humans relate to the action-readiness of the body in that moment. Specifically, assuming a forward-leaning posture potentiates approach responses whereas assuming a reclining posture reduces approach responses. We should consider the conceptual consequences of this research as we develop more embodied motivational theories.

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13

Avoidance Motivation is Resource Depleting

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A fundamental distinction in scientific analyses of behavior is that between approach motivation and avoidance motivation (see also Higgins, this volume). Approach motivation represents energization by and/or physical or psychological direction toward an incentive or reward (i.e., an appetitive object, event, possibility), whereas avoidance motivation represents energization by and/or physical or psychological direction away from a threat or punishment (i.e., an aversive object, event, possibility; Elliot, 2008a). This distinction between approach and avoidance motivation has been present in scholarly thought for millennia (since Democritus, 460–370 B.C.E.) and in scientific psychology since the advent of the discipline in both Europe (Wundt, 1887) and the United States (James, 1890). It is popular in the contemporary psychological literature, as illustrated by the recent publication of edited books and journal special issues (Eder, Elliot, & Harmon-Jones, 2013; Elliot, 2008b; Ryan, 2006). It is being applied to many different types of psychological constructs and phenomena, and it is being operationalized in myriad ways in diverse areas of inquiry. In short, the approach-avoidance motivational distinction is long-lasting and generative.

A considerable amount of research has been conducted in the past two decades on the implications of approach and avoidance motivation, especially in achievement and social contexts and in the context of pursuing personal goals

for daily life. Much of this literature has focused specifically on avoidance motivation, as manipulated by environmental cues and as assessed via self-reported goal commitments. Some existing research suggests that avoidance motivation is beneficial for some types of tasks (e.g., those requiring low-level persistence, vigilant attention to detail, and minimal mental manipulation; De Dreu, Baas, & Nijstad, 2008; Elliot & Aarts, 2011; Friedman & Förster, 2002; Koch, Holland, & Van Knippenberg, 2008; Roskes, De Dreu, & Nijstad, 2012), for certain types of life situations (e.g., when one seeks to quit smoking; Suls & Fletcher, 1985; Worth et al., 2005), and in the short run (Freund, 2006; Heckman et al., 2004). However, the majority of the extant research has focused on the downside of avoidance motivation, showing that it often has negative consequences for performance and well-being outcomes, particularly for tasks requiring flexible cognition and mental manipulation (Elliot & Church, 1997; Friedman & Förster, 2005; Hembree, 1988; Maier, Elliot, & Lichtenfeld, 2008; Mehta & Zhu, 2009), and especially in the long run (Gable, 2006; Roskes et al., 2012; Tamir & Deiner, 2008; Van Dijk, Seger, & Heller, in press).

In the present article, we consider why avoidance motivation often has inimical consequences, focusing on the affective, cognitive, and behavioral processes commonly evoked by such motivation. The central emphasis of the present chapter is on the link between avoidance motivation and the depletion of the self's executive resources. We will lay out the reasons to expect a link between these two concepts, and then overview some recent research that indirectly and directly supports this relation.

AVOIDANCE MOTIVATIONAL PROCESSES

As noted above, avoidance motivation represents energization and/or direction with regard to a threat or punishment. Accordingly, in avoidance motivation, an aversive object, event, or possibility serves as the centerpiece or hub of self-regulation. This structural aspect of avoidance motivation has a number of important implications.

First, the inherent focus on an aversive object, event, or possibility in avoidance regulation evokes a host of problematic psychological processes. These processes include: *affective* processes such as anticipatory worry (Elliot & McGregor, 1999; Eysenck et al., 2007; Gable, Reis, & Elliot, 2000); *perceptual-cognitive* processes such as heightened vigilance for and adherence to negative information (Derryberry & Reed, 2008; Elliot & Reis, 2003; Urdan & Midgley, 2001); and *behavioral* processes such as overstriving to ensure that negative outcomes are avoided (Elliot & Church, 2003; Murray et al., 2008; Righetti, Finkenauer, & Rusbult, 2011). Second, the aforementioned processes are often experienced as particularly urgent and all-consuming, given that, perceptually, "bad is stronger than good" (Baumeister et al., 2001).

Third, evading an aversive object, event, or possibility is not something that individuals typically feel intrinsically drawn to or excited about, but instead is something that one feels externally forced or internally pressured to do. As

such, avoidance regulation is commonly experienced as a requirement or obligation—something one *must* do, rather than something one *gets to* do (Carver, Sutton, & Scheier, 2000; Elliot & Sheldon, 1998; Ryan & Deci, 2006). Fourth, avoidance motivation provides the person with something to move or stay away from, but it does not provide the person with something to move toward. Thus, avoidance motivation does not provide specific guidance in a concrete direction that can both help one make progress and yield a clear and satisfying sense of progress (Carver & Scheier, 1998; Elliot, Sheldon, & Church, 1997; see also Carver, Johnson, & Joormann, this volume). Fifth, the structure of avoidance motivation only allows one to at best avoid the absence of an aversive outcome, it does not allow one to accomplish the presence of a desired outcome. Accordingly, the most gratifying experience that one can have upon successfully enacting avoidance motivation is the feeling of relief, rather than the joy and excitement of successfully enacting approach motivation (Baas, De Dreu, & Nijstad, 2011; Carver, 2006; Higgins, Shah, & Friedman, 1997; see also Higgins, this volume). Poignantly stated, avoidance motivation merely allows one to survive, as it does not yield the type of positive psychological experiences needed to truly thrive and develop to one's full capacity (Elliot, 2006; McFarland & Miller, 1994). In sum, the very nature of avoidance motivation would appear to place inherent limits on its effectiveness and would seem likely to exact a heavy toll on the motivated individual. Before elaborating on this point, we provide a brief overview of the notion of executive resources and their depletion.

EXECUTIVE RESOURCES AND THEIR DEPLETION

The self has several functions, one of which is the executive function. The executive function of the self is the active agent that "makes decisions, initiates actions, and in other ways exerts control over both self and environment" (Baumeister, 1998, p. 712). It is the aspect of the self that engages in the self-regulation of behavior. Several models of self-regulation contend that the executive function relies on a common, limited, depletable pool of cognitive and volitional resources (Baumeister et al., 1998; Cavallo et al., 2012; Hirst & Kalmar, 1987; Inzlicht, McKay, & Aronson, 2006; Muraven & Baumeister, 2000; Schmader & Johns, 2003; Schmeichel, 2007; Vohs & Heatherton, 2000). Engaging in an act of self-regulation is posited to require cognitive capacity and volitional energy, and this capacity/energy expenditure temporarily diminishes the amount of capacity/energy available for subsequent acts of regulation. Accordingly, a self-regulatory act that consumes capacity/energy from the limited available pool is posited to place the individual in a state of resource depletion (i.e., "ego depletion"; Baumeister et al., 1998, p. 1252).

A rapidly expanding body of empirical work supports this resource depletion model of the executive function of the self (for reviews, see Baumeister, Vohs, & Tice, 2007; Hagger et al., 2010; Inzlicht & Schmeichel, 2012; see also Schmeichel & Tang, this volume; Inzlicht & Legault, this volume). The paradigm used in a large portion of this research, the "two-task" paradigm, is as

follows: Participants engage in one act of self-regulation, such as managing their impulses or controlling their thoughts, and then engage in a second self-regulation task, such as solving challenging intellectual problems or persisting at a hand-grip activity. The common finding in this work is that performance on the second task is impaired, which is consistent with the notion that performance on the initial task depleted resources from a common pool that were no longer available when the second task was performed (Baumeister et al., 1998; Fischer, Greitemeyer, & Frey, 2008; Freeman & Muraven, 2010; Johns, Inzlicht, & Schmader, 2008; Schmeichel, 2007; Vohs, Baumeister, & Schmeichel, 2012). At the more general, trait level of analysis, individuals who are dispositionally high in executive resources (cognitive capacity and/or volitional energy) have been found to be more effective in their interpersonal interactions and relationships, have better physical health and psychological well-being, and engage in more adaptive eating, drinking, and sexual behavior (Bertrams & Dickhäuser, 2009; Côté, Gyurak, & Levenson, 2010; Peluso, Ricciardelli, & Williams, 1999; Ryan & Frederick, 1997; Tangney, Baumeister, & Boone, 2004).

AVOIDANCE MOTIVATION AND RESOURCE DEPLETION

Engaging in self-regulation of any sort expends executive resources because it requires mental control and volitional energy to mobilize and sustain effort, to select goals and strategies that serve one's enacted desires and fears, to shield perception and attention from the influx of competing demands, to monitor progress and adjust effort or attention as needed, to integrate and implement the processes necessary for effective task engagement, et cetera (Baumeister, 1998; Carver & Scheier, 1998; Fujita, 2011). Although all self-regulation expends resources to some degree, we posit that some forms of self-regulation are more depleting of executive resources than others.

In a recent article, Baumeister and Vohs (2007) stated that efficient and effective self-regulation entails the use of clear, well-defined standards, and indicated that self-regulation is made difficult when "ambiguous, uncertain, inconsistent, or conflicting" standards are used (p. 3). As detailed above, avoidance motivation does not afford clear, well-defined standards for efficient and effective regulation, and it also prompts processes that make self-regulation more arduous, more ambiguous, and, inherently, more aversive. Accordingly, we posited that avoidance-motivated self-regulation is likely to be particularly resource depleting (Oertig et al., 2013; Roskes et al., 2012; Roskes, Elliot, Nijstad, & De Dreu, 2013b). In the following, we overview two lines of recent research that support this proposition; the first does so indirectly and the second does so more directly.

Avoidance Motivation under Time Pressure

Roskes et al. (2013) conducted a series of studies designed to examine the effects of working memory under time pressure on different types of performance

tasks. Time pressure requires individuals to carefully monitor task progress and the remaining time available, and working under time pressure is commonly experienced as stressful. As such, time pressure consumes executive resources (Keinan et al., 1999; Kelly, Jackson, & Hutson-Comeaux, 1997). As noted above, we contend that avoidance-motivated self-regulation engages processes that consume an inordinate amount of cognitive and volitional resources. Accordingly, avoidance motivation represents a self-regulatory vulnerability whereby individuals are particularly susceptible to being overwhelmed by stressors in the achievement environment such as time pressure. In the Roskes et al. studies, we measured or manipulated type of motivation and manipulated level of time pressure and predicted that time pressure would have the strongest undermining influence on performance for avoidance-motivated individuals. Supportive data would provide indirect evidence that avoidance motivation is indeed particularly depleting of executive resources.

In a first study (with seventy-seven university undergraduates from the Netherlands), we assessed individual differences in avoidance motivation, manipulated time pressure, and examined the interactive effect of dispositional avoidance motivation (low vs. high) and time pressure (low vs. high) on performance on a creativity task. We assessed avoidance motivation with Elliot and Thrash's (2010) avoidance temperament measure (sample item: "It is easy for me to imagine bad things that might happen to me"). Participants then completed the Remote Associates Test (RAT; Mednick, 1962), which is a creative insight task consisting of thirty items that requires individuals to identify associations between words that initially seem unrelated to each other; they were given three words such as car, swimming, and cue, and the task was to find a word related to each (pool). The RAT items were presented under either low time pressure (18 seconds per item) or high time pressure (8 seconds per item). Time pressure was a between-subjects variable.

The results revealed a main effect of time pressure, such that participants working under high time pressure performed worse on the RAT ($F = 7.97$, $p = .006$). In addition, avoidance temperament was a negative predictor of RAT performance ($F = 7.69$, $p = .007$), indicating that those higher in avoidance temperament did worse on the test. Most importantly, there was an avoidance temperament × time pressure interaction ($F = 6.83$, $p = .011$). Simple slope analyses revealed that time pressure had no influence on performance for those low in avoidance temperament ($\beta = -.02$, $p = .92$), but did have an influence on performance for those high in avoidance temperament ($\beta = -.57$, $p < .001$). Specifically, for those high in avoidance temperament, time pressure undermined performance attainment.

In a subsequent study (with seventy-eight university undergraduates from the Netherlands), we manipulated, rather than measured, avoidance (and approach) motivation and examined the interactive effect of motivation (avoidance vs. approach) and time pressure (low vs. high) on performance on basic math problems. We manipulated motivation by varying the point structure for each randomly presented problem. For some problems, participants could lose

a point if they provided an incorrect answer, but a correct answer would have no bearing on their score (avoidance condition); for other problems, participants could win a point if they provided a correct answer, but an incorrect answer would have no bearing on their score (approach condition). Participants were informed of the type of problem forthcoming by presenting a minus sign (avoidance) or a plus sign (approach) on the screen immediately before the problem appeared. The problems were eight straightforward math items such as 114/2–58 = ? (answer: −1). The problems were presented under either low time pressure (18 seconds per item) or high time pressure (8 seconds per item). Motivation was a within-subjects variable and time pressure was a between-subjects variable.

The results revealed a main effect of time pressure, such that participants working under high time pressure performed worse on the math problems ($F = 10.34$, $p = .002$); there was no main effect of avoidance motivation ($F = .02$, $p = .96$). Most importantly, there was a motivation × time pressure interaction ($F = 5.03$, $p = .028$). Simple slope analyses revealed that time pressure had no influence on performance for those in the approach motivation condition ($F = 1.95$, $p = .17$), but did have an influence on performance for those in the avoidance motivation condition ($F = 14.58$, $p < .001$). Specifically, for those in the avoidance motivation condition, time pressure undermined performance attainment.

In a final study (with seventy-nine university undergraduates from the U.S.), we manipulated both motivation (avoidance vs. approach) and time pressure (low vs. high) and examined their interactive effect on performance on the d2 task (Brickenkamp & Zillman, 1998). This task was chosen because it requires careful, vigilant attention to detail, which should be an ideal fit to the type of processes evoked by avoidance motivation. We manipulated motivation using a variant of the owl-cheese maze manipulation from Friedman and Förster (2005). In this manipulation, participants are asked to look at a maze in which a cartoon mouse is depicted either trying to escape from an owl that hovers over the maze (avoidance condition) or trying to find a piece of cheese at the end of the maze (approach condition). They are instructed to write a vivid story from the mouse's perspective about "the terrible death of the mouse" involving the mouse being caught, killed, and eaten (avoidance condition) or about the "happiest day in the life of the mouse" involving the mouse getting closer to the cheese, finding it, and eventually eating it. After writing the story, participants completed a computerized version of the d2 task, which entailed finding and cancelling target characters (e.g., a "d" with two dashes placed above and/or below it) that were interspersed with similar non-target characters (e.g., a "d" with a different number of dashes above and/or below it). The test was comprised of 14 series of characters, each of which contained two rows of 48 characters each. The task was presented under either low time pressure (20 seconds per item) or high time pressure (13 seconds per item). Both motivation and time pressure were between-subjects variables.

The results revealed a main effect for time pressure, such that participants working under high time pressure performed worse on the task ($F = 276.36$,

$p < .001$); there was no main effect of avoidance motivation ($F = .22$, $p = .64$). Most importantly, there was a motivation × time pressure interaction ($F = 4.89$, $p = .030$). Simple slope analyses revealed that time pressure undermined performance in the approach motivation condition ($F = 106.31$, $p < .001$), but this effect was even stronger for those in the avoidance motivation condition ($F = 177.23$, $p < .001$.

In sum, the findings from the Roskes et al. (2013a) research provide support for the idea that avoidance motivation is particularly depleting of executive resources. Performance under avoidance motivation appears to be fragile due to the amount of resources necessary to regulate in this fashion. A situational factor that additionally expends or limits resources, such as time pressure, exposes this fragility, as manifest in impaired performance. The empirical evidence from these studies indirectly supports the link between avoidance motivation and resource depletion; importantly, this is also the case for nearly all of the empirical work in the burgeoning "ego depletion" literature. That is, the "two-task" paradigm used in the majority of research in this area documents resource depletion indirectly by demonstrating impaired performance on a second task following an initial act of self-regulation. A few researchers have operationalized resource depletion more directly by assessing blood glucose levels (Gailliot & Baumeister, 2007; Gailliot et al., 2007), and a few have utilized direct self-report measures of executive resources (Bertrams & Dickhäuser, 2009; Kehr, 2004). It is this latter approach that we utilized in the next set of studies that we overview.

Avoidance Goal Pursuit and Self-Regulatory Resources

Oertig et al. (2013) conducted two studies designed to examine the concurrent and longitudinal influence of pursuing daily avoidance goals on self-regulatory resources. Daily goal regulation in general demands considerable cognitive and volitional resources. In accordance with our analysis of the structure of avoidance motivation and processes emanating from avoidance regulation discussed above, we posit that avoidance goal pursuit is related to a reduction in the perceived availability of regulatory resources. This decrement in resources may have deleterious downstream implications for phenomenological outcomes such as subjective well-being (SWB), as prior research has shown a negative relation between resource depletion and well-being (Ciarocco, Sommer, & Baumeister, 2001; Forstmeier, Drobetz, & Maercker, 2011; Kehr, 2004; Tangney et al., 2004). We examined this possibility in the second of the two studies, specifically testing self-regulatory resources as a mediator of the avoidance goal—SWB link.

In a first study (with two hundred and eighty-three university undergraduates from Switzerland), we assessed participants' daily avoidance (relative to approach) goals and their perceptions of their self-regulatory resources in the middle of a semester (Time 1), and then assessed their perceptions of their self-regulatory resources again one month later. We measured avoidance goals with a broad range of twenty-two goal statements that focused on academics,

affiliation, and leisure. The goal statements juxtaposed avoidance-framed and approach-framed variants of the same content (e.g., "I really do not want to neglect my hobby activities [sports, music, theatre]" vs. "I really would like to have regular time for my hobby activities [sports, music, theatre]"), and participants were asked to select the variant that best matched their own goal pursuit (an option of "neither" was also provided). An avoidance goals measure was created by dividing the number of avoidance goal selections by the total number of goals selected. We assessed participants' self-regulatory resources with a brief, four-item, face-valid measure focused on their current levels of self-discipline, concentration, stress-resistance, and physical energy.

The results revealed a concurrent negative relation between daily avoidance goals and self-regulatory resources ($r = -.21$, $p < .001$); the higher the number of avoidance goals that participants pursued, the lower their perception of their resources. Most importantly, daily avoidance goals were a longitudinal predictor of change in self-regulatory resources across the one month period ($\beta = -.11$, $p = .016$). Participants pursuing a higher number of avoidance goals evidenced a decrease in perceived resources over the month-long period.

In a subsequent study (with one hundred and thirty-two university undergraduates from Switzerland), we examined the same set of relations investigated in the first study, but also included Time 1 and Time 2 SWB assessments to allow the following model to be tested: daily avoidance goals → self-regulatory resources → SWB. We assessed participants' daily avoidance (relative to approach) goals, their perceptions of their self-regulatory resources, and their perceptions of their SWB one month prior to the end of a fall semester (Time 1), and then assessed their perceptions of their self-regulatory resources and SWB again one month later at the end of the semester (and the beginning of the Christmas holiday). We measured avoidance goals with a broad range of thirty-one goal statements that, as in the first study, focused on academics, affiliation, and leisure, but also focused on issues specific to the end of semester and the beginning of the Christmas period (e.g., completing class projects, taking exams, doing Christmas shopping, attending to family responsibilities). The manner of presenting and selecting the goals statements was the same as in the prior study. The measure of self-regulatory resources was the same as that used in the prior study. We assessed SWB with a composite score derived from measures of positive affect, negative affect (reversed), and life satisfaction.

As in the prior study, the results revealed a concurrent negative relation between daily avoidance goals and self-regulatory resources ($r = -.40$, $p < .001$); the higher the number of avoidance goals that participants pursued, the lower their perception of their resources. The results also revealed a concurrent negative relation between daily avoidance goals and SWB ($r = -.33$, $p < .001$); the higher the number of avoidance goals that participants pursued, the lower their perceptions of SWB. More importantly, daily avoidance goals were a longitudinal predictor of change in self-regulatory resources across the one month period ($\beta = -.30$, $p < .001$). Participants pursuing a higher number of avoidance goals evidenced a decrease in perceived resources over the month-long period.

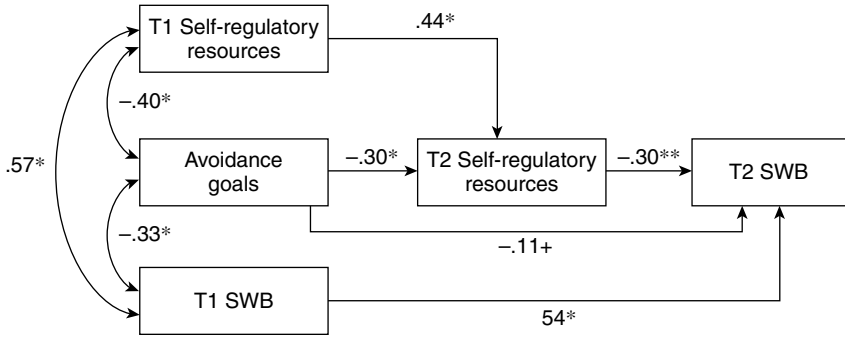

Figure 13.1 Standardized parameters for the hypothesized mediational model, with avoidance goals as the predictor, self-regulatory resources as the mediator and subjective well-being (SWB) as the dependent variable. $+p < .10$. $^{*}p < .01$. Figure revised from Oertig et al. (2013).

In addition, daily avoidance goals were a longitudinal predictor of change in SWB across the one month period ($\beta = -.23$, $p = .001$). Participants pursuing a higher number of avoidance goals evidenced a decrease in perceived SWB over the month-long period. Change in self-regulatory resources was a positive predictor of change in SWB, indicating that participants experiencing a decrease in resources also experienced a decrease in SWB over the month-long period. Finally, mediational analyses supported the proposed model. There was an indirect effect of avoidance goals on SWB via resources ($\beta = -.09$, $p < .001$) and the direct relation between avoidance goals and SWB dropped 52.2% when resources were taken into account (see Figure 13.1). In sum, the findings from these studies provide direct support for the idea that avoidance motivation is particularly depleting of executive resources, and the second study demonstrates that this resource depletion has important implications for well-being over time.

FURTHER CONSIDERATIONS AND BROADER IMPLICATIONS

The studies that we have overviewed represent both laboratory and field investigations of the link between avoidance motivation and the depletion of executive resources. In the rapidly expanding literature on resource depletion, nearly all of the research that has been conducted has utilized experimental methodologies under controlled laboratory settings. In light of this, the Oertig et al. (2013) findings may be seen as particularly noteworthy, in that they document the real-world generalizabilty of the resource depletion concept to the realm of everyday goal pursuit (see also Kehr, 2004). Furthermore, nearly all of the extant research in this literature has focused on the influence of self-regulation on resource depletion in the short-run, usually by testing the influence of an initial, brief (e.g., ten minute) act of self-regulation on resource depletion on a

second, equally brief act of regulation. Oertig et al.'s longitudinal data demonstrates that ongoing regulation that is engaged in periodically over a protracted time (in this case, a month) also depletes resources. Indeed, it is possible that resource depletion effects accumulate over time, and may even be reciprocal and cyclical in nature. For example, pursuing daily avoidance goals leads to resource depletion, this initial resource depletion prompts additional self-protection concerns that prompt increased avoidance goal pursuit (Hobfoll, 1989; Schnelle, Brandstätter, & Knöpfel, 2010), and this, in turn, leads to further resource depletion. Over time and repeated cycles, this process would undoubtedly lead to a pervasive and deep sense of fatigue, with likely downstream negative consequence for physical and mental well-being, and perhaps even chronic and clinical failures of self-regulation (e.g., obesity, alcohol abuse; Cox, Klinger, & Blount, 1991; Dickson, 2006; Dickson & MacLeod, 2004).

Self-control is a form of self-regulation that entails overriding a naturally occurring, prepotent response to a stimulus (Muraven & Baumeister, 2000; Schmeichel, 2007; see also Scholer, this volume). The vast majority of the existing conceptual and empirical work on resource depletion focuses on this particular form of regulation (Fujita, 2011), which Muraven (2008) characterized as "an avoidance-oriented situation" (p. 769). We concur that self-control is a specific form of avoidance goal regulation, and think that viewing it in this way may clarify why it is such a difficult endeavor. Avoidance goals have two components: 1) an aversive object, event, or possibility that is the focal point of the goal, and 2) a volitional commitment to move or stay away from that aversive object, event, or possibility (Elliot, 2008a). For the prototypic avoidance goal, an inherently aversive object, event, or possibility is appraised as undesirable, and the volitional commitment represents a natural propensity to evade the undesirable object, event, or possibility. Self-control is different from the prototypic avoidance goal in that it requires an additional volitional step: an inherently appetitive object, event, or possibility must be reappraised as undesirable, and a volitional commitment is then made to move or stay away from it. Thus, the process of self-control may be seen as an unusually difficult form of avoidance regulation, and it is likely that this type of regulation is even more demanding than the prototypic, modal variant of avoidance regulation (Oertig et al., 2013). From this standpoint, the prevalence of self-control failure should come as no surprise.

In addition to contributing to the resource depletion literature, the conceptual ideas and empirical work described herein also contribute to the literature on approach-avoidance motivation, especially research on avoidance goal pursuit. As noted earlier, avoidance goal pursuit has been shown to have inimical consequences for many outcomes, including performance, intrinsic motivation, and, of course (as detailed herein), SWB (for reviews, see Elliot, 2008a; Elliot & Friedman, 2007). A number of different psychological processes have been shown to mediate these avoidance goal effects, including anxiety, task distraction, controlled volition, stress generation, and poor goal progress (for reviews, see Elliot & Friedman, 2007; Elliot, Thrash, & Murayama, 2011). We think it likely that each of these process variables has deleterious consequences

for outcomes because (at least in part) they deplete executive resources. For example, controlled volition (i.e., feeling internal or external pressure to exert effort—"I *must* or *ought* to do this") likely mediates the inimical influence of avoidance goals on subjective well-being (Elliot & Sheldon, 1998), *because* this controlled volitional regulation is highly depleting of executive resources and leaves the person feeling worn out and unfulfilled. More generally, we contend that resource depletion may be seen as the proximal mediator of a broad array of negative avoidance goal effects, with avoidance goal pursuit evoking distal mediational processes such as anxiety, task distraction, and controlled volition, that in turn depletes executive resources, that, finally, proximally predicts the negative outcomes (Oertig et al., 2013). In this type of sequential mediational model, executive resource depletion is a final common pathway through which other mediators exert their inimical effects. Subsequent research would do well to put this integrative mediational model to empirical test.

Although we have concentrated nearly exclusively on the negative implications of avoidance motivation in this chapter, we hasten to add that avoidance motivation is not always deleterious for outcomes. Both approach motivation and avoidance motivation are clearly integral to and essential for effective psychological functioning in daily life. Empirical work on avoidance motivation has shown that it can be beneficial for certain types of tasks, in certain types of situations, and for certain types of individuals (Friedman & Förster, 2005; Hong & Lee, 2008; Koch et al., 2008; Muraven & Slessareva, 2003; Roskes et al., 2012; Seibt & Förster, 2004; Tamir, 2005; see also Higgins, this volume). However, and importantly, even when it is necessary and even when it is beneficial, it expends an inordinate amount of executive resources. As such, even when avoidance motivation is beneficial in the short run, it is simultaneously exacting a cost in spent resources that, if sustained, undoubtedly has residual negative consequences in the long-run (De Lange et al., 2010; Roskes et al., 2012; Ståhl, Van Laar, & Ellemers, 2012). In light of this, avoidance motivation seems best used (and encouraged) sparingly (Roskes et al., 2013b); problems ensue when it is hyper-activated and over-utilized which, research suggests, is common in achievement settings, social settings, and daily goal pursuits (Elliot, 2006).

In closing, the literatures on approach-avoidance motivation and on resource depletion have developed to the point that they are quite mature. Both literatures have contributed nicely to our understanding of how the motivated self navigates and negotiates its way through the challenges of daily life. In this chapter, we have demonstrated how these two heretofore separate literatures may be integrated, with benefits for each. The essential message from this integration is that avoidance regulation is, simply put, exhausting.

AUTHOR'S NOTE

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Rochester, NY, 14627. This chapter draws heavily on conceptual ideas developed and empirical work conducted by Oertig et al. (2013), and Roskes et al. (2013a).

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14

When Saying Yes to the Doughnut Is Not Saying No to Self-control

A Hierarchical Approach to Flexibility in Conflict Representation

ABIGAIL A. SCHOLER

There is much to like about self-control. The ability to put aside immediate needs and gratifications in order to achieve important, long-term aims is held up as one of the hallmarks of a civilized society. Successful self-control is linked to many significant and important outcomes, including academic achievement, job satisfaction, well-being, and better health (e.g., de Ridder, 2012; Duckworth, 2011; Moffitt et al., 2011). In Mischel and colleagues' classic delay-of-gratification study (now affectionately dubbed "the marshmallow test"), the longer children were able to hold out for a larger reward (e.g., two marshmallows) compared to a smaller reward (e.g., one marshmallow), the more successful they were later in life; seconds of delay time positively predicted better self-control even 40 years later (e.g., Casey et al., 2011; Mischel & Baker, 1975; Mischel & Ebbesen, 1970). If only I had more self-control, many of us sigh—as we look at our expanding waistlines, our shrinking savings accounts—I would be better, life would be better.

Yet perhaps equally as important as self-control is knowing when to hold out for two marshmallows and when to savor the one right in front of you (see also Koole et al., this volume). In life we are confronted with a myriad of such choices. We can reach for the broccoli or for the brownie. We must choose between going to the gym and going out for drinks with our colleagues. We can take a fabulous

vacation or save more for retirement. Always grabbing for the marshmallow right in front of us is one kind of self-regulation failure, the failure most often considered in the self-control literature. But there are other dangers here; we can wait when we should grab—and in extreme cases, can spend a lifetime waiting, stockpiling marshmallows just out of reach. Even more troubling, it is not always clear what counts as temptation versus goal; choosing to spend time with good friends instead of going to the gym is clearly not *always* a self-control failure. The trick, it seems, is knowing *when* to delay and when to leap. Perhaps just as important as exerting self-control is the ability to discern when and how to do it.

In this paper, I consider these issues within the broader context of self-regulatory hierarchies. I begin by introducing the general idea of self-regulatory hierarchies and then discuss how such a framework might be useful for considering self-control conflicts. In particular, how does a hierarchical approach suggest ways in which the classic goal-versus-temptation self-control conflict representation might be flexible? I discuss how different conflict representations can influence the experience of self-control and subsequent self-regulatory efforts. I conclude by considering the trade-offs of different types of conflict representations and factors that might influence wise discernment and flexibility in choice.

SELF-REGULATORY HIERARCHIES

There is a long tradition in psychology of distinguishing between different levels of behavior. Much of the theorizing about hierarchies grew out of a desire to understand how very abstract aims (e.g., "be good") could be translated into the motoric and even cellular activity necessary for action (e.g., the muscles that move the helping hand). A number of different hierarchical models have been proposed, differing in the types of distinctions that are highlighted, but similarly highlighting that each level is involved with different self-regulatory tasks (e.g., defining goals, determining strategies) and that at any lower level in the hierarchy, there are multiple means that can serve a higher level (e.g., Austin & Vancouver, 1996; Carver & Scheier, 1998; Elliot & Church, 1997; Elliot et al., this volume; Miller, Galanter, & Pribram, 1960; Pervin, 1989; Scholer & Higgins, 2008; Vallacher & Wegner, 1987).

Much recent theorizing about self-regulatory hierarchies has focused not on the structure of the hierarchy per se (i.e., tracing the translation of the higher-order aim into low-level behavior), but on understanding the nature of representations at different levels, the flexibility of these representations, and the relations between and within levels. These approaches take the hierarchy as a given, and ask how actions and goals can be better understood within that framework. In the discussion below, I provide brief snapshots of recent theorizing about self-regulatory hierarchies that demonstrate the richness of a hierarchical framework for understanding self-regulation.

Action identification theory (Vallacher & Wegner, 1987; 2012) highlights principles that predict when and under what conditions individuals represent behaviors at higher or lower levels in a hierarchy, emphasizing flexibility in the

identification of action: the same action can be known by many different names (e.g., I lift a fork to my mouth, I eat lunch, I enjoy good food with friends). Furthermore, the different descriptions can be organized hierarchically, such that some capture the "why" of the action and some capture the "how" of the action. Action identification theory provides evidence that receptiveness to new identities (i.e., the flexibility of representation) depends on one's current level of identification. For instance, people are more likely to accept high-level personality feedback when first induced to consider their behavior at low versus high levels because low levels permit emergence of new higher-level interpretations (Wegner et al., 1986). Furthermore, the theory predicts (and data supports) the idea that people will tend to use higher-level identities to describe action unless they encounter difficulty or challenge (Vallacher & Wegner, 1987; Vallacher, Wegner, & Somoza, 1989). When people identify action in ways that fit task difficulty (i.e., working on difficult tasks with low-level identification, working on easy tasks with high-level identification), they perform better.

Research in the tradition of construal level theory (Trope & Liberman, 2003, 2010) provides further support for the antecedents and consequences of high- versus low-level identifications of action. Construal level theory emphasizes the role of psychological distance in producing abstract (high-level) versus concrete (low-level) construals, whether that distance is social, temporal, spatial, or probability-based. Distant events and objects tend to be represented by central, abstract, and high-level features, whereas near events and objects tend to be represented by peripheral, concrete, and low-level features (Trope & Liberman, 2003). People weight more heavily low-level construals for near future decisions, but high-level construals for distant future decisions (Trope & Liberman, 2000). In the domain of self-control, research suggests that abstract construals generally facilitate self-control, though concrete construals may facilitate self-control under certain contexts (Fujita et al., 2006; Schmeichel, Vohs, & Duke, 2011).

Whereas action identification theory and construal level theory highlight flexibility in the level of action representation, goal systems theory highlights the nature of the relations within and between levels in a hierarchy (Kruglanski et al., 2002). Emphasizing in particular a distinction between two levels—goals and means—goal systems theory predicts patterns of activation and inhibition that facilitate (or impede) effective self-regulation within a multiple-goal system. For instance, activation of a focal goal will tend to inhibit the activation of other competing goals (Shah, Friedman, & Kruglanski, 2002), but increase the activation of relevant means (Kruglanski et al., 2002; Shah & Kruglanski, 2003). However, such relations can be asymmetric in the case of self-control conflicts; for successful self-regulators, temptations activate goals (i.e., the salient chocolate cake activates my health goal) and activated goals inhibit temptations (Kruglanski et al., 2002; see also Fishbach & Shah, 2006; Fishbach & Trope, 2007; Myrseth, Fishbach, & Trope, 2009).

In my own work, my colleagues and I have suggested that it can often be useful to distinguish between two types of psychologically distinct means—strategies (the general "how") and tactics (the specific, context-dependent

"how")—particularly as a way of identifying tactical profiles that reveal underlying strategies and motivational concerns (Scholer & Higgins, 2008; Scholer, Stroessner, & Higgins, 2008; Scholer et al., 2010). For instance, our approach suggests that the pattern of shifts from conservative to risky tactical behaviors elucidates the underlying strategy. Within the context of regulatory focus theory (Higgins, 1997), we have identified distinct tactical profiles that allow us to predict when vigilance or eagerness can drive risky behavior, and the implications this has for understanding how success and failure are defined within different motivational systems.

Across these approaches, it is clear that self-regulatory hierarchies can provide a valuable framework for understanding the dynamics of self-regulation. Self-regulatory hierarchies not only provide a structure for understanding how action arises, but also for thinking about the varied ways in which the same action can be represented in different ways across the hierarchy. Self-regulatory hierarchies also provide a useful framework for thinking about the fluid dynamics within a multiple goal or multiple means system. Building on these approaches, I turn next to a discussion of what a hierarchical framework may suggest about the flexibility of self-control conflict representations.

SELF-CONTROL BEYOND ANGELS AND DEVILS

Both lay and theoretical conceptions of self-control (Baumeister, Schmeichel, & Vohs, 2007; Fujita et al., 2006; Hofmann, Vohs, & Baumeister, 2012; Mischel, Cantor, & Feldman, 1996) draw tacitly, if not explicitly, on a hierarchical framework. The classic self-control conflict is represented as a conflict between a higher-order, central goal (e.g., maintaining a healthy weight) and a lower-order, incompatible temptation (e.g., chocolate cake). Typically, the higher-order goal is seen as providing beneficial, important, long-term outcomes, perhaps at the expense of some immediate pleasure (in colloquial terms, the angel on the shoulder). In contrast, the temptation typically provides immediate, short-term gratification at the expense of long-term outcomes (the devil on the shoulder). This battle between the angel and the devil (lofty, long-term goal versus fleeting and ultimately damaging temptation) is seen as the defining feature of a self-control conflict and has at least three non-trivial implications for the experience of what it means to exert self-control.

First, the classic self-control conflict representation requires individuals to compare options that are not easily compared (an immediate, concrete temptation versus an abstract, long-term goal). Exactly how does the desire to eat a piece of chocolate cake compare to one's goal to be healthy? Because the attributes of the cake are not equivalent to the attributes of the high-level goal to be healthy, the terms of comparison are unclear. This may make it difficult to accurately assess the underlying meaning or significance of the short-term temptation, obstructing an understanding of how the temptation relates to both immediate and long-term goals.

Some interesting work by Magen, Dweck, and Gross (2008) suggests that fuzzy comparisons can have significant consequences for decision-making. In their paradigm, participants had a choice between a smaller immediate reward and a larger reward after some delay (e.g., "$5 today versus $8 in 30 days"). In one condition, participants were given the choice just as I described it above. In another condition, the foregone alternative was made salient (e.g., a choice between $5 today and $0 in 30 days versus $0 today and $8 in 30 days). Magen et al. found that participants were significantly less impulsive (i.e., better able to delay for a larger reward) when the full comparison was highlighted and the foregone alternative was made salient.

Other research suggests that the uneven terms of comparison within the classic self-control conflict may also often favor the immediate, concrete temptation (Fujita et al., 2006; Metcalfe & Mischel, 1999). At low levels of representation, objects tend to be represented in terms of concrete, corporeal features. This "hot" representation of the object's appetitive features may exert a strong pull over the relatively cooler, abstract higher-level representation. Both adults and children are able to delay longer when instructed to view temptations abstractly or in "cool" versus "hot" terms (Fujita & Carnevale, 2012; Mischel & Baker, 1975). In the absence of specific instruction, however, hot features likely exert a strong pull in self-control situations.

Second, although there may be a strong pull for the temptation, framing self-control conflicts in the classic way suggests that there is only one "right" choice: avoiding the short-term temptation. Such clarity, however, may come at a steep cost: the "right" option is a rigid and coercive "should," not what one freely chooses to do. Restrictions on autonomy can lead to reduced motivation and well-being (Deci & Ryan, 2000; Ryan & Deci, 2000). Controlled choice, relative to autonomous choice, has also been shown to be more depleting of self-regulatory resources (Moller, Deci, & Ryan, 2006). Therefore, even if they choose the classically-defined "right" option, people may subsequently perceive that they have fewer self-regulatory resources, and have less energy to cope with future challenges.

Third, the classic framing of self-control implies that if individuals succumb to the temptation, they have made a bad choice: going with the devil is failure. While the negative affect or distress that arises from such failure can be a useful signal for adjusting future behavior, it is likely to do so only if people can accept and "hear" this negativity (Inzlicht & Legault, this volume). This may be more difficult to do in a vertical representation that makes the weakness of the choice so paramount; consequently, an initial failure of self-control may beget a chain of self-regulatory lapses, a phenomenon aptly described in the eating regulation literature as a "what-the-hell effect" (Herman & Polivy, 1984; Polivy & Herman, 1985). This "what-the-hell effect" has also been established in other self-control domains (Cochran & Tesser, 1996; Soman & Cheema, 2004; Wilcox, Block, & Eisenstein, 2011) and the consequences of the negative spiral may be just as pernicious as the initial failure itself.

Given that this classic representation of the self-control conflict carries with it these negative repercussions, one might wonder whether it was the only viable representation. As noted earlier, this classic representation depicts a tension between different levels of higher-order, long-term concerns and lower-order, short-term concerns (e.g., Baumeister et al., 2007). Indeed, most models assume that this vertical representation is an inherent and inevitable property of self-control conflicts. However, a wealth of research suggests that people can reformulate their goals in making decisions more broadly (e.g., Griffin & Ross, 1991; Tversky & Kahneman, 1981). This flexibility in mental representation can also be applied to self-control conflicts, such that these conflicts do not *have* to involve different levels in a hierarchy (Scholer & Higgins, 2010).

When considering the classic self-control conflict between higher-order and lower-order concerns, it is clear that within a self-regulatory hierarchy, such a conflict is represented as a *vertical* conflict, a conflict *between* levels: between a higher-order goal (e.g., academic success) and a lower-order means of behaving—the temptation (e.g., partying all night)—that is incompatible with or impedes higher-order goal attainment (cf. Fujita et al., 2006). This is not the only type of conflict that can be represented in a hierarchical model, however. Conflicts can also be *horizontal*; they can exist *within* levels in a self-regulation hierarchy (Emmons, 1989; Scholer & Higgins, 2010). Horizontal conflicts can exist between goals, between strategies, or between behaviors. For example, individuals can have a conflict between pursuing two different goals (academic success versus fitness) or between two different means for the same goal (running or swimming to maintain fitness).

The idea that conflicts can be either vertical or horizontal is not new; however, this distinction suggests a new way of examining self-control conflicts. A single self-control conflict can be represented as *either* vertical or horizontal. In other words, not all self-control conflicts are inevitably vertical; they are malleable, mental constructions that can be reformulated (Scholer & Higgins, 2010). This view builds on hierarchical frameworks that have discussed flexibility in the level of object representation to propose flexibility in conflict representations. It is important to note that I am not arguing that all decision or goal conflicts are self-control conflicts. For instance, a conflict between running or swimming as a means to maintain fitness is not a self-control conflict. What I am arguing, however, is that the vertical representation of many self-control conflicts is not sacred. Just because the conflict *can* be represented vertically does not mean it is an inherent property.

For example, a vertical conflict between the goal of achieving academic success versus the temptation of partying with friends could be reframed as a horizontal conflict representation between the two higher-order goals of connecting with friends versus investing in scholarship. Similarly, the conflict could be reframed as a horizontal conflict between two means (e.g., studying, spending time with friends) that serve the same higher-order goal (e.g., having a balanced, fulfilling life). Whereas a vertical conflict pits angel versus devil, a horizontal conflict suggests a fork in the road with two viable paths. A horizontal

conflict may reduce the clarity of what is "right," but may allow for clearer comparisons, more autonomous choice, and less fall-out after failure. Each representation likely has its trade-offs, as I examine below. Yet understanding that the representation is flexible—and how that flexibility relates to the experience of self-regulation itself—is important to explore.

WHEN THE DEVIL BECKONS

Although we can imagine a world where self-control reigns and the devil is always resisted, such a world is a far cry from the one we inhabit. As we know from empirical studies (and likely our own lives), at times the devil beckons and we yield; self-control failures are a part of life (Hofmann et al., 2012). This does not mean such failures are inevitable; there are a number of individual difference and situational factors that make it more likely that individuals will succeed at self-control (e.g., De Ridder, 2012; Moffitt et al., 2011; Tangney, Baumeister, & Boone, 2004). Yet in spite of these factors, self-control failures still occur. Indeed, most people striving for behavior change make several attempts before the change sticks (Prochaska, DiClemente, & Norcross, 1992). Despite our best intentions, we lash out, we take another doughnut for the road, we hit the snooze button one more time, and we tell ourselves we can start saving tomorrow. What happens next, after failure?

Not surprisingly, self-control failures often elicit negative affect (Soman & Cheema, 2004; Tice & Bratslavsky, 2000; Wilcox et al., 2011). Furthermore, as noted earlier, research suggests that self-control failures can prompt a downward spiral of further failure (e.g., "What the hell . . . I caved and ordered the fries so I might as well get dessert, too") (Cochran & Tesser, 1996; Polivy & Herman, 1985). This phenomenon has been best documented in the eating regulation literature with restrained eaters, a population of individuals who struggle to regulate their eating effectively (Herman & Mack, 1975). In these studies, typically portrayed to participants as taste tests, some participants are first subtly induced to ingest a "pre-load" to induce a feeling of self-control failure (e.g., a milkshake). In a subsequent task, participants then have the opportunity to sample other foods as part of a second taste test. In control conditions individuals who score high in eating restraint eat *less* in this second task relative to non-restrained eaters, but when they have consumed a pre-load, they eat *more* than non-restrained eaters (see also Coelho, Polivy, Herman, & Pliner, 2008, 2009; Polivy, Herman, & Coelho, 2008). In other words, following an initial failure (the ingestion of the pre-load), restrained eaters are actually more likely to fail to regulate subsequent eating.

Researchers have proposed a number of possible explanations for the what-the-hell effect. Cochran and Tesser (1996) argued that restrained eaters are particularly vulnerable to the effect because they focus on proximal, inhibitional goals (e.g., Do not eat more than 1500 calories). This means that failures are felt acutely at the individual level; furthermore, once the failure has occurred, the opportunity to achieve the proximal goal has been permanently passed by

(i.e., the person ate more than 1500 calories for the day), and the goal is likely to be abandoned. Some evidence indeed suggests that approach or acquisitional goals, at which one cannot so definitively and permanently fail, may buffer against the what-the-hell effect; failures to progress do not elicit the same level of negative affect nor invalidate the possibility of ever reaching the goal (Cochran & Tesser, 1996; Soman & Cheema, 2004).

In some contexts, individuals who are typically most skilled at self-control may be most vulnerable to such a downward spiral. Wilcox et al. (2011) found that individuals high in trait self-control are more likely to exhibit what-the-hell patterns in credit card spending under conditions that promote more serious experiences of failure. Although it may seem surprising that people who typically regulate more effectively were more vulnerable to this effect, Wilcox et al. found that it was because individuals high in trait-self control felt credit card debt more acutely that they were likely to subsequently give up on their original goal and spend more. Negative affect can lead even initially committed individuals to abandon goal pursuit, either because the goal feels unobtainable or because escape reduces the salient pain of failure.

In other words, existing research suggests that conditions that make self-control failures more acute will increase the likelihood of the what-the-hell effect. These approaches have focused on a number of factors that may intensify failure: representation of the goal within a hierarchical level (e.g., approaching a desired end-state versus avoiding an undesired end-state), representation of the failure itself (e.g., softening the perception of credit card debt by making the available credit limit larger), or on individual difference factors that intensify failure (e.g., holding higher personal standards; Wilcox et al., 2011). Beyond these factors, it is likely that the *conflict* representation itself may also influence the affective experience of failure. Although speculative, perhaps one reason that both restrained eaters and individuals high in trait-self control are vulnerable to the what-the-hell effect is because they may be more likely to view self-control conflicts as vertical conflicts about what *should* be done and thus they experience greater negative affect after failure.

David Kille and I have been exploring how the nature of the conflict representation might influence affective responses following self-control failure (Kille & Scholer, 2013). One primary difference between vertical and horizontal conflict representations is whether the options are evaluatively tagged, as noted earlier. In a vertical representation, the higher-order goal is clearly the right, good choice; the temptation is the bad choice. In the horizontal representation, in contrast, both options are seen as reasonable. Consequently, we predicted that affective responses to self-control success and failure would be modulated in the horizontal versus vertical representation.

In an initial set of studies (Kille & Scholer, 2013), participants were presented with a description of self-control conflict scenarios common to undergraduate students. All participants were given the same information about the conflict (e.g., "It is Saturday afternoon and you are nearing the end of the academic semester. You have a big paper due on Sunday at midnight, worth 60% of your

grade in the course. But some of your friends are planning a night out tonight to celebrate the birthday of a friend"). What varied between participants was the nature of the representation (vertical versus horizontal) and whether participants were asked to imagine self-control "success" (studying) versus "failure" (going out). In the vertical representation conditions, participants were asked to imagine that they were "tempted to go out for your friend's birthday this evening" but that "unfortunately, you can't both accomplish your academic goals and go out for your friend's birthday tonight." In the horizontal representation conditions, participants were told "unfortunately, you can't accomplish both of these goals tonight." As predicted, we found a significant conflict representation × outcome interaction on choice evaluation, such that participants evaluated "failure" more negatively—and said they would feel worse after it—in the vertical versus horizontal condition.

In another version of the study, we induced horizontal versus vertical representation separately from the description of the conflict itself by asking participants to reflect either on temptations or on goals that competed with a number of commonly pursued goals (e.g., academics, fitness, etc.). With this procedure, we primed a horizontal versus vertical conflict mindset while keeping the description of the target self-control conflict exactly the same across conditions. With this new manipulation, we found the same pattern of results: greater negative affect and evaluation of choice in the vertical versus horizontal condition after failure. Given the association in prior research between negative affect and greater vulnerability to subsequent self-control failures, we are currently pursuing the what-the-hell implications as well.

Research that Kristin Laurin and I have done does suggest that following failure in a vertical representation, individuals may be less likely to return to the non-chosen goal (Laurin & Scholer, in preparation). In one study, participants were asked to recall a recent time in which they chose to engage in social media instead of academics. Not surprisingly, undergraduate students can easily recall such a time. We asked participants to describe the conflict in vertical (e.g., goal versus temptation) versus horizontal (goal versus goal) terms and then asked them to describe what they planned to do in an upcoming weekend. We found that participants were less likely to report intentions to pursue academic goals in the future when they had just recalled a vertical conflict where they "failed" to choose the "right" option, as opposed to horizontal conflict where they had simply chosen to pursue friendship goals. In other words, in both conditions, participants had been reminded of a time in which they did *not* pursue their academic goal, yet in the horizontal condition this did not interfere with subsequent goal pursuit as much as it did in the vertical condition.

These studies suggest that different ways of representing the same objective self-control conflict may have important implications for what happens following an initial choice. In the real world, self-control is not a single-shot occurrence; what happens over time is arguably just as or more important as what happens in a single instance. One piece of cake, one skipped gym class, one month in which the piggy bank is ignored, is not problematic. It is the accumulation of

failures that can lead to real problems. Thus, it is important to understand how we respond when we do fail, and how different ways of thinking about self-control conflicts might mitigate the pernicious cycle of subsequent failures.

ANGEL OF MY BETTER SELF

What about those times when we make the "right" choice? If the self-control conflict is considered in isolation, such a question may seem somewhat odd. If people make the right choice, then what more is there to say? Yet just as failures do not happen in isolation, neither do successes. A consideration of horizontal versus vertical conflict representations suggests that just as failure may be a different experience under a vertical versus horizontal representation, so too may success. If vertical conflict representations reduce the experience of autonomous choice, individuals may be less able to hold onto the "right" choices they make under vertical versus horizontal framing.

In particular, we have found that "right" choices under a vertical framing may be harder for people to consistently pursue than right choices under a horizontal frame, particularly when people are not wholly committed to the goal (Laurin & Scholer, in preparation). There are many times in life when we choose what we think we should do, even if we chafe against it. Picture a university student who believes that academics are relatively important, but is often tempted to hang out at a local bar with friends instead of studying. Although almost all university students will evaluate their academic goals as relatively important, there is nevertheless variability (this may come as no surprise to instructors). When participants rate academics as moderately (as opposed to highly) important and make a choice to stay in and study under a vertical versus horizontal frame, they are more likely to spontaneously mention the desire to engage in counter-goal behavior (e.g., partying another night, finishing the work quickly in order to go out later that same night) and report non-academic goal behavioral intentions (Laurin & Scholer, in preparation). Sticking with a chosen goal may be harder in a vertical frame, particularly to the extent that the choice feels less autonomous.

These differences may also arise because choices are less guided by central concerns in a vertical versus horizontal frame. In one study, we measured the importance of academic and social goals in a separate session. When participants came to the lab, they were presented with a self-control conflict (academic versus social) presented as a vertical or horizontal conflict. When the conflict was horizontal, people's choices were guided by importance of the social goal, with those who valued social goals more highly choosing the social option more often. In the vertical condition, importance played no role in guiding choices (Laurin & Scholer, in preparation). In other words, a horizontal conflict representation may allow greater insight in the decision process, promoting self-regulation that is guided by what really matters to an individual.

These results suggest that there may be some conceptual overlap between horizontal conflict representations and abstract construals. Indeed, Fujita et al. (2006,

Study 3b) found that participants primed with high-level construals were more effective at self-control only if the high-level benefits of the situation were personally important to them. In other words, it is not as if abstract construals themselves lead individuals to effectively exert self-control; abstract construals lead individuals to be more likely to act in accordance with central values, whatever those are. This could lead to more *or* less effective self-control by normative standards; indeed, abstraction may operate in part by permitting a conflict comparison that is horizontal. It is important to note, however, that a horizontal conflict framing does not appear to be simply another way to prime an abstract construal, given that a horizontal representation itself can be low-level (e.g., a conflict between two means). That said, it will be important to explore the similarities and differences between these approaches in future research.

TRADE-OFFS OF FLEXIBLE REPRESENTATIONS

Considering the classic self-control conflict within a hierarchical framework suggests that the vertical representation may be more flexible than traditionally conceived. As reviewed above, when people consider a self-control conflict vertically versus horizontally, they may be more vulnerable to negative affect after failure and be less likely to return to the non-chosen goal. Horizontal conflict representations may promote choice guided by an individual's central concerns and may lead individuals to be better able to stick with a "right" choice, particularly when their commitment is moderate. While this summary touts the benefits of a horizontal representation, this does not mean that the vertical representation is always worse. In this section, I discuss some remaining questions, particularly with regard to the trade-offs of horizontal versus vertical representations.

To begin, the relative benefits or effectiveness of horizontal versus vertical framing of self-control conflicts may depend on characteristics of the individual. For some individuals, a vertical conflict about what one *should* do may in fact be more motivating than a horizontal conflict that is arguably more about what one *wants* to do. Research in regulatory focus theory suggests that individuals are differentially motivated by sensitivity to duties and responsibilities (the prevention system) versus ideals and aspirations (the promotion system; Higgins, 1997). Furthermore, regulatory fit theory provides evidence that individuals are more engaged when the means of goal pursuit fit or sustain their underlying motivational orientation (Higgins, 2000). Together, these two ideas suggest that prevention-focused individuals may be more effective when self-control conflicts are vertical (likely promoting vigilance), whereas promotion-focused individuals may be more effective when self-control conflicts are horizontal (likely promoting eagerness). Some existing research supports this prediction. Freitas, Liberman, and Higgins (2002) found that prevention-focused individuals, relative to promotion-focused individuals, had higher enjoyment of tasks that involved resisting temptation and outperformed promotion-focused individuals under conditions in which temptations or distractions had to be resisted.

In some cases, at least, it may also be that vertical self-control conflicts cannot be easily conceptualized as horizontal. In other words, not all self-control conflicts are the same. This is perhaps most clear when considering addictive behaviors. For example, the conflict between a higher-order goal to "be healthy" and the temptation of a cigarette cannot be as easily justified as a conflict between two goals: "being healthy" and "enjoying life's pleasures." In this case, a horizontal representation may simply work as a rationalization, providing a justification for an unhealthy behavior. Thus, while it may be helpful for dieters to move away from vertical conflicts that increase the likelihood of failure following setbacks, it may be just as important for smokers to move away from horizontal representations that support or justify continued smoking. Understanding the conditions under which horizontal conflict representations provide insight rather than license to misbehave is an important question we are currently beginning to investigate (see also Myrseth, Fishbach, & Trope, 2009). This argument bears some conceptual similarity to Tetlock and colleagues' research on taboo trade-offs (Tetlock et al., 2000; Tetlock, McGraw, & Kristel, 2004). These authors show that trade-offs between sacred and secular values (e.g., human life and money), seen as morally reprehensible, can be reformulated as (arguably horizontal) trade-offs between sacred values or between secular values. Often, such reformulation is used to justify decisions that are considered abhorrent in a vertical, taboo trade-off.

However, if one takes seriously the idea that at times, a temptation can be legitimately represented as another goal, one must also acknowledge the need to move away from the notion that there are always normatively good and bad options in a self-control conflict. While often acknowledged in passing, this complex reality is not often embraced in empirical study. Yet what is good versus bad in a single case is much less clear than what is good or bad in a sequence or pattern of behavior. When we consider the self-control conflict in the hierarchy, we may think again about what it means to make a bad choice. Some earlier discussions of this issue have highlighted situations in which a "good" decision to delay versus leap is relatively clear (Mischel et al., 1996). For example, in the marshmallow test, most would agree that delaying for a large reward (assuming a stable world and an honest experimenter) is the better self-regulatory choice. In contrast, in another developmental psychology paradigm called the gift delay paradigm, children are given a gift to open in which there is no increased reward for waiting. In this case, delay is often considered maladaptive, a sign of over-control (Mischel et al., 1996; Mischel, Shoda, & Peake, 1988).

In the complexities of everyday life, it is not always clear under what conditions we are operating. As important as it is to study what predicts the rejection of temptation, it may be just as important to understand people's ability to flexibly switch between delaying and leaping, between recognizing when the whisper in our ear is the devil and when the whisper comes from another important goal. Part of truly effective self-regulation may be knowing which conflict representation is appropriate, understanding that sometimes choices are failures and sometimes choices are choices.

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15

Motivated Distance Perception Serves Action Regulation

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AND
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In nearly every aspect of life, there is a fundamental need to act. People must act in order to survive, to advance, to meet their goals, and to avoid pitfalls along the way. Hungry people act to quiet the rumblings in their stomachs. Ostracized individuals act to restore feelings of social inclusion. Frightened people act to circumvent the dangers that prompt their fear. And aspiring doctors, artists, clinicians, and researchers act to earn the credentials their fields require for entry. People must move, react, and respond when the situation requires it.

Many situations require action, and immediate behavioral responses may be warranted. As a result, people may be best served by having a system in place that is sensitive to changing situational demands and that prompts action when action is needed. Fortunately, people do have such a system—the motivated perceptual system (see Balcetis & Dunning, 2007, 2010; Dunning & Balcetis, 2013). We argue that people possess a perceptual system that is adaptively designed to aid them in solving the regulatory challenges of everyday life and is particularly sensitive and responsive to needs to act, which vary as the contents of the environment and people's internal states fluctuate. The perceptual system assesses whether environments call for action (e.g., to acquire desirable goods, to defend against threats) and produces visual experiences that prompt and guide appropriate behavioral responses. Just as people's muscles and minds gear up physiologically when action is needed, we argue that people see the world in ways that facilitate action when action is needed. As a result, as they

scan their surroundings, people may not see the world as it really is (see Balcetis & Lassiter, 2010). Instead, people perceive the world in systematically biased ways that correspond to their need to act.

PERCEPTUAL SYSTEM ASSISTS WITH PREPARATION FOR ACTION

Decades of research across multiple species, using physiological, neurological, and behavioral measures, converge on the conclusion that rewards and threats call bodies to action (for a general review see Elliot et al. in this volume; Harmon-Jones, Price, & Harmon-Jones in this volume). Before taking the first steps to meet their needs, bodies physiologically prepare for action. For instance, when standing in the stalls minutes before a race begins, thoroughbred horses' hearts beat over 2.3 times faster relative to when they were back in the stables before the race (Mukai et al., 2007). Similarly, just before sprinting up a flight of stairs, humans' heart rates accelerate steadily until 1-sec prior to starting (Stern, 1976).

Bodies also prepare for action to defend against threats (Lazarus, 1966). In dogs and cats, hindlimb blood flow increases when frightened (Martin, Sutherland, & Zbrozyna, 1976). In sheep, heart rate climbs by over 300% just before a wolf attack (Clark, 2012)[1]. Moreover, as rewards and threats come close and loom large, the need and subsequent preparation for action intensifies. In our program of research, we build upon this solid empirical foundation. We propose that if readiness to engage in action increases as the proximity of a reward or threat increases, people may be best served by misperceiving rewarding or threatening targets as more proximal. By seeing objects as closer, the body may prepare for action sooner and may more readily attain rewards or defend against harm.

In this chapter, we review a growing body of work that suggests people perceive objects as closer when those objects are related to reward or threat given the need to act in response to possible rewards and threats. Using multiple paradigms, we demonstrate that objects that call for action appear closer than objects that do not. In the first section, we review research suggesting that desirable objects related to approach and acquisition tendencies appear closer than less desirable objects. In the second section, we review research suggesting that threatening objects related to defensive behavioral tendencies appear closer than non-threatening objects. These two lines of work converge to suggest that when an object requires action, people misperceive that object as closer. Perception, at least of distance, appears responsive to the regulatory needs of the perceiver to engage in action.

REVISITING THE GIBSON, NEW LOOK, AND ECONOMY OF ACTION PERSPECTIVES

To suggest that perception is implicated in the regulation of action adds to theoretical perspectives that predate ours. For instance, the ecological approach articulated by Gibson and others (e.g., Allport, 1989; Gibson, 1979; Tucker &

Ellis, 1998) proposed that people perceive the environment in light of how they are acting within it (Gibson, 1950). As people move through space, objects cross their field of view at a certain speed and in specific directions. This relative motion between observers and objects suggests properties of objects that people could perceive. For instance, a round object whose diameter grows larger at a rapid rate may be perceived (perhaps rightfully so) as a quickly approaching baseball.

Both the theory of motivated perception and the ecological approach connect action and vision. However, these two approaches focus on two different aspects of action. Motivated perception focuses on the effects of anticipated action, the consequences for perception of planning action. The ecological approach to perception, instead, articulates mechanisms by which actions affect perception in real time, as people and objects move within a space. Nonetheless, both theories assume perception is tied to action.

Additionally, the motivated perception approach shares commonalities with the New Look perspective (Bruner, 1957), which suggested that perceivers' needs, wants, and fears influence visual perception. The approach further articulated that to facilitate appropriate action, people maintain a readiness to perceive objects in the environment that satisfy needs. For example, as participants' hunger grew, they were more likely to interpret ambiguous objects as food (Levine, Chein, & Murphy, 1942). Unfortunately, the New Look perspective suffered from methodological and theoretical shortcomings that rendered the conclusions tenuous (Erdelyi, 1974). For instance, it was unclear whether needs affected visual perception or later-stage processes, like judgments and cognition (Carter & Schooler, 1949). Further, it was unclear whether needs were responsible for perceptual bias or whether it was memory, frequency of exposure, or target familiarity that affected vision (Adkins, 1956).

Finally, the motivated perception approach shares commonalities with a contemporary perspective articulating the effects of physiological energy on perception of the environment (see Proffitt, 2006). In their economy of action account, Proffitt and colleagues argue that perceptual experiences help people plan their actions within environments given the energy they have available to traverse them. When energy is depleted, environments appear more extreme, distances longer, and hills steeper. Indeed, people reporting chronic fatigue perceived hills as steeper (Schnall, Zadra, & Proffitt, 2010) and patients experiencing chronic pain perceived targets as further away than people without pain (Witt et al., 2009). When energy is low, anticipated effort very high, or the ability to act excessively difficult, environments appear more extreme, perhaps to discourage action.

Moreover, the economy of action account suggests the effort required to traverse a distance only affects perception when the anticipated effort is relevant to the perceptual experience (Witt, Proffitt, & Epstein, 2004, 2010). For instance, distances look farther to people who believe walking will be effortful but only if they intend to walk to the target. Distances do not appear as far if those people will simply throw a beanbag at the target (Witt et al., 2004). Perception appears

sensitive to the energetic costs of traversing a space, but functional perceptual biases emerge only to the extent that a person anticipates requiring those energy reserves. Just as our motivated perception account argues that perception is sensitive to motivational needs to act, the economy of action perspective suggests perceptual biases are also sensitive to the energetic resources required of and available for action.

DESIRE AND PERCEPTIONS

Armed with a firm foundation in classic research but improved theory and scientific rigor relative to the historic perspectives, we reopened and expanded upon the question of whether perception is influenced by motivational components. Compared to the New Look, we test a modern theory regarding potential relationships between regulatory action needs and perceptual experiences. We began by studying motivated perception of distance, and called upon New Look ideas and classic goal gradient research as a basis for our hypotheses. Goal gradient research showed that desirable objects energized approach behaviors to the extent that those objects were located in close proximity to the perceiver (Dollard & Miller, 1950). For instance, animals in a maze ran faster and pulled harder against restraints when they were actually closer to a food reward (Crespi, 1942; Brown, 1948).

If it is true that proximity is related to action as suggested by classic research, we theorized that people may underestimate the distance that separates them from an object when that object is desired and calls for action. We predicted that people's inclination to act in response to a desirable object may relate to perceptions of proximity.

To test whether desirable objects appear closer than less desirable objects, we began by manipulating the visceral need state of perceivers, which we expected would affect the desirability of a target object. First, we manipulated thirst by asking some participants to consume a serving of dry salty pretzels that constituted 40% of their daily intake of sodium and others to drink four 8-oz glasses of water (Balcetis & Dunning, 2010, Study 1). We then asked participants to estimate how many inches away a bottle of water was, using a 1-inch line as a reference. Thirsty participants reported the water was very desirable and estimated that it was 25.1-in away. Quenched participants, on the other hand, reported the water as less desirable and estimated that it was 28-in away. The object, when it was considered desirable because of its ability to satisfy a visceral need, appeared significantly closer than the same object when it was considered undesirable.

We argue that desirability led to perceived proximity, but it is possible that a general state of arousal differed between the thirsty and quenched groups. High arousal does shift how people process the focal and peripheral objects in their environments (see meta-analysis by Steblay, 1992). However, it is unlikely that general arousal alone led people to perceive the water as closer when thirsty compared to quenched. Just because they were thirsty does not mean people

were also experiencing greater levels of arousal. Indeed, people can feel thirsty without feeling increased arousal (Messing & Campbell, 1971). Rats will press a bar to receive water indicating they are thirsty, but heart rate does not correlate with thirst, suggesting the state of thirst is not necessarily associated with common indicators of general arousal (Hahn, Stern, & Fehr, 1964).

In addition, even if thirst had produced greater arousal, general arousal alone is unlikely to produce perceived proximity. To support this claim, we measured participants' visceral states and tested perceptions of distance to one of two objects (Balcetis, 2006). Specifically, we gathered some participants who were entering a dining hall before dinner, were hungry, and were arguably experiencing arousal. They estimated the distance to either two warm, delicious pieces of pizza or to a dull stack of paper cups. We compared these estimates to those made by participants who were leaving the dining hall after finishing dinner, were satisfied, and arguably not experiencing arousal.

With this design, we could simultaneously test the effects of object desirability as well as participants' arousal on perceived distance. We found that hungry participants estimated that two delicious slices of pizza were about 21-in away while other hungry diners estimated a boring stack of cups were 28-in away. This tendency to perceive the pizza as closer disappeared after hunger was satisfied. Participants leaving the dining hall after dinner estimated that both the pizza and cups were about 28-in away. If general arousal alone led to perceived proximity, then any focal object should have appeared closer to hungry participants compared to satisfied participants. However, this was not the case. Only those participants who were hungry and estimating distance to pizza perceived the target as closer.

Desirability need not stem from visceral needs in order to produce perceived proximity. Objects considered psychologically desirable also appear closer than objects considered psychologically undesirable. For instance, a mere piece of paper that provides positive self-relevant feedback can appear closer than a piece of paper that provides negative feedback (Balcetis & Dunning, 2010, Study 2b). In a study demonstrating this, college students completed a bogus personality test supposedly evaluating a most valued characteristic among our student sample—their sense of humor. The experimenter then ostensibly graded the test. For some participants, on the front page of the test, the experimenter printed an A, indicating participants had a stellar sense of humor and were among the most funny in the study. However, for other participants, on the front of the test, the experimenter printed a D+, indicating participants had a poor sense of humor and were among the least funny in the study. Then, the experimenter hung the graded personality test on the wall and asked participants to estimate the distance to the piece of paper, using a 1-in line as a reference. While participants looking at the unflattering feedback estimated the paper was 43-in away, participants looking at the flattering feedback estimated it to be closer, at only 36-in. Importantly, these effects do not seem to be the direct result of changes in mood. Environments do at times appear less extreme (e.g. hills less steep) when people are in good moods (Riener et al., 2011). Although our participants

did tend to be in a better mood after receiving positive rather than negative feedback, distance estimates did not correlate with mood.

Moreover, it is not numerical judgments of distance alone that are affected. Instead, people also act in ways in that suggest their perceptual experience has actually changed. When we measured distance perception by testing people's behaviors in response to desirable objects, we found that action-based measures of perception converge with judgments that require participants to translate perceptual experiences into numeric reports. In one experiment (Cole & Balcetis, 2013, Study 1), some participants saw a $100 bill in a picture frame on the ground in front of them. They knew that later on, they might win that $100 bill if they drew a lucky card from a deck. Other participants saw an empty picture frame on the ground and were told nothing about a drawing. Participants assessed the distance that separated them from either the desirable or neutral picture frame. Rather than providing a numeric estimate to represent their perceptual experience, participants tossed a beanbag at the picture frame. Participants were instructed to hit the object with their beanbag, and the beanbag was rubber so it would not slip when it hit the carpeted floor. Because there were no consequences tied to their toss, we considered the place where the beanbag landed to solely reflect participants' perceptions of distance to the object. If, as we suspected, participants perceived the desirable frame housing the $100 bill as closer than the empty frame, then the beanbag should land closer to participants. Our prediction was supported. Participants undertossed the beanbag by 2.4-in when the frame contained a $100 bill, relative to the actual location of the frame. They also overtossed by 11.3-in, relative to the actual location, when the frame was empty. This action-based measure suggested the desirable object appeared closer than the less desirable object.[2]

Further, it does not seem that participants were systematically or consciously altering their responses when tossing the beanbag (Balcetis & Dunning, 2010, Study 3a). In a different study, participants tossed a beanbag at a Visa gift card. We told some participants that the gift card held a $25 value, and we told others that its value was already used up. This time, we made participants' reward contingent on their toss. Participants knew that if they hit the gift card, they would win it. Participants again perceived the more desirable object to be closer than the less desirable object. The beanbag landed 9-in shy of the card when it held a $25 value but landed within an inch of the card, on average, when it had no value. In other words, participants seemed generally able to hit the card when it was valueless but on average undertossed the beanbag when it held financial value, suggesting they perceived the desirable object as closer. These results suggest people not only report that desirable objects appear closer, they also act as though the objects are closer. Moreover, participants were probably not systematically altering their responses to maximize payoff. If they were, they should have (and could have) hit the $25 gift card with the beanbag. Instead, results from this study and other evidence suggest that the desirability of the object, and the need to act in response to the object, influenced participants' actual perceptual experiences outside of their awareness.

Finally, we argue that the need to act, not simply the strength of participants' appraisal or opinion of the object in the environment, leads people to perceive desirable objects as closer. To test this, we measured perceptions of distance to objects that evoked strong affective reactions but that differed in the behavioral responses they called for. Specifically, participants viewed one of two objects on a table across from them. Half of the participants saw a package of colorfully wrapped chocolates, while the other half saw a plastic bag containing what was described as a freshly collected sample of dog feces. Unsurprisingly, but importantly, pre-test participants reported having more positive opinions about the chocolate than the feces, but in an absolute sense, the intensity of their feelings was actually slightly stronger about the feces than the chocolate. That is, participants felt more strongly about the feces than they felt about the chocolate.

On the wall above the table, two strips of tape were separated by 90.5-in of wall space. Participants completed a distance-matching task. Participants adjusted their own position by walking towards or away from either the chocolates or the feces until they believed the distance between themselves and the object was equal to the distance between the two pieces of tape on the wall. When they were finished adjusting, the distance between participants and the target object constituted participants' distance estimate.

We predicted that participants would experience the desirable chocolates as closer than the feces. In order to match the distance represented by the tape on the wall participants should paradoxically position themselves further from the chocolate than the feces. If, however, participants perceived the object about which they held a stronger attitude as closer, they should position themselves further from the feces than the chocolate. Again, we found that the desirable appeared closer than the undesirable object. Participants positioned themselves about 101-in away from the chocolates and 88-in away from the feces. We argue that because the chocolates appeared closer and seemed to loom nearer, participants needed to stand further away to match the set, referent distance. Again, while participants reported being in a more positive mood when viewing chocolates rather than feces, participants' mood did not predict distance estimates in any way.

Converging Evidence

Beyond the work emanating from our labs, additional evidence converges on the suggestion that visual perception, desirability, and action are linked. Football kickers who scored more points estimated the field goalposts were set wider apart (Witt & Dorsch, 2009). Golfers who played better estimated the hole size was larger (Witt et al., 2008), and softball players who hit well estimated that the ball was bigger (Witt & Proffitt, 2005) than their less accomplished counterparts. Improved performance, at least in these competitive athletic domains, correlates with perceptual overestimation (Witt, 2011). Perhaps those who see the hole as larger or the ball as bigger simply have an easier time hitting their mark. Indeed, reactions from baseball's biggest stars corroborate this sentiment.

When Mickey Mantle hit a 565-foot home run he claimed, "I just saw the ball as big as a grapefruit." Alternatively, Joe "Ducky" Medwick of the St. Louis Cardinals commented about his slump that he was "swinging at aspirins," and Ty Cobb described the legendary Walter Johnson's pitching, claiming "his fastball looked about the size of a watermelon seed and it hissed at you as it passed." Perception, and more specifically systematic misperceptions, seem related to action.

THREATS AND PERCEPTIONS

As a second approach to studying the links between perceptual bias and the regulation of action, we tested how people perceive distances to threatening objects. Just as people must act to take advantage of opportunities for reward, it is also imperative that people act to defend against approaching threats and looming dangers. We propose that threatening objects that require immediate action might appear close to guide effective, even essential, action. If the need to act contributes to perceived proximity, then threatening objects should appear closer than other negative objects that do not require immediate action, such as disgusting objects.

Indeed, threatening objects typically require quick behavioral responses. For example, in July 2011, during mating season, a 7.5-ft long boa constrictor in the U.K. broke through the lock on its tank and went missing after a 3-week fast. Abbigayle Harding, the snake's owner, along with the police, quickly devoted her efforts to mitigating the threat to the school kids and neighbors nearby. Residents were warned that the "hungry and unfriendly" snake could climb trees from where it might pounce on, bite, and attack prey. Clearly such an incident warranted immediate action, likely to a degree that, say, a gross rubbish bin, toilet, or soiled carpet in need of cleaning never would.[3] Both fear and disgust may be associated with negative feelings and avoidance tendencies, but fear typically necessitates active mobilization to withdraw from or dispel potential threats, whereas disgust does not.

In fact, physiological differences in the body's reactions to fear and revulsion support the assertion that threats call for immediate action whereas disgusting objects do not. Compared with fear, disgust generally is associated with a more static avoidance of objects and reduced readiness to act (Stanley & Knight, 2004). For instance, compared with fear, disgust is much less strongly tied to anticipated effort and exertion (Smith & Ellsworth, 1985). In contrast, feelings of fear increase activity in the sympathetic nervous system, prompting the body to mobilize for action. However, disgust activates parasympathetic responses, actually decreasing heart rate, blood pressure, and respiration and thereby suppressing action responses (Woody & Teachman, 2000). As measured by neuroendocrine stress responses, fear increases blood pressure and cortisol, a hormonal correlate of stress, whereas disgust lowers blood pressure and cortisol levels (Lerner et al., 2005). Increased blood pressure and cortisol suggest the body is prepared to take action when threats are present. These

biological markers suggest that although both disgust and fear are aversive states of arousal, fear is a motivating force that prompts action.

If perception of distance is responsive to needs to regulate action, and if perceived proximity is related to increased action, then threatening objects should be perceived as closer than disgusting or neutral objects because threats require more immediate responses than do contaminants. In one line of research, we tested these assumptions. In our first study, we put participants in a relatively small room across from a live tarantula that was walking around, unimpeded, on a tabletop (Cole, Balcetis, & Dunning, 2013). Participants reported the degree to which they felt threatened. They also reported the degree to which they felt disgusted. Finally, using a 1-in line as a reference, they reported the number of inches separating them from the tarantula. When statistically isolating the effect of fear from the effect of disgust, we found that the more threatened participants felt, the closer they perceived the tarantula. Importantly, this effect was not simply due to increased feelings of negativity, since stronger feelings of disgust actually led participants to estimate the tarantula was further away. Feelings of fear but not disgust produced perceptions of proximity to the tarantula.

In a second study (Cole, Balcetis, & Dunning, 2013), we experimentally manipulated participants' affective experiences to test the causal effect of threat on perceptions of distance. Female participants knew they would soon sit in a small room with a man as part of a study about first impressions. Before interacting with him, they watched a video he supposedly just made describing himself. Some participants watched him describe how he loved the feeling of a gun in his hand and how he felt his anger was bottled up inside without a way for release. Other participants watched him describe a summer job at a fast food restaurant that he found annoying, which led him to urinate into customers' sodas before serving them. Other participants watched him describe his class schedule. Then, participants went to meet the man in the video. After being seated, we measured participants' heart rate to assess general arousal.

Before chatting, participants estimated the distance separating them from the man. Perceptions of distance depended on what participants learned about the man beforehand. The threatening man appeared, on average, 55-in away. However, the disgusting man appeared 78-in away and the harmless man who discussed coursework appeared 74-in away. Experimentally induced fear but not disgust led to perceived proximity, even adjusting for arousal as measured by heart rate. Data from these two studies support the assumption that the regulatory need to act led objects considered threats to appear closer than objects considered disgusting or neutral.

Converging Evidence

Additional evidence converges on the hypothesis that the need to act in response to a threat produces a perceptual bias that facilitates action. For instance, the threat of falling caused people to overestimate how far it was to the ground when they stood on a balcony ledge (Stefanucci & Proffitt, 2009). Moreover, spider

phobics, who suffer strong subjective experiences of fear, perceived the speed of a spider moving toward them as faster than did nonphobic peers (Riskind, Moore, & Bowlby, 1995). Images of threatening objects appeared physically bigger than neutral or positive images (van Ulzen et al., 2008). Arguably, seeing the distance to the ground as farther, the speed of a scary spider as faster, and other biases encourage people to respond faster. Across these studies, threat leads to exaggerated perceptual experiences, which may facilitate or expedite appropriate responses to those threats.

POSSIBLE MECHANISMS

Because this work is still in its infancy, researchers have yet to pinpoint the precise mechanisms that contribute to systematic biases in perceived proximity. Emerging research has hinted at a few possibilities.

Arousal and Distance Perception

While arousal itself does not fully explain the effects of desirability and threat on perceived proximity, arousal does contribute to perceptual bias when perceiving distance. For instance, participants estimated that the distance to the ground off a 2-story balcony was further after viewing 30 emotionally arousing positive and negative images compared to non-arousing, neutral images (Stefanucci & Storbeck, 2009). Interestingly, however, perception of horizontal distance was not influenced by emotional arousal. Further, if directed to up-regulate their emotional experience and intensify their feelings while viewing the emotionally arousing images, heights appeared greater than if directed to down-regulate their emotional experiences. While it is difficult to isolate the effects of emotional states from general arousal, it is possible that arousal contributes to and is implicated in perceptual experience.

Although a contributing factor to bias in perceptual experience, the causal role arousal plays within our developing theory is unclear. One reason this might be the case is that arousal assumes many forms, and the specific way in which arousal affects perception may depend on how a theory conceptualizes arousal. One way to conceptualize arousal is as a sort of amplifier, strengthening the link between emotions and perception. Arousal, coming from imagery or up-regulation, might intensify emotional experiences, which affect perceptual experiences. Indeed, participants perceived the distance across a bed of nails as longer if they just imagined falling into it than if they just imagined successfully jumping over it (Stefanucci et al., 2012).

Another way to conceptualize arousal is as a source of energy. Arousal might provide a boost of energy physiologically (Brown, 1961), and such energy may affect perceptual experiences (Proffitt, 2006). For instance, male participants who viewed highly arousing pictures of nude females, an aimed gun, and skydivers experienced a 6% increase above baseline levels of circulating blood glucose whereas participants who viewed less arousing pictures of a fork, farmland,

and cows experienced only a 1% increase (Blake, Varnhagen, & Parent, 2001). Arousal may be a source of energy, and energy is related to perception of the environment.

Indeed, we experimentally manipulated the energy participants had available and found a causal effect of insufficient energy on perceptions of distance (Cole & Balcetis, 2013). First, we depleted blood glucose levels for all participants by having them complete a cognitively demanding and boring focused attention task. Next, we asked some participants to consume Kool-Aid sweetened with sugar, which increases blood glucose and available energy. We asked other participants to consume Kool-Aid sweetened with Splenda, a non-caloric sugar substitute, which has no effect on available energy. Participants, experimenters, and the supervising graduate student were all blind to energy condition. After drinking, participants estimated the distance to a target by tossing a beanbag with the intention to hit it. Participants who consumed sugar undertossed the beanbag by 2.4-in, on average, while participants who consumed Splenda overtossed the beanbag by 10.7-in. Although participants could not accurately guess at above chance levels whether they consumed sugar or Splenda, they saw the target as closer after receiving an energy boost compared to when energy levels remained low. Across self-reported and manipulated measures of energy, it seems that perception takes into account available energy.

If theorists consider arousal to have measurable effects on energy, then it is possible that arousal is related to perceptual biases that serve action-regulation. If arousal creates energy and ample sources of energy produce perceived proximity, then it is plausible that arousal should be considered and studied as a contributing mechanism by which perceptual experiences are biased. However, given the multiple operational definitions of arousal, the precise nature of the correlational and causal effect of arousal is yet to be determined.

Attention and Distance Perception

Another psychological mechanism that may contribute to perceived proximity is attention. Eye gaze is directed to and focused on select elements in the environment at the expense of others (Posner & Peterson, 1990). Often, attention is fixated on objects relevant to the perceiver's current desires (Fox et al., 2001; Maner et al., 2007; see also Maner & Leo, this volume; Most, this volume). For instance, when people feel positive and experience approach motivations, they narrowly focus visual attention (Gable & Harmon-Jones, 2010) and reduce global-level information processing (Gable & Harmon-Jones, 2008). For instance, when pictures of desirable foods (e.g., delicious desserts) appeared in the center of a computer screen, observers' attention narrowed, leading them to better recognize words presented in the center of the screen than words presented at the periphery. Likewise, heterosexual individuals interested in finding a sexual partner had their visual attention captured by photographs of very attractive members of the opposite sex more so than photographs of only mildly attractive opposite sex individuals or photographs depicting same-sex

individuals (Maner et al., 2007; Maner, this volume). Visual attention is directed to and captured by desirable targets.

Likewise, people orient attention towards threatening targets. Threatening objects capture and narrow the scope of visual attention (Chajut & Algom, 2003). When participants scan a collection of faces of the same person with the goal of identifying the one discrepant facial expression, participants are able to locate the target more quickly when the target face is angry than happy (Hansen & Hansen, 1988). People suffering from anxiety attend to personally threatening rather than neutral information (Pineles & Mineka, 2005). Attention is also allocated to threats.

One consequence of attentional orienting and capture may be biased perceptions of distance. It is possible that distances appear shorter when attention is narrowly focused on a target object. Indeed, some research suggests narrowly attending to a target location distorts perception of the surrounding space (Wardak, Denève, & Ben Hamed, 2011). When restricting an observer's visual field to the area directly around a target, distance is underestimated; narrowed focus on a distant target provides limited access to depth cues, which are necessary for coding distance accurately (Wu, Ooi, & He, 2004). In some of our own data, hungry participants who focused on chocolate chip cookies estimated that they were 15% closer than did participants with a more expansive focus of attention (Balcetis, 2006). Desirable and threatening objects capture attention, and narrowed attention leads to underestimation of distance. Future research should explore whether narrowly focusing on and maintaining attention to desirable and threatening objects is a mechanism by which they appear closer.

CONCLUSION

Major League Baseball has seen its share of unlikely athletes. Eddie Gaedel, the shortest player in the history of MLB, weighed 65 pounds and stood 3-ft 7-in tall. Walter Young, the heaviest player, tipped the scales at 322 pounds. Pete Gray and Jim Abbott played with one arm, Joe Nuxhall was just 15 years old, William Hoy was deaf, and Satchel Paige played until he was almost 60. Major League Baseball has seen players overcome their relative disadvantages. However, Major League Baseball is unlikely to see a player who is blind. People can overcome many physical hurdles, but without sight, players would not know when to swing the bat, where to position their glove to catch the ball, or how to hit their mark when running the bases.[4] In baseball, as in many facets of life, the regulation of action is inextricably linked to visual perception of the surrounding world.

Seeing is for doing. This classic assertion has found renewed interest among researchers interested in studying how people meet their regulatory needs. This chapter and the research described within add to a growing theory modeling the ways in which perception relates to and promotes action (see Witt, 2011). Although we focused primarily on distance perception as it relates to desires and threats, when we broaden our scope, additional evidence attesting to the

functional nature of perceptual bias for the regulation of action mounts. For instance, slopes and distances appear greater to the elderly, sick, overweight, and tired compared to their younger, fitter, and more energized counterparts (Proffitt, 2006). Additionally, objects appear bigger when they can satisfy an active goal, which makes them easier to detect in the environment (Veltkamp, Aarts, & Custers, 2008). Converging evidence suggests a link between perceptual biases and action regulation.

As this theory continues to develop and empirical evidence continues to mount, inevitably researchers will find the relationship between perceptions of the environment and the regulation of action to be more complex than we have depicted. Indeed, as we have demonstrated, the need to act may bias perception. But, importantly, perception may also in turn alter the need, want, or inclination to act. The next generation of research exploring the links between perception and action should seek to provide empirical evidence for the effects of biased perceptions on action tendencies. A functional system that is sensitive to the regulatory needs of perceivers should also help to facilitate those needs. Testing measurable effects on action that stem from perceptions, or misperceptions, of the environment is an important next step for researchers developing theory about how perception and action influence one another. Perception and action are most likely dynamically interdependent and inextricably linked.

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NOTES

1 As an interesting side note, collars on sheep's necks that monitor heart rate may soon be capable of sending a text message to farmers alerting them to the presence of predators (Clark, 2012).

2 It is possible that one might interpret results from our lab that rely on beanbag tosses as proxy measures of distance perception to suggest perception does not facilitate acquisition of desired objects. This remains an open possibility to be resolved by future research. We suggest the resolution might lie in the fact that tossing a beanbag at an object does not directly lead to acquisition of the object in the same way that actually walking towards it might. The beanbag toss is an indirect measure of perception, and may relate to functional outcomes in ways that differ from direct measures of perception including asking participants to wear a blindfold and actually walk to the location of the desired object (see Loomis et al., 1992).

3 Although the police, vigilant to protect the neighborhood, forbade school children from playing in the park next door to where they assumed the snake would flee, Harding eventually found the boa under her kitchen sink.

4 Of course, the National Beep Baseball Association was designed explicitly to include visually impaired athletes in the sport. Sighted players wear blindfolds, and fully and partially blind players field and bat by relying on noises emitted by the bases and the

ball. Even though adapted to rely on auditory cues rather than visual ones, sighted spotters are still required to call out where the ball is headed, and sighted pitchers and catchers do not wear blindfolds.

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Part IV

Interpersonal, Social and Cultural Implications

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16

Sex, Love, Temptation

Human Mating Motives and their Regulation

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Sex and relationships are a central part of human life. Indeed, when 4000 young men and women were asked the question: "Did you think about sex or were your thoughts sexually colored even for a moment during the last 5 minutes?" the results were quite telling. Five out of ten men said yes, as did four out of ten women (Cameron & Biber, 1973).

From the perspective of evolutionary biology, this comes as no surprise. The engine that drives biological evolution is differential reproductive success—some members of a species are better able than other members to reproduce their genes. The primary means through which people transmit their genes into the next generation is through sex. As a result, humans, like members of other sexually reproducing species, are powerfully motivated to play and succeed at "the mating game." Indeed, at a fundamental level, people's bodies, minds, and nervous systems are built to form sexual and romantic relationships.

Yet, forming a relationship is just the start. People also spend tremendous energy maintaining and protecting long-term committed relationships. This is a big difference between humans and chimpanzees, the latter of which tends to engage primarily in non-dyadic relationships with little promise of commitment (Tutin, 1979). Successfully maintaining a relationship into the long-term requires people to overcome a number of substantial challenges, not the least of which is avoiding temptations posed by desirable alternatives to one's long-term

partner. To help solve these challenges, people possess a variety of adaptive psychological and physiological mechanisms designed to help them overcome the obstacles that stand in the way of maintaining a successful long-term relationship. Powerful motives help people regulate their mating behavior in the face of tempting alternatives.

This chapter describes recent evidence for the role that biologically based motivational systems play in forming and maintaining sexual and romantic relationships. The chapter describes recent evidence for motivational processes that help people solve challenges associated with romantic attraction (e.g., seeking new partners; identifying the most desirable partners) and relationship maintenance (e.g., avoiding the temptation of romantic alternatives). The chapter also discusses emerging lines of research that take an interdisciplinary approach to identify basic perceptual mechanisms (e.g., attention) and physiological mechanisms (e.g., hormones) that help people solve important relationship challenges.

THE SIGHTS OF SEXUAL ATTRACTION

Sexual Motives and Attention to Possible Mates

Think back to the last time you walked across a college campus or down a crowded city street. Did you find yourself looking at some people more than others, and were there some people in particular you could now pick out of a line-up? Are the answers to these questions determined merely by random characteristics of the people you passed? Or, instead, are the ways we selectively attend to others linked to important underlying motivations, including those involved in mating?

It is well known that perceptual processes such as attention are influenced by people's motivations (see, for example, Balcetis & Cole, this volume; Bargh & Huang, this volume; Most, this volume). Several recent studies on mating and attention have tested the hypothesis that mating motives lead perceivers to attend preferentially to phenotypic cues in other people that signal the presence of desirable mating-related traits. For example, some cues that signal a variety of reproductively important traits are also often judged as physically attractive. Physical attractiveness has received attention in the evolutionary psychology literature because attractiveness can signal characteristics that are relevant to a person's level of reproductive fitness. Highly symmetrical people, for instance, are typically judged to be physically attractive, and symmetry can signal the presence of a strong immune system and a person's overall level of genetic fitness (e.g., Gangestad & Simpson, 2000). As such, physical attractiveness often is integrated into theories of "good genes" sexual selection. Indeed, women, particularly those pursuing a short-term sexual strategy, have a preference for physically attractive men in part because male physical attractiveness is a potential sign of high genetic fitness. Mating with an attractive man should increase the likelihood that a woman will, in turn, have more genetically fit offspring (Fisher, 1958; Scheib, Gangestad, & Thornhill, 1999). Moreover, a man's physical attractiveness often signals his level of social dominance (e.g., via

markers of testosterone; Cunningham, Barbee, & Pike, 1990), and women tend to prioritize dominance in their male partners (Buss, 1989).

In addition, perceptions of female attractiveness are often rooted in characteristics that signal a woman's health and fertility (Buss & Schmitt, 1993). From an evolutionary perspective, men have an evolved preference for healthy, fertile mates because such a preference would have increased the likelihood that a male ancestor would have fathered healthy offspring and, in turn, successfully passed his genes on to subsequent generations (Kenrick & Keefe, 1992; Singh, 1993). In summary, both men and women tend to prefer physically attractive partners (compared to less attractive ones).

Because physical attractiveness is highly valued in mating-related contexts and because it is an easily and rapidly recognizable stimulus characteristic (relative to other traits such as kindness), we have hypothesized that people possess psychological mechanisms that lead them to selectively attend to highly attractive individuals (Maner et al., 2007; Maner et al., 2003). That is, mating motives may lead people to become visually attuned to physically attractive members of the opposite sex at early and automatic stages of visual perception.

Several studies have provided support for this hypothesis. In an eye-tracking study, for example, undergraduate participants were presented with arrays of male and female faces that varied in their level of physical attractiveness. We found that both men and women gazed more intently on opposite-sex faces that were highly attractive, as compared to those that were less attractive (Maner et al., 2003). This attentional bias was especially strong among single people and people who were sexually unrestricted (i.e., individuals who tend to have strong interest in casual sexual partnerships and who place the greatest premium on physical attractiveness; see Simpson & Gangestad, 1991). Thus, attention to attractive opposite sex targets was especially strong among people with the most to gain from quickly identifying prospective partners.

Moreover, these attentional biases translated into subsequent frequency estimation biases. That is, after quickly viewing arrays consisting of 50% attractive faces and 50% average faces, people thought there were more attractive faces than average-looking faces. This bias presumably was partially a result of participants allocating a disproportionate amount of their attention toward the attractive faces. This sort of frequency estimation bias could have important consequences for relationship decisions. Thinking there are more highly attractive people in the local community than there really are, for instance, could lead people to develop unrealistically high standards for their romantic partners, and could even reduce people's commitment to a current relationship (Kenrick et al., 1994).

Examining lower-order cognitive processes such as attention can also help test sex differences in the characteristics men and women prioritize in a romantic partner. Although physical attractiveness is valued by both men and women, for example, other characteristics such as kindness, intelligence, sense of humor, and social status all play an important role, as well. But how do men and women differ in their prioritization of these traits? One recent study presented men

and women with pictures of people that varied independently in their level of attractiveness and social status (some were nicely dressed; others were dressed rather shabbily). While participants gazed at the people, their eye movements were tracked. Findings suggested that whereas men were inclined to look preferentially at the women who were physically attractive, women attended preferentially to men who displayed signs of social status, rather than attractiveness (Maner, DeWall, & Gailliot, 2008). Thus, status seemed to trump physical attractiveness for female perceivers. This finding fits with a large evolutionary literature suggesting benefits for women who form relationships with high status men (e.g., greater access to resources for themselves and their offspring; Buss & Schmitt, 1993; Sadalla, Kenrick, & Vershure, 1987).

The research described thus far in this section presumes that attunement to other people is caused, at least in part, by the presence of mating motivation—a desire to find a mate and form a romantic partnership. Such studies presume that some level of mating motivation is chronically active. Mating-related cognition, however, is also highly responsive to temporarily activated motivational states. To test the hypothesis that activated mating motives would increase attention to prospective mates, Maner et al. (2007) primed people with a mating motive and then examined attentional biases toward attractive opposite-sex faces. They examined the extent to which attention would "stick" on particular faces, such that people would be less efficient at pulling their attention away—a phenomenon we have referred to as "attentional adhesion."

In one study, people wrote a short essay about a time in which they were sexually and romantically aroused. In a second study, people unscrambled sentences that contained mating-related words (e.g., kiss, love, lust, erotic). In both cases, the mating prime increased participants' attentional adhesion to attractive opposite-sex faces (and only those faces). Moreover, those effects were most pronounced among sexually unrestricted participants—individuals who are interested in casual sexual partnerships and who are therefore most inclined to view attractive strangers as desirable and immediate mating opportunities. Mating related motives caused attractive faces to become "magnetic," in the sense that they captured and held people's attention at an early stage of perceptual processing: attentional adhesion was observed after participants had seen each face for only 500 milliseconds (half a second). People were able to detect a person's attractiveness literally in the blink of an eye and highly attractive targets captured people's attention without enough time for much conscious control.

Other work from our lab (Maner, Gailliot, & Miller, 2009) demonstrates that even when the motivational prime itself occurs outside of conscious awareness, mating motives direct attention toward attractive members of the opposite sex. In one study, participants first viewed either mating-related words (e.g., kiss, lust) or neutral words at a speed too quick to be consciously processed (40ms). In a second study, people performed an implicit priming procedure in which they unscrambled sets of words to form sentences. Some of the sets of words included mating-related words; others did not. In response to these implicit mating primes, single participants (but not participants already committed to a

current romantic partner, a point to which we return later) had their attention more powerfully captured by images of attractive opposite-sex targets. Thus, even when people were unaware of the source of their mating motivation, they still attended powerfully to prospective mates.

Other intriguing evidence for mating-related attentional biases comes from research examining psychological changes across women's menstrual cycle. A woman's level of fertility fluctuates dramatically throughout her menstrual cycle. Typically, there are only a few days in a woman's cycle when sexual intercourse can result in conception—the few days before ovulation (the late follicular phase) and the day of ovulation itself (Wilcox, Weinberg, & Baird, 1995). Outside this brief window, the probability of conception is very low. Thus, the period surrounding ovulation is important from a reproductive standpoint because it represents the peak period of a woman's fertility.

Anderson and colleagues (2010) applied this literature to study attentional changes across women's menstrual cycle. They asked naturally cycling women to view arrays of male faces while their focus of attention was surreptitiously recorded with an eye-tracker. Findings demonstrated that when women were ovulating, and thus were highly fertile, they attended more to the highly attractive male targets. Moreover, Laeng and Falkenberg (2007) had normally cycling women look at pictures of their male partners at different points in their cycle. The researchers found that when viewing their partners during the fertile part of their cycle, women displayed increases in pupil diameter—an indicator of heightened attention and arousal. These findings hint at the intriguing possibility that basic physiological states related to fertility attune women's perceptual systems to desirable mating-related traits in men—both their long-term partners and new potential mates.

Inattention to Attractive Alternatives

Although paying close attention to highly attractive members of the opposite sex can help people identify and procure a new partner, it can also spell disaster for a current long-term relationship. Indeed, a primary threat to close relationships is the temptation of relationship alternatives and infidelity is one of the most consistent predictors of divorce (Amoto & Rogers, 1997). Avoiding the temptation of relationship alternatives can involve substantial self-control and can be exhausting (see Inzlicht & Legault; Koole et al.; Scholer; all this volume, for discussions of the link between self-control and the depletion of executive resources).

Relationship alternatives who are physically attractive are particularly threatening to a relationship, as attractiveness is highly valued in extra-pair partners (Gangestad & Thornhill, 1997; Haselton & Gangestad, 2006). Consequently, attending to alternative partners can undermine a person's relationship commitment (Kenrick et al., 1994). Indeed, people in long-term relationships perceive desirable relationship alternatives as basic threats to their relationship (Plant, Kunstman, & Maner, 2010).

Many people are highly motivated to protect their long-term relationships and to downregulate their interest in relationship alternatives. For example, individuals who are in committed romantic relationships often "devalue" alternative partners—they judge alternatives as being less attractive than single people do (Johnson & Rusbult, 1989; Lydon et al., 1999; Simpson, Gangestad, & Lerma, 1990). Negative evaluations of alternative partners can help people stay committed to their current partner.

Some research suggests that limiting one's attention to attractive alternatives can enhance relationship success. Miller (1997) asked participants in romantic relationships to inspect magazine photographs that included images of physically attractive members of the opposite sex. Compared with participants who spent a lot of time gazing at the attractive opposite-sex photos, participants who spent less time looking at those photos reported greater relationship adjustment and satisfaction, and were less likely to have broken up, at a two-month follow-up.

Work from our own lab suggests that, even at early stages of perceptual processing, the desire to maintain a long-term relationship reduces people's attention to desirable romantic alternatives. For example, in one set of studies, people were primed with a mating motive and their attention to attractive opposite-sex targets was assessed with the dot probe task (Maner, Gailliot, & Miller, 2009). As described earlier in the chapter, this task measures early-stage attentional biases. In one study, participants were primed with mating words (or neutral control words) at the edge of visual perception (40 ms presentation). In a second study, participants were primed using a sentence unscrambling task; some of the sentences contained mating-related priming words (or neutral words in the control condition). Regardless of how they were primed, single participants responded by paying more attention to attractive members of the opposite sex. A very different pattern, however, emerged for participants who were already in a relationship: they paid less attention, not more, to images of highly attractive opposite-sex targets. At an early stage of visual attention, their attention was repelled by those members of the opposite sex who pose the greatest threat to relationship commitment.

In another study, we sought to directly activate a relationship maintenance motive in romantically involved participants (Maner, Rouby, & Gonzaga, 2008). Participants—all of whom were in a committed long-term relationship—performed a priming task intended to activate a relationship maintenance motive: they wrote a short autobiographical essay about an instance in which they felt strong feelings of romantic love for their partner (versus a neutral topic in the control condition). Feelings of romantic love are intimately linked with relationship maintenance and they motivate people to engage in strategies aimed at maintaining their long-term relationship (Diamond, 2004; Diamond & Dickenson, 2012; Gonzaga et al., 2001). Indeed, evolutionary theories suggest that love is a key affective mechanism that underlies long-term pair bonding (Frank, 1988).

After undergoing the priming procedure, participants completed the dot probe attention task. Participants who had written the romantic love priming

essay displayed substantially less attention to images of attractive opposite-sex targets. Being primed with a relationship maintenance motive (via feelings of romantic love) led people's attention to be automatically repelled by desirable alternatives to their current relationship partner.

Thus, people tend to be highly motivated to maintain and protect their long-term relationships from the threats posed by attractive relationship alternatives. At the level of basic perceptual processing (e.g., attending away from alternative partners) and at higher order stages of cognition (e.g., devaluing alternative partners), people display a variety of responses aimed at helping them resist temptation.

When Inattention to Relationship Alternatives Backfires

Although attending away from desirable relationship alternatives may help safeguard people's commitment, one recent set of studies suggests there may be an important exception to the general rule that less attention to attractive relationship alternatives is good for relationships (DeWall et al., 2011). In three experiments, DeWall and colleagues brought romantically committed participants into the lab, and subtly directed their attention away from images of attractive relationship alternatives. They used an attention modification task designed to limit people's attention to attractive alternatives without participants realizing that their attention had been manipulated. The task was a modified version of the dot probe task, in which two opposite-sex target photos (one highly attractive and one average-looking) were presented on a computer monitor, side by side. The researchers manipulated the proportion of trials on which the task required participants to attend to the location of the attractive images versus the less attractive images. In the experimental condition, the task required participants to attend away from the images of attractive opposite-sex targets on the majority of the trials, thus limiting their attention to attractive relationship alternatives. On 80% of the trials, a target object appeared behind the average-looking opposite-sex image, which required participants to attend to that image and away from the highly attractive image. Importantly, at no point did the experimenter explicitly instruct participants to attend away from the attractive images. A post-experimental suspicion probe confirmed that participants had no awareness that their attention had been constrained.

Across the three experiments, results indicated that manipulating people's attention away from relationship alternatives had the effect of turning those alternatives into "forbidden fruit." That is, just as people want jobs they cannot have, salaries they cannot earn, and cars they cannot afford, people also desire alternatives they cannot have. When people were placed in situations that limited their ability to attend to attractive alternatives, those people ended up desiring attractive relationship alternatives even more, and desiring their current relationship partner even less. This general pattern was observed across a number of dependent variables. Subtly limiting people's attention to attractive alternatives reduced their self-reported level of relationship satisfaction

and commitment and it increased their positive attitudes toward infidelity. It enhanced their memory for attractive relationship alternatives in a recognition memory experiment. And, finally, limiting people's attention increased their attention to attractive alternatives at a subsequent stage of the experiment, thus producing a rebound effect.

These findings are consistent with reactance theory (Brehm, 1966), which posits that people respond forcefully to threats to their own liberty by doubling their efforts to restore the threatened or lost freedom. Our findings are also consistent with a small number of studies suggesting that reactance can occur even when people are not aware that their freedom has been limited. For example, when participants were subliminally primed with the name of a relationship partner who limits their freedom, they rebelled and pursued a goal that ran counter to the partner's wishes (Chartrand, Dalton, & Fitzsimons, 2007). The studies of DeWall and colleagues demonstrate that when situational demands implicitly prevented committed participants from attending to attractive relationship alternatives, those alternatives became even more enticing.

Thus, the literature on mating and attention suggests that, although attention to desirable relationship alternatives can be harmful, so too can forcibly limiting attention to attractive alternatives. Being told simply not to look is probably not an effective strategy for boosting satisfaction and commitment or reducing interest in alternatives. To be sure, spending most of one's time attending to attractive alternatives is not a boon to a good relationship (Miller, 1997). Probably the most effective solution involves working on enhancing relationship processes that naturally lead to decreased attention, such as focusing on positive aspects of one's partner (Fletcher & Simpson, 2000).

SEXUAL ATTRACTION ACROSS THE MENSTRUAL CYCLE

When Men are Especially Attracted to Fertile Women

Earlier we described research suggesting that women pay particular attention to attractive mates at the point in their menstrual cycle when they are most fertile. Indeed, investigating psychological changes across the menstrual cycle represents an exciting new development in relationship psychology (Haselton & Gildersleeve, 2011). Research has documented an array of psychological and behavioral changes across the menstrual cycle, both in women and the men with whom they interact. Because such changes are inextricably linked with physiological and hormonal changes, identifying psychological changes across the menstrual cycle provides powerful opportunities to examine the biological mechanisms underlying mating motives. Indeed, examining those mechanisms provides some of the best insight into the evolved underpinnings of human mating.

Because fertility is essential for reproduction, evolutionary theories suggest that men and women possess psychological adaptations designed to activate

mating motives during the period surrounding ovulation (Gangestad, Thornhill, & Garver-Apgar, 2005). Indeed, in many sexually reproducing species, fluctuations in female fertility play a key role in shaping sexual attraction and mating behavior (Kendrick & Dixson, 1983; Ziegler et al., 2005).

Most of the relevant research in humans has focused on menstrual cycle shifts that occur within women. During the few days when conception risk is highest, for example, women report increases in sexual self-stimulation, sexual desire, and number of sexual fantasies (Bullivant et al., 2004; Harvey, 1987; Regan, 1996). Women also report greater interest in activities associated with finding and attracting new romantic partners, such as attending social gatherings (Haselton & Gangestad, 2006) and wearing sexually provocative clothing (Durante, Li, & Haselton, 2008; Haselton et al., 2007; Hill & Durante, 2009). During peak fertility, women show a particular preference for men displaying indicators of good genes (e.g., Gangestad et al., 2007; Gangestad, Thornhill, & Garver-Apgar, 2005; Penton-Voak et al., 1999). Consequently, when approaching ovulation, women engage in activities designed to secure genetic benefits from potential mates, in turn, maximizing the reproductive fitness gains afforded by their high level of fertility. Thus, during their fertile window, women experience an increase in their level of mating motivation, particularly in response to sexually desirable men.

Just as fertility plays an important role in the mating psychology of women, it also plays an important role in the mating psychology of men. The males of many species spend extraordinary time, energy, and resources attempting to court potentially fertile females and humans are no exception. From an evolutionary perspective, men who devoted their resources and energy toward pursuing fertile women (as opposed to women low in fertility) would have gained a substantial reproductive advantage over other men. As a result, evolutionary theories suggest that men possess adaptations that lead them to identify and engage in sexual courtship with women who are at their peak level of fertility. Indeed, in numerous species, female fertility plays a primary role in heightening male mating behavior (Kavaliers, Choleris, & Colwell, 2001; Ziegler et al., 2005).

Human women, unlike the females of many of other species, do not exhibit highly overt physical indicators of fertility, such as the sexual swellings that appear on the hindquarters of other primate females. Consequently, for quite some time, scientists presumed that women's ovulation was concealed (Burley, 1979). However, an emerging body of evidence suggests otherwise.

One intriguing line of research suggests that olfactory cues of ovulation—the scent of women during their peak period of fertility—play a key role in motivating mating behavior among men. Studies have begun to suggest that smelling the scent of an ovulating woman promotes in men psychological and physiological changes that reflect increases in mating motivation. The idea that olfaction serves as a mechanism by which men can detect women's level of fertility breaks with the colloquial wisdom that humans do not rely much on smell as an important communicator of social information. However, it is consistent with mating

research in other species. In many animals, chemosensory signaling serves as a principal medium by which female fertility shapes male mating behaviors (Pankevich, Baum, & Cherry, 2004; Ziegler et al., 2005).

In humans, a growing number of studies indicate that men prefer the odors of women close to ovulation and rate those odors as more pleasant-smelling than the odors of women at other points in their menstrual cycle (Havlíček et al., 2006; Singh & Bronstad, 2001; Thornhill et al., 2003; cf. Roney & Simmons, 2012). Those findings provide evidence that, in humans, men are sensitive to subtle signs of female fertility. Moreover, they suggest that olfaction may be one modality through which men can detect whether a woman is ovulating.

To test this idea further, Miller and Maner (2010a) asked male participants to smell t-shirts, some of which had been worn by women during the fertile phase of their cycle. After smelling the t-shirts, the men provided saliva samples, which were assayed for testosterone—a hormone associated with sexual desire and mating behavior. Findings from two experiments showed that men who had smelled the t-shirt of an ovulating woman (as compared to control shirts) displayed higher testosterone levels. Thus, the scent of fertility led to specific physiological changes in men known to promote sexual desire and sexual courtship (cf. Roney & Simmons, 2012).

Other recent research has explored whether the scent of female fertility produces broader changes in men's mating-related psychology and behavior. In one experiment, Miller and Maner (2011) asked men to smell the scent of an ovulating woman, a non-ovulating woman, or a control scent and then to perform a task designed to measure the accessibility of sexual concepts. Men performed a word stem completion task in which some of the word stems could be completed to make sexual words (e.g., S _ X and _ U S T). Findings from the experiment showed that men who smelled the t-shirts imbued with the scent of ovulation generated more sexual words than did men in the other two conditions. The increased accessibility of sexual thoughts and concepts is consistent with the idea that subtle cues to fertility activate a mating mindset in men.

In another study (Miller & Maner, 2011), men smelled t-shirts worn by women (some of whom were ovulating and some of whom were not) and then rated the emotions the woman was feeling when she was wearing the shirt. We had participants perform this task because previous work had shown that, when men are motivated to find a sexual partner, they sometimes perceive women as being more sexually aroused than they really are (Maner et al., 2005; see also Haselton & Buss, 2000). Thus, if the scent of fertility primes mating motives in men, those men exposed to the scent of a fertile woman should think that the woman is highly sexually aroused. Indeed, men who smelled the scent of ovulation (as compared with a control scent) thought that the t-shirt wearer felt more sexually aroused. This was particularly true for men scoring high on a measure of chemical sensitivity to smells. Moreover, although men also rated the extent to which the t-shirt wearer was feeling happy, sad, and afraid, there were no effects of female fertility on ratings of those emotions. Thus, the scent

of fertility produced a highly specific cognitive bias known to reflect the presence of heightened male mating motivation.

A number of additional studies have taken this line of research even further to examine implications for men's behavior. For example, Haselton and Gangestad (2006) found that women report heightened mate-guarding behaviors (e.g., possessiveness and monopolization of the woman's time) by their male romantic partners during periods of peak fertility (see also Burriss & Little, 2006). This makes sense from the standpoint that men should be especially inclined to guard against potential infidelity when their partner is highly fertile, in order to avoid potential cuckoldry. Additionally, Miller, Tybur, and Jordan (2007) reported that men tend to give larger tips to female dancers when the dancers are near ovulation as compared to other phases of their cycle.

In another study (Miller & Maner, 2011), male participants interacted closely with a female confederate at various times during her menstrual cycle. Two aspects of men's behavior were assessed. First, the interaction was videotaped and the degree to which men mimicked the posture of the confederate was assessed. Because behavioral mimicry can signal romantic attraction (Van Straaten et al., 2008), we reasoned that men might mimic the confederate's behavior more when she was close to ovulation, as compared to far from ovulation. Indeed, findings demonstrated this to be the case.

The second aspect of men's behavior involved risk-taking: men performed a blackjack task while the confederate watched. When men are motivated to attract a mate they often behave in risky ways as a way of signaling their confidence and ambition (Baker & Maner, 2008, 2009; Daly & Wilson, 2001). Consistent with this idea, men made riskier choices on the blackjack task (they decided to hit more) when the confederate was ovulating, as compared to when she was low in fertility. These findings suggest that signs of female fertility prompt increases in behaviors that reflect heightened male mating motivation.

Notably, in the course of this study, the confederate's behavior was carefully scripted: she kept eye contact and conversation to a minimum; she wore similar clothes and make-up across sessions; she behaved in an introverted way and was not flirtatious. Independent observers confirmed each of these aspects of her behavior. Nevertheless, despite the fact that nothing in her overt behavior signaled her level of fertility, men responded with behaviors associated with romantic attraction. Her level of fertility was presumably communicated via more subtle cues such as scent and vocal tone (Bryant & Haselton, 2009). These findings speak to the powerful effects relatively covert signs of fertility have on men's behavior.

When Men are Less Attracted to Fertile Women

Here we discuss one intriguing exception to the literature on attraction and fertility. Just as individuals who are already in a committed relationship often avoid attending to desirable relationship alternatives, so too might they avoid

responding with attraction to highly fertile women. In the study described above (Miller & Maner, 2011), men responded to a fertile research confederate with signs of enhanced romantic attraction—they took more risks and mimicked the confederate's nonverbal behavior. There was one dependent variable, however, that produced a more complex pattern of findings: self-reported judgments of attractiveness (Miller & Maner, 2010b). At the end of the session, men reported on how attractive they thought the confederate was using a standard Likert scale. Based on the fertility literature, one might expect that men would rate the confederate as more attractive when she was highly fertile than when she was not. And, indeed, this is exactly what we found, but only for single men. Men who were already in a committed romantic relationship rated the confederate as significantly *less* attractive—not more attractive—when she was ovulating. This pattern is consistent with a desire to protect their level of relationship commitment in the face of a highly desirable alternative to their current partner. That is, men presumably found the woman to be especially attractive when she was highly fertile and, consequently, were especially motivated to regulate their level of desire so as to avoid any loss of commitment.

It is interesting to note that evidence for relationship protective responses was found for the overt self-report measure of perceived attractiveness but not for the other, more implicit behavioral measures. One possible explanation is that men interpreted the overt measure as revealing their level of romantic desire and so they became especially motivated to downregulate that desire. This sort of response would be consistent with other evidence (mentioned earlier) on the devaluation of romantic alternatives (e.g., Lydon et al., 1999). Men may not have interpreted the other behavioral measures (nonverbal mimicry, risk-taking) as indicative of mating behavior and, in those circumstances, the motivation to maintain their relationship was not activated.

The study by Miller and Maner (2010b) suggests that motivated forms of relationship maintenance are calibrated not only to highly overt characteristics such as physical attractiveness in alternative relationship partners; they are also calibrated to highly subtle yet reproductively important cues such as level of fertility. Those findings reveal a heretofore hidden aspect of the regulatory processes through which people might avoid temptation and protect their long-term romantic relationships.

TWO UNRESOLVED BUT INTERESTING ISSUES

In closing, we briefly raise two additional questions spawned by the recent literature on adaptive relationship cognition: 1) Does relationship maintenance require conscious executive control? 2) To what extent are there sex differences in mating-related psychological processes?

With regard to executive control, work from our lab suggests the operation of relationship maintenance processes in the absence of conscious executive control. For example, the dependent measure we use in our work on attention biases assesses attentional processes that are relatively quick and automatic

(Maner et al., 2007). People in relationships avert their attention from sources of temptation apparently without much time or need for conscious control (cf. Bargh & Huang, this volume). Other work, however, suggests that executive control plays an important role in helping people avoid the temptation of attractive alternatives. For example, in a line of research by Karremans and colleagues, people high in trait self-control (Pronk, Karremans, & Wigboldus, 2011) and state self-control (Ritter, Karremans, & Van Schie, 2010) were better able than those low in self-control to resist temptations posed by attractive relationship alternatives. It seems likely that automatic and consciously controlled processes both play a role in helping people avoid temptation. Future research would benefit from assessing more carefully the ways in which particular aspects of relationship maintenance involve automatic versus consciously regulated processes.

With regard to sex differences, a large literature in evolutionary psychology suggests sex differences in men's and women's mating strategies, their desire for casual sexual relationships, and other mating-related variables (Buss & Schmitt, 1993; Clark & Hatfield, 1989; Simpson & Gangestad, 1991). Yet, other work suggests that men and women both pursue casual sex relationships, engage in infidelity, and the like (Haselton & Gangestad, 2006; Lammers et al., 2011). One possible reconciliation is suggested by our work on mating-related cognition. For example, in our work on attention to highly attractive members of the opposite sex, we sometimes find sex differences in baseline levels of attention to attractive targets, with men attending to attractive targets more than women (Maner et al., 2003). However, we rarely find that a person's sex moderates effects of motivational priming on attention to attractive mates; in response to priming, women are just as interested in attractive men as men are in attractive women (Maner et al., 2007). This pattern fits with a model in which men and women do differ in their pre-potent levels of desire for casual sex, preference for attractiveness, and so on; but once mating motives are active, men and women display similar patterns of mating-related cognition and behavior.

CLOSING

Mating is a powerful motivator and it has profound effects on all levels of perception, cognition, and behavior. Mating motives lead people to rigorously seek novel mating opportunities, while relationship maintenance motives lead people to protect the relationships they already have. These motives shape the way people attend to, evaluate, and behave toward many types of social stimuli. Integrating theories of social psychology and evolutionary psychology provides a strong overarching framework with which to understand the adaptively motivated aspects of people's relationship psychology. The research described in this chapter has implications for understanding a broad range of relationship phenomena, from romantic attraction to the dissolution of a long-term romantic partnership.

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17

The Natural Order of Things

The Motivated Underpinnings of Naturalistic Explanations for Inequality

JAIME L. NAPIER

> *There is a tendency to think that what we grew up with, what we have seen all our lives, is natural and inevitable. That any other way would be against human nature.*
>
> —*Howard Zinn,* Declarations of Independence *(1990, p. 161)*

In line with the observation made by historian Howard Zinn, research has established that people hold beliefs about social groups that serve to equate "the way things are" with the way they *ought* to be (e.g., Bem & Bem, 1970; Eagly & Steffen, 2000; Eidelman, Crandall, & Pattershall, 2009; Feldman, 1972; Fiske et al., 2002; Glick & Fiske, 2001a, 2001b; Jackman, 1994; Jost & Banaji, 1994; Jost et al., 2005; Kay et al., 2007, 2009; Napier, Thorisdottir, & Jost, 2010; Triandis, 1977; Yzerbyt et al., 1997). The system-legitimizing role of ideological beliefs has been a central focus of researchers for many years (Glick & Fiske, 2001a; Jost & Banaji, 1994; Lerner, 1980; Sidanius & Pratto, 2001). However, the question of whether different *types* of system-legitimizing beliefs might be differentially evoked (and have differential consequences) has received little attention.

In this chapter, I bring together recent empirical work that sheds new light on the process of system justification by focusing on a particular type of system-justifying belief, namely, "naturalistic" attributions for societal inequality. I first review recent research that shows that when both group- and system-justifying

motivations are activated, women increase their endorsement of gender essentialism. I argue that essentialist beliefs are just one example of a more general type of system-justifying belief—namely, naturalistic attributions for inequality. I next present factor-analytic evidence that people explain inequality in at least two distinct system-exonerating ways—by placing the blame on disadvantaged individuals (personal responsibility attributions) or on nature (naturalistic explanations).

An important difference between these two types of attributions is the locus of causality. In contrast to personal responsibility attributions, naturalistic explanations can deflect blame away from *both* the system and the group members, and thus can legitimize the system without directly blaming members of disadvantaged groups. I then review another set of studies that offer an empirical test of the consequences of naturalistic explanations of inequality, namely that these attributions can serve to buffer people's self-esteem when they are motivated to justify the system but feel low personal control over their outcomes.

SYSTEM JUSTIFICATION THEORY

According to system justification theory (Jost & Banaji, 1994; Jost, Banaji, & Nosek, 2004; Jost & van der Toorn, 2012), people are motivated to view the systems under which they work and live as stable, fair, and legitimate. A central focus of this work has been on how people understand inequality between social groups (e.g., men and women; Whites and Blacks). Specifically, system justification researchers have highlighted how beliefs that emphasize (or exaggerate) the degree to which individuals can be held personally accountable for their outcomes can serve to legitimize inequality among social groups insofar as they imply that status differences are earned. In line with this notion, a host of studies have shown that perceptions of individual responsibility (and endorsements of ideologies that emphasize individual responsibility) are associated with prejudicial attitudes toward Blacks and members of other disadvantaged groups (Crandall, 1994, 1995; Jost, Banaji, & Nosek, 2004; Jost, Glaser, et al., 2003; Nosek, Banaji, & Jost, 2009; Pratto et al., 1994; Rim, 1988; Sears et al., 1997; Sidanius, Pratto, & Bobo, 1996; Weiner, 1986; Weiner, Perry, & Magnusson, 1988).

Although research on system justification has largely focused on how people often hold those who are disadvantaged as personally responsible for their own plight (e.g., Napier et al., 2006), this is not the only way that people rationalize inequality. Psychological essentialism, the belief that members of social groups share some deep, underlying essence that makes them part of that group, is often evoked in system justifying ways (e.g., Keller, 2005). For instance, Martin and Parker (1995) found that the belief that sex and race differences are due to biological factors is related to the belief that such differences are large in magnitude, and is also associated with the belief that these differences cannot be eliminated. Keller (2005) found that a general "belief in genetic determinism" was significantly and positively related to system-legitimizing ideologies,

including patriotism, nationalism, social dominance orientation, and the Protestant work ethic (see also Jayaratne et al., 2006).

In contrast to personal responsibility attributions, which assume that outcomes are causally related to an actor's behavior, essentialist (or naturalistic) beliefs are dependent on the assumption that outcomes are beyond an individual's control (i.e., that an external locus of causality is operating). At the same time, naturalistic attributions are system justifying insofar as they place the locus of causality *outside* of the system. These beliefs (such as "some people are innately superior to others") acknowledge the existence of inequality but do not hold system-level authorities or policies responsible for it. Thus, they deflect blame away from the system as well as the individual and group.

ESSENTIALIST BELIEFS AS A RESPONSE TO CONFLICTS BETWEEN SYSTEM- AND GROUP-JUSTIFICATION MOTIVATIONS

The question of whether members of disadvantaged groups engage in system justification, and to what extent, has been an important focus for system justification theory. On the one hand, members of both advantaged and disadvantaged groups should be motivated to view the system as stable and fair, insofar as such a view serves epistemic and existential motivations for order and meaning. On the other hand, members of disadvantaged groups should experience conflicts between maintaining a positive view of the system (system justification) and maintaining a positive view of the group and the self (group and ego justification).

Previous explorations into this question have mostly focused on personal responsibility types of system-justifying beliefs (e.g., "people who work hard are almost always successful"; Jost, Pelham, et al., 2003; Rankin, Jost, & Wakslak, 2009), and have produced mixed results. Some work suggests that members of disadvantaged groups will engage in system justification only to the extent that their group membership is not salient (Jost, Pelham, et al., 2003). Because naturalistic explanations of inequality deflect blame away from the system without holding the group members personally responsible, my colleagues and I proposed that they could serve to ameliorate the conflict between system- and group-justification motivations for members of disadvantaged groups (Napier et al., in prep.). We examined this in the context of gender inequality by examining "essentialist" beliefs about gender among men and women.

In a first set of studies, my colleagues and I (Napier et al., in prep.) examined essentialist beliefs about gender among men and women who were motivated to justify the system. We reasoned that essentialist beliefs about gender would be heightened among women (but not men) when people were both motivated to justify the system and when gender disparities were made salient. That is, we attempted to create a "conflict" between women's group- and system-justifying motivations, and expected that when this conflict was present (vs. absent), women would be higher on essentialist explanations for gender inequality as compared to men, who presumably would not experience this conflict.

In our first two studies, we experimentally manipulated people's motivation to justify the system using paradigms from prior work, and then reminded all participants about the state of gender inequality in their country. Specifically, in Study 1, we randomly assigned undergraduate participants to read a paragraph ostensibly covering a study that concluded that it would be increasingly difficult to move out of their country in the coming years ("high system dependency" condition) or that leaving the country will become increasingly easier ("low system dependency" condition). This manipulation was taken from Laurin, Shepard, and Kay (2011), who demonstrated that people are more motivated to justify the system when their ability to emigrate is restricted and they feel "stuck." After reading one of the two passages, participants read a paragraph describing the state of gender inequality in their country, and were asked the extent to which they believed that these gender disparities were "due to genuine differences between women and men."

Results confirmed our expectations. When participants were told it was relatively easy to leave their country (and were thus not particularly motivated to justify the system), women were slightly (but not significantly) less likely than men to endorse the essentialist explanation of gender differences. When they were told emigration would be restricted, and their motivation to justify the system was presumably heightened, however, this trend was reversed: women were more likely than men to say that gender inequality is due to essential differences between men and women. Looking at it another way, women were significantly more likely to endorse the essentialist explanation of gender inequality when their motivation to justify the system was high (vs. low), whereas men's endorsement of essentialist explanations was unchanged by the manipulation.

In Study 2, we replicated this using a different manipulation of system justification motivation and a different dependent measure. Specifically, participants were randomly assigned to read a paragraph about how much the country that they live in affects their life and well-being ("system dependence" condition) versus a control paragraph (taken from a geology textbook). Following this, participants read an ostensible *New York Times* article recounting the history of patriarchy in the United States. For our dependent measure, participants were shown a list of occupations that were described as "predominantly male" or "predominantly female" and asked to rate the extent to which the gender makeup of each occupation was "due to biological factors." They rated four occupations that were labeled "predominantly male" (fire fighters, chefs, mathematicians, and business executives) and four that were labeled "predominantly female" (elementary school teachers, nurses, stay-at-home parents, and daycare workers). We computed an overall biological attribution score based on these eight ratings to use as our measure of gender essentialism.

Results mirrored our findings from the first study. The system justification manipulation did not affect men's biological attributions, whereas women were significantly more like to endorse the biological reasons for gender disparities when system dependence was high (vs. low). Alternatively, men tended to be more likely than women to endorse biological explanations of occupational

gender disparities in the control condition, but there was no gender difference in biological explanations when system justification motives were activated.

Study 3 was conducted in order to home in on whether or not we were truly creating a motivational conflict between system- and group-justifying motivations. In this study, participants were all White women who were reminded of their high ("White") or low ("women") status. Specifically, after participants were randomly assigned to read the system dependency manipulation (used in Study 1), they saw a screen that was labeled "Societal privilege check." In the high status condition, they were asked "Are you White?" In the low status condition, they were asked "Are you a man?" Finally, participants responded to one item that assessed their lay theory of intelligence: "I can develop my intelligence if I really try" (e.g., Dweck & Leggett, 1988). This item was coded so that higher numbers corresponded to an entity (vs. incremental) theory of intelligence (1 = "Strongly agree"; 7 = "Strongly disagree").

Results confirmed our prediction that women would be more likely to endorse essentialist (or entity-based) theories of their own intelligence when they were motivated to justify the system, and when their low (but not high) status was salient. Among White women who were reminded of their high (White) status, there was no effect of the system dependence manipulation. White women reminded of their low (women) status, however, were more likely to say that their intelligence is immutable when they were led to feel dependent on the system as compared to when they were not. Alternatively, when the motivation to justify the system was not salient, whether participants' low or high status was made salient did not impact their endorsement of essentialist reasoning about intelligence. When the motivation to justify the system was activated, by contrast, those reminded of their low status were significantly more likely to endorse an entity-based theory of intelligence as compared to those reminded of their high status.

TWO TYPES OF SYSTEM-JUSTIFYING BELIEFS

Results from this first attempt to examine the motivational functions of essentialist beliefs about inequalities confirmed our expectations that these types of explanations would be heightened when there was a conflict between group- and system justifying needs. In these first studies, however, our conception of naturalistic explanations was limited to essentialist beliefs about groups (men and women). Essentialism should be one instantiation of a more general view of how the system works. That is, I propose that people can hold a view of the system (and its outcomes) as a reflection of individual agencies and behaviors (the system is "fair") or as a reflection of natural forces (the system is "natural").

In order to provide empirical evidence for two distinct types of legitimizing beliefs, personal responsibility beliefs and naturalistic beliefs, I factor analyze a subset of items from the economic system justification scale (Jost & Thompson, 2000). Several items on this scale, shown in Table 17.1, explicitly assess either personal responsibility or naturalistic rationalizations of the system. In particular,

TABLE 17.1 The bivariate correlations of personal responsibility (PR) and naturalistic (N) attributions for inequality from the economic system justification scale (Study 1)

	1	2	3	4	5	6
Sample Mean	5.21	4.28	4.38	3.93	4.32	5.10
Sample Standard Deviation	2.11	1.98	2.03	2.01	2.00	2.11
1. If people work hard, they almost always get what they want. (PR)	–	.381	.373	.248	.212	.134
2. Most people who don't get ahead in our society should not blame the system; they have only themselves to blame. (PR)		–	.418	.251	.311	.268
3. Economic positions are legitimate reflections of people's achievements. (PR)			–	.301	.347	.232
4. Laws of nature are responsible for differences in wealth in society. (N)				–	.496	.270
5. Social class differences reflect differences in the natural order of things. (N)					–	.264
6. Equal distribution of resources is unnatural. (N)						–

the contents of three items directly assess the belief that economic outcomes are contingent on personal deservingness or effort (e.g., "If people work hard, they almost always get what they want"). In addition, the contents of an additional three items explicitly assess the belief that social inequality is the result of "natural" forces (e.g., "Social class differences reflect the natural order of things").

Over the course of nine semesters—from Spring 2004 to Spring 2008—3,830 New York University undergraduates completed this 17-item economic system justification scale (Jost & Thompson, 2000). Participants were 31.6% male and had a mean age of 19.0 years (SD = 1.28). Approximately 61% of the participants identified their race as White; 20.5% as Asian; 4.2% as Black; and the remaining participants identified as "Other." A subset of these participants (from Spring 2004 to Spring 2007, n = 3,024) also completed a 7-item measure of acceptance of income equality (Kluegel & Smith, 1986; α = .86).

In order to test whether personal responsibility attributions and naturalistic attributions are distinct rationalizations for the status quo, I conducted a confirmatory factor analysis of the six aforementioned items from the economic system justification scale.[1] A single factor solution, in which all of the six items listed in Table 17.1 loaded on to one latent variable, showed rather poor fit to the data, CFI = .871, SRMR = .057, RMSEA = .122, $\chi^2(9)$ = 543.41. Next I tested a two-factor solution, with the three personal responsibility items loaded on to one latent variable and the three naturalistic rationalization items loaded on to a second latent variable, allowing the two latent variables to correlate. The fit statistics for this model were acceptable, CFI = .971, SRMR = .029,

TABLE 17.2 The estimates from a 2-factor solution of the economic system justification (ESJ) scale (Study 1)

Factor loadings and error variances				
	b (SE)	*β*	R^2	σ^2 *(SE)*
Personal responsibility attributions				1.62 (.09)
← ESJ1	.91 (.04)	.55	.30	3.09 (.09)
← ESJ2	1^{NT}	.64	.41	2.30 (.08)
← ESJ3	1.08 (.04)	.68	.46	2.25 (.08)
Naturalistic attributions				1.85 (.10)
← ESJ4	1^{NT}	.68	.46	2.20 (.08)
← ESJ5	1.05 (.04)	.71	.51	1.97 (.08)
← ESJ6	.63 (.03)	.41	.17	3.72 (.09)

Note. ^{NT}, not tested; All other estimates (including error variances and factor loadings) are significant at $p < .001$.

RMSEA = .062, $\chi^2(8) = 129.24$. Further, this model fit showed significant improvement over the one-factor solution, $\Delta\chi^2(1) = 414.17$, $p < .001$. Table 17.2 lists the factor loadings, error variances, factor covariances, and fit statistics for the two-factor model. A subsequent model that constrained the correlation between the two latent variables to 1 showed significantly worse fit, $\Delta\chi^2(1) = 8.22$, $p < .01$, suggesting that these two factors are not redundant.

To further probe whether both factors are reflections of distinct inequality-legitimizing beliefs, I conducted a linear regression model predicting the acceptance of income inequality with the two factors simultaneously. Results confirmed that beliefs that attribute inequality to personal responsibility, $b = .32$, $SE = .02$, $p < .001$, and to naturalistic factors, $b = .36$, $SE = .02$, $p < .001$, both independently and significantly contributed to the acceptance of inequality. Thus, above and beyond one's belief in personal responsibility, endorsing naturalistic rationalizations was positively associated with the acceptance of income inequality.

In sum, I find support for the notion that there are at least two distinct types of inequality-legitimizing beliefs. A confirmatory factor analysis showed that the best fitting model is one that distinguishes beliefs that emphasize personal responsibility from those that emphasize nature. Importantly, I found that both these two factors independently contributed to a significant amount of variance in the acceptance of inequality, which is in line with the notion that both types of attributions can serve to justify system-level inequality.

One important divergent underlying assumption between these two types of system-justifying beliefs—explanations that highlight individual responsibility versus explanations that implicate naturalistic factors in outcomes—is the locus of causality. Whereas personal responsibility attributions are predicated on the notion that individuals are personally in control of their outcomes, naturalistic explanations in some sense have the opposite assumption—that people do not have personal control, and that they are subject to the forces of nature. In the last section, I examine the consequences of this assumption for individual well-being.

THE PALLIATIVE FUNCTION OF NATURALISTIC EXPLANATIONS IN THE FACE OF LOW PERSONAL CONTROL

To the extent that naturalistic explanations exonerate the low status individual (or group) from being personally (or intentionally) responsible for their relatively bad outcomes, it makes sense that these types of explanations may ameliorate the negative affect that would presumably be associated with a personal responsibility attribution. In another line of research, my colleague and I have been examining the "palliative function" of naturalistic attributions for inequality (Sawaoka & Napier, in prep.).

A long and extensive body of research has identified a sense of *personal control* as a key component for developing and maintaining physical and psychological well-being (for review, see Kay et al., 2009). The perception of high personal control seems to promote subjective well-being even when this perception is illusory (Taylor & Brown, 1988), whereas the perceived loss of personal control has been linked to emotional trauma (Janoff-Bulman, 1992; Pennebaker & Stone, 2004), depression and withdrawal (Schulz & Aderman, 1974; Seligman, 1975; Streib, 1971), and even early death (Schulz & Aderman, 1973).

At the same time, the realization that "nothing can be done" is sometimes a rather palliative one insofar as it alleviates the individual from having to take action (e.g., Brehm, 1999). In this research, we attempted to shed light on this apparent paradox, arguing that when people *personally* experience low control, a belief that *no one* is in control can serve to buffer subjective well-being, at least to the extent that people are motivated to perceive their world as ordered and meaningful.

Across four studies, we tested the hypothesis that naturalistic beliefs about the system—beliefs that attribute system-level inequalities to natural factors (such as genetics)—can serve a palliative function for people who feel low personal control but are motivated to maintain a worldview that things are as they "ought" to be.

In our first two studies, we compared the relationship between naturalistic beliefs and subjective well-being among people who are involuntarily unemployed and those who are not. Results showed that there was no relationship between employed people's well-being and their beliefs in genetic determinism (in the General Social Survey) or their naturalistic explanations of system-level inequality as measured by the items from the naturalistic factor of the Economic System Justification scale (from a sample collected on MTurk). Among the involuntary unemployed, however, endorsement of these naturalistic beliefs was positively related to measures of well-being, including self-esteem and life satisfaction. People who are involuntarily unemployed (vs. not) report lower levels of subjective well-being only to the extent that they reject naturalistic explanations for outcomes. Involuntarily unemployed individuals who endorse these naturalistic beliefs, however, report equally high well-being as their

employed counterparts, suggesting that appealing to nature for an explanation for outcomes can serve to buffer subjective well-being in the face of hardship and feelings of personal inefficacy.

We experimentally tested this idea in two additional studies. In one study, after measuring participants' endorsement of naturalistic beliefs, we manipulated their motivation to justify the system by having them read a passage, taken from Kay and Jost (2003), about the state of decline of the United States ("system threat") or about a recent discovery on Mars ("control condition"). We then manipulated their feelings of personal control by having them recall a time when something positive happened to them which they either had control over ("high personal control") or they had no control over ("low personal control"; Kay et al., 2008). Finally, we measured their self-esteem, to assess subjective well-being. When the system was not threatened—and thus presumably when participants' motivation to justify the system was less active—reminders of low (vs. high) personal control marginally significantly reduced subjective well-being, regardless of participants' endorsement of naturalistic beliefs. Under system threat, however, naturalistic beliefs about inequality were positively associated with subjective well-being among participants induced to feel low control, but were unrelated to well-being among participants induced to feel high personal control. Again, this study is in line with the notion that naturalistic beliefs about inequality can protect subjective well-being in the face of low control. That is, in the low personal control condition, participants who rejected naturalistic explanations of inequality reported significantly lower levels of subjective well-being as compared to those in the high control condition; among those who endorsed these beliefs, however, those primed to feel low personal control had equally high well-being as those primed to feel high control.

In the final study, we sought to provide causal evidence that naturalistic explanations for outcomes buffer subjective well-being in the face of low control. All participants were exposed to a system threat, and then randomly assigned to feel low versus high personal control in the same manner as the previous study. We then manipulated participants' beliefs about inequality by exposing them to a passage claiming that life outcomes are due to genetic factors (natural condition) or to effort (meritocratic condition). Among those exposed to a meritocratic explanation of outcomes, being reminded of low (vs. high) personal control negatively impacted subjective well-being; among those exposed to the naturalistic explanation, by contrast, there was no effect of the control manipulation on well-being.

CONCLUDING REMARKS

In this chapter, I have summarized emerging work examining beliefs that people have innate, essential differences and disparities in society are simply reflections of these natural disparities. In our first line of work on this topic, my colleagues and I have shown that when system justification motivation is

activated (vs. not), members of disadvantaged groups who are reminded of their disadvantage increase their endorsement of essentialist explanations for inequality. I have been exploring the notion that essentialism is one type of belief that denotes a broader view of the system as functioning as a reaction to "natural" forces. In other lines of work, we have shown that (1) reminders of injustice (vs. justice) lead to increased belief in this naturalistic view, and decreased belief in a meritocratic view (Napier, under review) and that (2) to the extent that a person endorses a naturalistic view of the system, they maintain relatively high subjective well-being in the face of low personal control, as compared to those who reject such a view.

Humans have an affinity for nature (Wilson, 1984). Research has shown that people are more accepting of things when they are described as "natural." For instance, people are less opposed to marijuana usage when it is described as an "herb" as compared to "a drug," and report more favorable views of sun bathing when they are told radiation is "natural" as compared to "man-made." This work illustrates that the system, too, can be described as a natural phenomenon, and this makes its prevailing inequalities more acceptable than would otherwise be the case.

NOTE

1 The remaining questions did not explicitly assess either "personal responsibility" or "naturalistic" attributions for inequality. These items were omitted from the analysis because including potentially irrelevant items could cause spurious factors to emerge or obscure theoretically important factors (Cattell, 1978; Fabrigar et al., 1999).

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18

Cultural Neuroscience of Choice Justification

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HANNAH FAYE CHUA

How do we make choices, and do the choices we make have consequences for how we think and feel about the choice options? That is, what is the nature of the dynamic interaction between the choices we make and our preferences for the choice options? While neoclassical economics theory argued that choice reveals our true underlying preferences (Samuelson, 1938), subsequent work in psychology showed that this assumption is frequently violated (Tversky & Kahneman, 1981). More directly contradicting the revealed preference view of choice, Festinger (1957) proposed that choice plays a causal role in influencing preferences. This insight has culminated in a sizable body of literature on post-decisional attitude change (Cooper & Fazio, 1984; Harmon-Jones, Amodio, & Harmon-Jones, 2009; Kitayama & Imada, 2008; Schwartz, 2000; Steele, 1988).

In his original formulation of the hypothesis that choice can induce attitude change, Festinger (1957) argued that when people make an important choice, they often feel conflicted about the choice, since some of the attributes of the rejected option may actually be quite desirable and some of the attributes of the chosen option may actually be less than ideal. This cognitive conflict is aversive to the chooser and results in increased negative arousal. This negatively arousing cognitive conflict is called *cognitive dissonance* and motivates the chooser to reappraise the chosen option more favorably and the rejected option less favorably. This pattern of reappraisal leads to an effect called Spreading

of Alternatives (SoA), where attitudes for the chosen option increase and attitudes for the rejected option decrease following a choice. The SoA effect is understood to show choice justification. That is, the reappraisals of the choice options rationalize the choice that has been made. Since the initial demonstration by Brehm (Brehm, 1956), the effect has been replicated in numerous studies (Heine & Lehman, 1997; Kitayama et al., 2004; Steele, Spencer, & Lynch, 1993). Research findings from this literature have converged with similar findings using other paradigms to form a substantial literature demonstrating the role of cognitive dissonance in motivating post-decisional attitude change (Cooper & Fazio, 1984; Harmon-Jones et al., 2009; Steele, 1988).

The focus of the current chapter is on the cognitive dissonance process as revealed in choice justification. We will first examine a view of this effect as mediated by self-threat (Steele et al., 1993) and its elaboration in a cultural domain. On the basis of the assumption that cultures vary in the aspects of the self they value, researchers have argued that individuals with different cultural backgrounds may experience dissonance in different circumstances (Kitayama et al., 2004). After reviewing this literature, we will consider the degree to which recent neuroscience evidence can help us better understand the nature of SoA and, finally, we will evaluate a recent claim that the SoA effect might be an artifact that is inherent in the procedure. We will then conclude by arguing that an approach that emphasizes both culture and neuroscience will significantly expand the scope of the theoretical analysis of choice justification, which will in turn contribute to the emerging field of cultural neuroscience (Han et al., 2011; Kitayama & Uskul, 2011).

CULTURE, SELF, AND DISSONANCE

Self-threat Hypothesis

Numerous researchers have shown the integral role of the self in cognitive dissonance and choice justification (Festinger, 1957; Steele, 2008; Steele et al., 1993; Stone & Cooper, 2001). While it is well accepted that cognitive conflict motivates individuals to justify their choices, these researchers have also suggested that some conflicts may be more important to the self and thus more motivating. In particular, Steele and colleagues (Steele, 1988; Steele et al., 1993) theorized that choice-induced dissonance can threaten one's sense of self-competence. It is this perceived self-threat that motivates the subsequent choice-justifying behavior.

Given this analysis, cognitive conflict will not necessarily lead to choice justification if the self is buffered from conflict-related threat. Such buffering may result from high chronic self-esteem, positive feedback on the self (or self-affirmation), or both. To test these possibilities, Steele and colleagues (1993, Study 1) had undergraduates at an American university with either high or low self-esteem (as assessed by the Rosenberg self-esteem scale) make a choice

between two equally likable CDs and examined whether the participants in each group showed the SoA effect. Right before the choice, two-thirds of the participants received either positive or negative feedback on their personality based on a mock personality test they had taken one week earlier. The remaining one-third did not receive any such feedback.

The key findings from Steele et al. (1993) are illustrated in Figure 18.1. Overall, there is a strong effect of personality feedback among those with low chronic self-esteem such that SoA was larger in the negative feedback condition than in the positive feedback condition, with null SoA in the positive feedback condition. This shows that personality feedback used in this study was potent enough to produce a strong self-threat if the feedback was negative and to alleviate any sense of threat if it was positive. In contrast, the pattern observed among those with high chronic self-esteem was quite different. The positive feedback diminished SoA as may be expected by the notion that the positive feedback alleviates any sense of self-threat. But a similar effect was observed in the negative feedback condition as well. From this study alone it is hard to say exactly why this effect might have occurred. However, individuals with high self-esteem are quite adept at defending their positive self-view when this view is threatened. Thus, it would seem likely that when threatened with the negative personality feedback, these individuals countered the negative personality feedback and not only nullified the latter, but actually also even boosted their positive self-view. In this way, there presumably remained no need to justify the choice they had made.

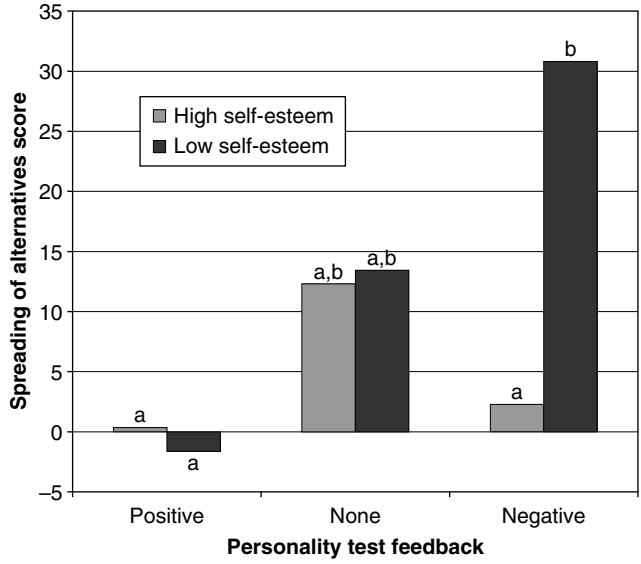

Figure 18.1 Spreading of alternatives as a function of chronic self-esteem and personality test feedback. Adapted from Steele et al. (1993).

The effect of positive personality feedback, observed initially in the Steele et al. (1993) study has been elaborated in subsequent work under the rubric of self-affirmation (Sherman & Cohen, 2006; Steele, 1988). The key idea is that self-threat would have little psychological consequences when the self is temporarily affirmed and thus buffered from the threat. This line of work provides initial support for the self-threat hypothesis of choice justification. Yet, further support for this hypothesis comes from an inquiry into cultural variation of SoA.

Culture and Private versus Public Choices

Over the last two decades, substantial evidence has accumulated to suggest that cultures vary considerably in the view of the self they endorse. Individuals of European descent living in the United States and Canada (i.e., European Americans and European Canadians) tend to view the self as independent from others and defined primarily by one's internal attributes including attitudes and preferences (Kitayama & Uskul, 2011; Kitayama, Duffy, & Uchida, 2007; Markus & Kitayama, 1991; 2010). Application of this general idea to the domain of choice justification has proven to be quite fruitful (Imada & Kitayama, 2010; Kimel, Grossmann, & Kitayama, 2012; Kitayama et al., 2004).

Because choice leads to justification especially when it strongly threatens relevant aspects of the self, we may anticipate that North Americans of European descent should be motivated to justify a choice especially when it threatens personal aspects of the self by calling into question one's own competence as a decision maker (e.g., "Am I stupid that I have made this choice?") (Kitayama & Imada, 2008). In contrast, for both Asians living in Asia and Asians living in North America, the self is viewed in a more interdependent fashion, with a strong emphasis placed on social attributes such as social roles, duties, and obligations. It follows that these individuals should be strongly motivated to justify a choice under conditions where choice-related cognitive conflict creates concerns over social or interpersonal aspects of the self (e.g., "What would my friends think if they knew I had made this choice?").

Kitayama and colleagues (2004) tested these predictions by examining the degree to which people from different cultural backgrounds show SoA for both private choices (i.e., when no one is watching) and public choices (i.e., when the choices are witnessed by others). Notably, along with a separate line of work demonstrating systematic effects of watching faces on decisions in behavioral economics games (Haley & Fessler, 2005; Rigdon et al., 2009), this work has uncovered that mere exposure to faces or face-like stimuli is sufficient to produce an impression that one is being seen by others (Imada & Kitayama, 2010; Kitayama et al., 2004; Na & Kitayama, 2012; Park & Kitayama, 2012).

In one of the first experiments comparing public choices and private choices, participants were exposed to images of faces that appear to be watching them

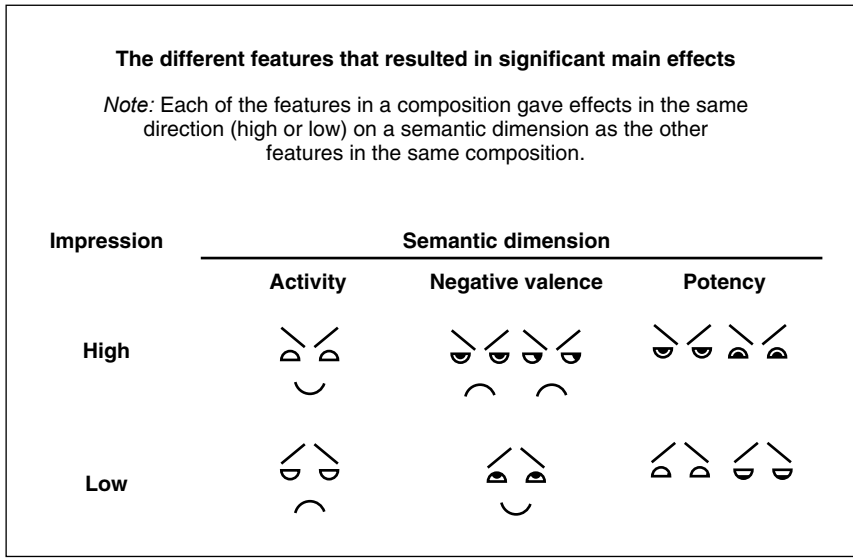

Figure 18.2 A wall poster used to prime social eyes in public choice conditions. Adapted from Kitayama et al. (2004).

(called "social eyes"). These faces were presented in a poster that was hung surreptitiously in front of the participants (shown in Figure 18.2) at eye level so that the faces in the poster appeared to be watching them. Both European Americans and Japanese were asked to make a choice between two equally attractive CDs either in the presence of such social eyes or in the absence thereof. Through this subtle manipulation, it was anticipated that individuals would be automatically primed with social eyes, which in turn would make social evaluations of the self much more salient, whereas in the private choice condition the choice may threaten one's personal competence as a decision maker.

Consistent with the assumption that European Americans have an independent self and are more concerned with personal competence, European American participants showed a significant SoA effect in the private choice condition, but not in the public choice condition. However, Japanese showed the opposite pattern, such that they showed a strong SoA in the public choice condition but not the private choice condition (see Imada & Kitayama, 2010 for further evidence). One interpretation of this finding is that the European Americans were more independent and dismissive of social evaluative threat (Park & Kitayama, 2012), whereas Japanese individuals were more interdependently oriented and, as a consequence, were more threatened when the choice was perceived as public (i.e., being witnessed by others). Both groups therefore justify their choices to defray self-threat, but the nature of the self-threat alters whether each cultural group will justify the choice. The cross-culturally divergent effect

of social eyes has been conceptually replicated with a performance measure of motivation (Na & Kitayama, 2012).

For Me or for My Friend

While the free choice literature above has focused on how individuals make choices between two equally preferred items for themselves, it is of considerable interest, both theoretically and practically, whether individuals show an analogous SoA effect when they make choices for someone else (e.g., a friend or family member). We have hypothesized that European Americans experience self-threat when a choice threatens personal aspects of the self. If so, when making a choice for someone else, these individuals may not experience self-threat because the choice is informed by inferences about another person's preferences (i.e., "Which item would be best for this person?") and, thus, it may not be revealing or reflecting their own internal attributes. In contrast, Asians supposedly experience self-threat when social or public self-evaluations are threatening. We may therefore expect that Asians will show a strong SoA effect when they make a choice for another person because this choice potentially raises questions about the chooser's competence or taste in the eyes of the other.

These possibilities were explored in a series of studies by Hoshino-Browne and colleagues (Hoshino-Browne et al., 2005). In one condition, both European Canadian and Asian Canadian undergraduates at a Canadian university made a choice between two equally preferred items for themselves (called the self-choice condition). In another condition, however, participants were asked to make a choice for one of their friends on campus (called the friend choice condition). The items had been pre-selected so that each chooser perceived them to be equal in terms of his or her friend's preferences. As shown in Figure 18.3, European Canadians showed a reliable SoA effect in the self-choice condition, thus replicating previous evidence from European Americans. Importantly, however, in the friend choice condition, Asian Canadians showed a reliable SoA effect—an effect that was subsequently replicated with Asians living in Asia in one of the studies in this series. Finally, European Canadians showed no such effect in the friend choice condition.

The finding that European Canadians show no SoA in the friend choice condition is consistent with the supposition that these individuals are independently (rather than interdependently) oriented. If this reasoning is correct, however, even North Americans of European descent may show a reliable SoA effect in the friend condition when interdependent orientations are temporarily primed and activated. This possibility was tested in a recent series of experiments (Kimel et al., 2012). The researchers had participants make choices for a close friend after being primed with an interdependent orientation by subliminally exposing them to a series of words implying affiliation such as unity, relation, together and the like (adapted from an earlier study by Chartrand & Bargh, 1996). Compared to individuals who made friend choices without being primed, individuals in the interdependent prime condition showed a reliable SoA.

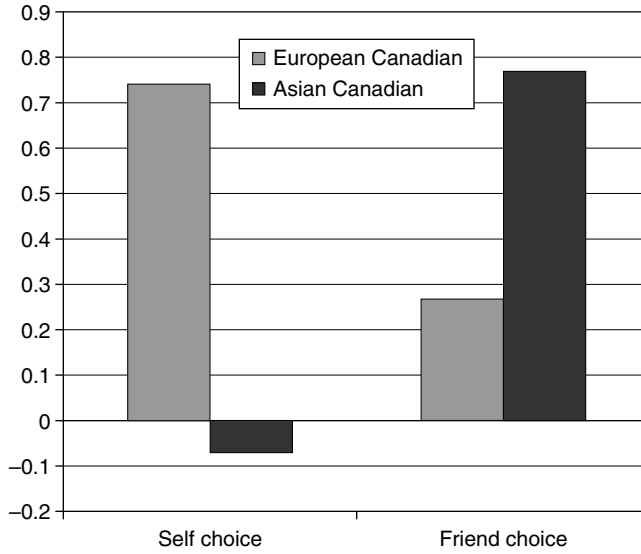

Figure 18.3 The SoA effect is observed when European Canadians have made a choice for themselves and Asian Canadians have made a choice for their close friend. Note that there is no SoA effect in the friend choice condition for European Canadians and in the self-choice condition for Asian Canadians. Adapted from Hoshino-Browne et al., 2005.

Culture and Self-Affirmation

Before concluding this section, we should also mention two studies that tested cultural variation in the effect of self-affirmation. In the first study, Heine and Lehman (1997) duplicated the personality feedback manipulation of the Steele et al. (1993) study discussed earlier (Figure 18.1). One important difference was that Heine and Lehman also tested the potential effects of ethnicity, in addition to the personality feedback manipulation. The researchers replicated the Steele et al. finding (Figure 18.1) for Canadian participants, such that Canadian participants showed a reliable SoA effect in the no feedback condition but not in the positive personality feedback condition, thus suggesting that self-affirmation effectively eliminated the self-threat caused by a difficult choice. Moreover, for Canadian participants, the SoA effect was augmented in the negative feedback condition, suggesting that the effect of self-threat becomes even more pronounced when self-protective resources were depleted by negative feedback (note that while this pattern occurred only for low-self-esteem participants in the Steele et al. (1993) study, Heine and Lehman (1997) did not test chronic self-esteem of their participants). Perhaps most interestingly, Asian participants showed no SoA regardless of the feedback manipulations. Consistent with the current analysis, Asians supposedly experienced no self-threat to begin with when they made a choice for themselves in private.

In another study that tested the effect of self-affirmation (Hoshino-Browne et al., 2005), two important changes were made to examine self-affirmation among Asians. First, participants made a choice for a close friend. Second, a subset of participants made a choice for a close friend after an opportunity to affirm their own personal values or the values their families had. This latter manipulation was considered more appropriate to individuals with more interdependent, group-oriented views of the self. The researchers observed a reliable SoA effect for Asian participants who made choices for a friend following the personal affirmation as well as in a no-affirmation control condition, but this SoA was completely eliminated in the family affirmation condition.

Summary

In combination, the findings here provide evidence to support the hypothesis that the nature of self-threat depends on self-construal. Whereas those with independent self-construal experience self-threat when their personal self is called into question, those with interdependent self-construal experience self-threat when their social self is called into question.

SPREADING OF NEURAL RESPONSES TO CHOICE ALTERNATIVES

With the explosion of interest in neuroscience in general and neuroimaging in particular as a tool to investigate social psychological phenomena over the last decade or so (Lieberman, 2007), it is perhaps not surprising that researchers have also begun to use neuroimaging techniques (including fMRI) to investigate choice justification. Though there are only a handful of studies that have used fMRI to examine choice justification, these studies have shed light on a number of important questions related to cognitive dissonance and choice justification.

We will now discuss how emerging work on the neuroscience of cognitive dissonance might help us to better understand choice justification. Some studies have examined brain activity during choice to predict SoA based on preference ratings (Jarcho, Berkman, & Lieberman, 2011; Kitayama et al., 2013). These studies are discussed in detail elsewhere (Kitayama, Tompson, & Chua, 2013). In contrast, some other studies examined whether SoA itself would be observed in terms of brain activity (Izuma et al., 2010; Qin et al., 2011; Sharot, De Martino, & Dolan, 2009). It is the latter category of studies that is our focus in this section (see also Harmon-Jones et al., 2011 and Park & Kitayama, 2012 for event-related brain potential evidence of dissonance and related processes).

Demonstrating SoA with Brain Activity

Currently, there are three published studies that examined SoA in terms of brain activity. Sharot and colleagues (2009) had British participants rate how they would feel if they went on a number of different hypothetical vacations

(the first hedonic ratings). Participants then made choices between pairs of vacations which were previously rated as similar (i.e., difficult choices) or different (i.e., easy choices). Participants chose one vacation from each pair, and then completed the hedonic rating task again.

Several findings were important to note. First, SoA was observed for hedonic ratings in the difficult choice condition but not easy choice condition. Second, brain activation during the pre-choice rating period predicted participants' choices, such that activation in the caudate nucleus was greater for vacations that were later chosen (vs. rejected), even when pre-choice self-report ratings for the two choice options were identical. The caudate is part of a dopaminergic subcortical region strongly implicated in reward processing (Berridge, Robinson, & Aldridge, 2009). Thus, the finding implies that pre-choice reward-related brain activity predicted future choices above and beyond subjective self-report measures. Third, post-choice brain activation in the caudate also showed preferential activation for chosen (vs. rejected) options, and this difference in caudate activation between chosen and rejected options increased from the pre-choice to the post-choice rating period (Figure 18.4A). This in effect constitutes SoA at the neural level.

Izuma and colleagues (2010) used a similar paradigm and had Japanese participants rate a variety of food items and found SoA in both subjective ratings and ventral striatal activation for difficult choices between two equally rated food options (Figure 18.4B). While the striatal activation observed in this study is ventral to the activation identified in Sharot et al. (2009), this adjacent region is also implicated in reward processing. As in the Sharot et al. (2009) study, Izuma et al. (2010) observed SoA only for difficult choices. Curiously, however, unlike in the Sharot et al. (2009) study, this effect was evident only for the rejected food items (not observed for the chosen food items).

Qin and colleagues (2011) used a similar free choice paradigm to Sharot and Izuma, but used music CDs as the choice options. A clear SoA effect was

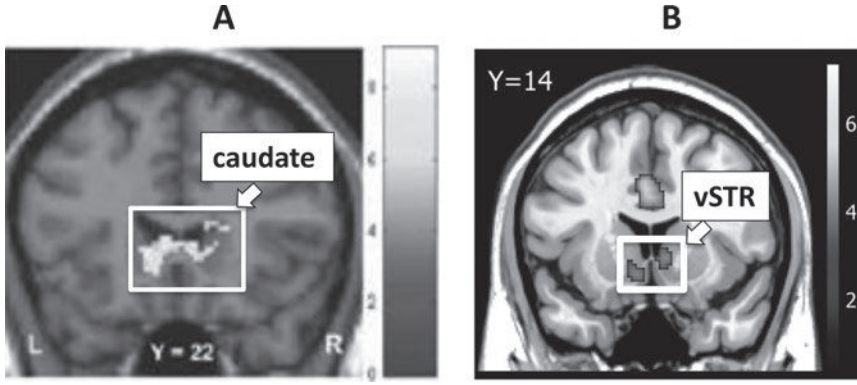

Figure 18.4 Areas that showed a reliable neural SoA effect. A. Sharot et al. (2009) found the effect in the caudate nucleus. B. Izuma et al. (2010) identified such an effect in the ventral striatum.

found for self-report ratings, with chosen CDs showing increased post-choice ratings and rejected CDs showing decreased post-choice ratings. Moreover, CDs that were chosen showed preferential activation in posterior cingulate cortex (PCC) but decreased activation in the insula (relative to rejected CDs) during both the pre-choice rating period and post-choice rating period. The midline cortical region including PCC is often linked to self-processing (Kelley et al., 2002; Northoff et al., 2006) whereas the insula plays a significant role in negative emotions such as regret and disappointment (Chua et al., 2009). The finding may therefore suggest the CDs which implicate the self (via posterior cingulate activation) but don't induce negative affect (via insula activation) are rated as more likeable. Interestingly, this pattern did not increase from pre-choice to post-choice, indicating curious absence of neural SoA among Chinese participants.

In addition to the three published studies reviewed here, one unpublished study is relevant (Tompson, Chua, & Kitayama, 2013). In this study, American undergraduates had their brain activity measured in an MRI scanner while they rated music CDs both before and after making choices between two CDs. Neural activation during the pre-choice rating period was statistically no greater for CDs that would later be selected relative to those that would later be rejected. However, after the choice, the same contrast resulted in strong activation across midline cortical regions (including caudate, medial prefrontal cortex, and posterior cingulate cortex). Once chosen, CDs recruited these regions much more relative to the CDs that were rejected. Although the specific regions activated were broader in this study (the midline cortical areas) as compared to either the Sharot et al. study (the caudate nucleus), or the Izuma et al. study (ventral striatum), this may be due at least in part to the fact that both Sharot et al. and Izuma et al. focused their analysis only on dopaminergic regions of interest. Notably, Tompson and colleagues administered a self-report scale of independent vs. interdependent self-construal (Singelis, 1994) and observed that the neural SoA was correlated with independent self-construal, such that those who scored higher on independent self-construal showed a greater neural SoA in midline cortical regions.

Does Culture Moderate Neural SoA?

Given the early stages of this research, it is difficult to make any definitive claims at this time. However, it is noteworthy that in all studies, SoA was observed in self-report. Regarding SoA in neural measures, both Sharot et al. (2009) and Izuma et al. (2010), as well as Tompson et al. (2013), found SoA with neural activity although Izuma et al. found such an effect only for rejected (rather than chosen) items. In contrast, Qin et al. (2011) found no evidence for neural SoA. One important difference across these studies is the cultural background of the participants. While the Sharot et al. study was conducted in Great Britain and the Tompson et al. study in the United States, the Izuma and Qin studies were conducted in Japan and China, respectively.

This is consistent with the hypothesis that under private choice conditions SoA should be greater for individuals with European backgrounds than those with Asian backgrounds. Moreover, the fact that the neural SoA is greater for independently oriented Americans (Tompson et al., 2013) suggests that the neural SoA varies as a function of self-construal. Future work should test comparable measures of neural SoA by making the choices more public (Kitayama et al., 2004) or examining choices made for friends or family members (Hoshino-Browne et al., 2005).

One important issue that must be clarified in future work concerns mediating mechanisms that produce neural SoA. Much of the behavioral evidence is consistent with the hypothesis that self-threat significantly mediates SoA, but more effort is required to identify specific brain areas that are recruited to produce this effect. While dissonance in general and self-threat in particular are likely to be involved (Kitayama et al., 2013), it is also prudent to consider other possibilities including self-perception (Bem, 1967) and mere ownership (Gawronski, Bodenhausen, & Becker, 2007).

Another potentially significant question comes from the Qin et al. (2011) study. Why did the Chinese participants in this study show SoA in self-report ratings while showing no such effect in neural indicators? We will return to this issue in the next section where we consider a possibility that a certain stochastic artifact can sometimes compromise self-report (but not neural) SoA.

SPREADING OF ALTERNATIVES AS AN ARTIFACT?

So far, we have reviewed behavioral evidence in support of the self-threat hypothesis of SoA as well as the emerging literature on the neuroscience of choice justification. At this point, however, we should pause a moment and consider a recent claim by Chen and Risen (2010) that SoA is an artifact that is caused by the non-random way in which choice pairs are formed in virtually all experiments reported in the free-choice dissonance literature. If SoA is an artifact, it by definition has nothing to do with dissonance or self-threat (or, for that matter, any other substantive psychological mechanisms). The argument by Chen and Risen therefore must be carefully examined for what it means and what it does not.

Regression toward True Attitudes (RTTA)

Chen and Risen's (2010) argument is complex, involving an elaborate set of mathematical proofs. Yet, the gist of their argument can be re-framed in rather simple terms. At the base of their argument is a premise that any ratings are prone to noise and thus preference ratings are a function of both true attitude (X) and measurement error (e). Therefore,

$$\text{Rating} = X + e$$

(where X = true attitude, e = measurement error)

Because of the measurement error (*e*), the rating of each item can fluctuate across measurements. As a consequence, even though two items are rated similarly in the first rating task of a free-choice experiment, the apparent similarity could be due to measurement error driving the rating down for one item and up for the other item, resulting in two options which appear similar in rating but are potentially quite different in terms of the true attitude. Thus, at the level of real attitude, one of the items may well be more clearly likable than the other. The item that is truly more likable should be more likely to be *both* chosen when a choice is requested *and* rated more favorably when liking ratings are requested again. That is, both subsequent choice and ratings will show what may be referred to as the *regression toward true attitudes (RTTA)* (Kitayama, Tompson, & Chua, 2013). Because of this stochastic process, the SoA can happen even in the absence of any true attitude change. Although other parameters such as variance associated with both ratings and choices can influence the magnitude of SoA in systematic, if somewhat complex, fashion (Izuma & Murayama, 2013), this basic principle seems to hold.

Once the Chen and Risen argument is reformulated this way, it will be clear that whether the RTTA artifact presents a real threat to the validity of SoA as a measure of choice justification will depend crucially on certain methodological considerations. If, for example, the first rating task is set up in such a way that the ratings are highly prone to measurement errors, the RTTA could prove to be quite sizable, thereby potentially compromising the finding from such a study. Measurement errors may tend to be larger in fMRI studies that require a large number of ratings (Izuma et al., 2010; Qin et al., 2011; Sharot et al., 2009). Above all, however, they may also become larger under poorly managed experimental conditions, including if participants are tested in groups (vs. individually), if they are presented with a large number of choice options, or if they rush through their responses (vs. after thinking carefully).

As we have argued elsewhere (Kitayama et al., 2013), this consideration may explain why some studies (Chen & Risen, 2010; Izuma et al., 2010) have observed SoA in self-report even when choice followed (not preceded) second ratings and, thus, choice cannot have a causal effect on the rating to produce SoA. Moreover, this might also explain why a self-report SoA effect is sometimes observed when the corresponding effect at the neural level is absent. Such a pattern has been obtained in at least two published studies. In the Qin et al. study researchers tested Chinese subjects and found a clear SoA effect in self-report, but no such effect in neural indicators. Because Chinese participants are less likely to show choice justification when choices are made for themselves (Hoshino-Browne et al., 2005) in private (Kitayama et al., 2004), the clear SoA effect in self-report may well be an artifact caused by RTTA. The fact that there was no neural SoA in this condition indicates that the neural index is not susceptible to the RTTA artifact. Likewise, in yet another fMRI study Izuma et al. (2010) observed that SoA was reliable in self-report even when choice followed second ratings. The self-report SoA in this condition clearly is an artifact of RTTA. Importantly, when choice followed second ratings no

SoA was observed in a neural index. Moreover, this was the case even though a clear neural SoA was observed at least for rejected items when choice preceded second ratings. This also suggests that self-report is susceptible to the RTTA artifact, but neural response is not.

Why Is Neural SoA Less Susceptible to the RTTA Artifact?

So far, our discussion implies that neural SoA is less susceptible to the RTTA artifact. Empirically, this appears to be the case. In the two studies reviewed above (Izuma et al., 2010; Qin et al., 2011), neural SoA did not occur in conditions in which a clear SoA effect was observed in self-report even though it would not be expected to if it were in fact caused by choice. But how can we understand this dissociation between the two measures in theoretical terms?

To address this issue, it must be recognized that both a preference rating and a neural index of reward processing can reflect the true underlying attitude. Moreover, in both cases, there is measurement error. Thus, the preference rating is a function of the true attitude (X) and measurement error associated with ratings (e_{rating}). Thus,

$$\text{Rating} = X + e_{\text{rating}}$$
(where X = true attitude, e = measurement error for rating)

Likewise, the neural index is also a function of the true attitude (X) and measurement error associated with neural activity ($e_{\text{neural activity}}$). Thus.

$$\text{Neural measure of preference} = X + e_{\text{neural activity}}$$
(where X = true attitude, e = measurement error for neural activity)

It is often taken for granted that because self-report and brain activity are correlated (which is true in nearly all relevant fMRI studies), if the RTTA artifact influences one then it should also influence the other (Chen & Risen, 2010; Izuma & Murayama, 2013). Careful examination of the formulae above suggests otherwise, however. Specifically, it will be evident from these formulae that the self-report index of preference and the neural index of preference are likely correlated *either* because both reflect the true attitude (X), because the two error terms are correlated, *or* both. On the one hand, it is clear that the correlation stems at least in part from the fact that the two indices of preference reflect the true attitude (X). On the other hand, however, it is far from clear whether the two error terms (e_{rating} and $e_{\text{neural activity}}$) might in fact be correlated. The reason is that while there are many, largely unknown factors that contribute to these errors, the factors that contribute to the measurement error for preference rating (e_{rating}) and the measurement error for neural activity ($e_{\text{neural activity}}$) are likely to be distinct. For example, measurement error in preference ratings can arise from inadequate cognitive calibration of the true attitude

in terms of a rating scale that is used, but a cognitive process like this will be irrelevant in the measurement of the attitude with brain activity. Likewise, measurement error in an assessment of brain activity can result from noise in the measurement technique (fMRI in this case), including magnet instability in fMRI and variance in brain morphology across subjects, but neural artifacts like these will unlikely influence self-report ratings. These considerations suggest that the two error terms in the above formulae are likely to be uncorrelated statistically.

If the correlation between e_{rating} and $e_{\text{neural activity}}$ is negligible, it ought to be the case that measurement of activation in a brain region (e.g., vSTR) will be unlikely to over- (or under-) estimate the true level of activation simply because the self-report measure over- (or under-) estimates the true attitude (and vice versa). In other words, even when SoA in a rating measure is greatly influenced by measurement error (e_{rating}) and, thus, compromised by the RTTA artifact (which could happen especially when the procedure is set up in such a way that self-report ratings are fraught with measurement error), the neural SoA is unlikely to be influenced by this measurement error. In other words, the neural SoA is likely to be valid as an indicator of choice justification even when the rating SoA is not.

Summary

The upshot of the current analysis is that when self-report preference ratings are error-prone, the RTTA artifact can be a significant factor in producing a SoA effect in self-report. Yet, in most behavioral studies on SoA available today, the procedure is set up in sufficiently careful ways that such measurement error is likely to be relatively minor. For example, the total number of options that are rated is relatively small and, moreover, ample time is allocated for the ratings. Indeed, if RTTA is operative, SoA should be observed even when there is no dissonance. Accordingly, the very fact that these studies show a near-complete absence of SoA in conditions that are expected to produce no self-threat (see Figures 18.1 and 18.3 for examples) indicates that at least in these studies (Heine, Kitayama, & Lehman, 2001; Hoshino-Browne et al., 2005; Kitayama et al., 2004; Steele et al., 1993), the RTTA artifact was negligible.

Given the discussion above, it would seem fair to conclude that SoA is a true phenomenon, but one that can sometimes be influenced by measurement error, which causes the statistical artifact of RTTA. Future work should pay extra attention to certain methodological considerations to make sure that the RTTA artifact is negligible even when a large number of choice items are involved.

CONCLUSIONS

In concluding this chapter, it will be worthwhile to highlight some key contributions of the work summarized here. First, the cultural psychological approach has shown that culture and situational cues jointly influence choice justification

(i.e., SoA in the free choice paradigm) such that conditions in which SoA is observed are systematically different depending on cultural or ethnic background. In general, aspects of the self that are culturally sanctioned must be threatened before choice justification is motivated (Kitayama et al., 2004). Second, neuroimaging techniques have helped outline candidate regions which may play a pivotal role in choice justification, Specifically, regions in the dopaminergic reward processing network including caudate (Sharot et al., 2009) and ventral striatum (Izuma et al., 2010), as well as cortical midline structures (Tompson et al., 2013) may mediate or at least reflect the choice justification effect. We believe that the neuroscience of SoA represents a big leap for the study of cognitive dissonance. Third, on the basis of a critical appraisal of a recent argument (Chen & Risen, 2010) on a stochastic process that produces SoA without any causal effect of choice (called here the RTTA artifact), we recommended that future work should minimize this artifact by improving on procedures so that the noise associated with attitude measurement is reduced as much as possible.

From a broader theoretical point of view, it has become clear that making choices is an open, dynamic process that receives constant input from both immediate situations and broader cultural contexts (Kitayama, Tompson, & Chua, 2013). The current effort illustrates, then, how collaborative effort among social and cultural psychologists and neuroscientists can be fruitful and generate new insights. From this vantage point, the most important contribution of the effort summarized in this chapter is to point to the promise of an integrative approach that combines insights from both behavioral and neuroscience methods and concepts—the approach called cultural neuroscience (Han et al., 2011; Kitayama & Uskul, 2011). It is our hope, then, that the current effort on the cultural neuroscience of dissonance will be extended to other areas of psychology to illuminate how the brain (a biological organ) is plastically shaped through its long-term engagement in the behavioral environment that is constituted by cultural beliefs and practices.

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19

Scaring the Bejesus into People
The Role of Religious Belief in Managing Implicit and Explicit Anxiety

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AND
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Humans are anxious creatures. For a species at the top of the food chain, we have delicate sensibilities, with over 500 documented phobias (including aulophobia, the fear of flutes). We may have cornered the market on deadly force, yet we easily become anxious when left out of a ball tossing game (see Zadro, Godwin & Gonsalkorale, this volume), and downright terrified at the prospect of singing in public. Consequently, much of our behavioral, cognitive and emotional efforts go into avoiding and, in some heroic cases, overcoming anxieties.

Yet there is one source of anxiety that no behavior modification can avoid, and no cognitive work can rationalize away: our own death. Unlike flutes, our demise is unavoidable and, naturally, upsetting, and coping with death's inevitability requires more than therapy: it requires a belief system optimistic and robust enough to buttress us in the face of constant reminders that life is fragile and fleeting, and that there is no evidence that anything awaits us afterwards.

Religious belief, many philosophers (and some psychologists) have noted, could provide just such a system. It is optimistic, in the sense that most religious belief systems include supernatural entities whose very existence documents the possibility of eternal life, and who in many cases have the power to extend that privilege to mortals as well. And it is robust in the sense that, as has long been noted by anthropologists, there is no known culture, past or present,

completely devoid of supernatural agent concepts, most commonly related to life after death (souls, spirits, etc; Barrett, 2004; Boyer, 2001); indeed, ancestral worship seems to date back at least 60,000 years (Rossano, 2006). Furthermore, all attempts to argue or legislate religion away—from first century BCE Epicureans (e.g., Lucretius), to large-scale experiments with state atheism in the Soviet Union, Maoist China, and Socialist Albania, to the current wave of "New Atheists" (e.g., Dawkins, 2006; Hitchens, 2007)—have so far failed.

Indeed, the durability of religious belief is, upon inspection, something of a psychological and evolutionary conundrum, since supernatural religious agents, while providing a solution to the problem of death, are invariably inconvenient and costly things in which to believe. The world over, the belief in gods comes almost inevitably with self-denial and sacrifice, and often with divinely-mandated participation in demanding pilgrimages and dysphoric rituals (Whitehouse, 1996, 2004). Hindus' pilgrimage to Prayag, Muslims' to Mecca, and Christians' to Jerusalem, are examples of economically and medically risky endeavors; the Ganges river is infamously polluted with human and industrial waste, and the banks of the Jordan with landmines. Additional religious requirements like tithing and proscriptions on sex make little sense from an evolutionary perspective unless they are offset by proportionally greater benefits, such as the relief of existential anxiety. Thus, while religion potentially answers the question of how people manage their death anxiety, the management of death anxiety may conversely answer the question of why people invest so much effort in religious beliefs and rituals with little tangible reward.

The history of ideas is replete with theories of religion, many of which speculate about the causal role of existential anxiety. Hume (1757/2008) includes "the terrors of death" among the phenomena that "men scrutinize, with a trembling curiosity that leads them, still baffled, to see the first obscure traces of divinity." Similarly, Feuerbach (1851/1967) argued that religious beliefs are projections of psychological needs, particularly the need to assuage the otherwise crippling fear of loneliness, meaninglessness, and death. Thus, he boldly concludes his *Lectures on the Essence of Religion* with the claim that "the meaning and purpose of God are immortality" (Feuerbach, 1851/1967, p. 276). More (in)famously, Freud (1927/1961) supposed that religious beliefs were paradigmatic examples of wish-fulfillment, driven by "the oldest, strongest, and most urgent wishes of mankind" (p. 38), the desire for a powerful father who can protect us from the dangers of life and the finality of death. And so, gods "exorcise the terrors of nature, [and] must reconcile men to the cruelty of Fate, particularly as it is shown in death." More recently, anthropologists like Malinowski (1948) and Becker (1971, 1973) have put even more acute emphasis on the function of religion as a strategy to assuage the fear of death. Malinowski's (1948) ethnographic work led him to conclude that "Of all sources of religion, the supreme and final crisis of life—death—is of the greatest importance," while Becker (1973), strongly influenced by the psychoanalytic and existential traditions, argued that not just religion, but much of human culture, is motivated by a fear of death and the concomitant desire for immortality.

In modern psychology the best example of this line of thought is Terror Management Theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986; Vail et al., 2010). TMT, drawing heavily on Becker's (1973) work, begins with the observation that human beings are, perhaps uniquely, aware of their mortality. This cognizance of our inevitable deaths elicits crippling existential anxiety, which must be dealt with if we are to function in the world. We are therefore motivated to accept and embed ourselves in cultural worldviews that allow for immortality, either literally (via afterlife provisions) or symbolically (via memberships in groups that are larger and more enduring than any particular member). In this view, religious worldviews are particularly effective at relieving existential anxiety by providing both literal *and* symbolic immortality; Greenberg, Landau, Solomon, & Pyszczynski (in press) have even recently argued that the relief of existential anxiety is in fact the ultimate (i.e., evolutionary) function of religious belief. Certainly, at a proximate level of analysis, anxiety's influence on belief is consistent with an extensive literature on the regulatory functions of mood (see Forgas, this volume).

However, there are reasons to question whether religious belief is an evolved (and presumably effective) mechanism for managing existential anxiety. An obvious problem is that, when one examines the specifics of religious afterlife beliefs, one finds them hardly comforting, and arguably more terrifying than death itself. Not all religious belief systems come with afterlife beliefs (e.g., Baka Pygmies; Woodburn, 1982), and many that do posit gloomy graves or horrific hells. Mythical worlds are populated by benevolent deities, but also with malevolent ones who are often ambivalent or capricious in their dealings with human beings (Lambert, Triandis, & Wolf, 1959). According to their own religious texts, Homeric Greeks (cf. Iliad) all descended into a dreary Hades regardless of merit, while ancient Mesopotamians were infamously cast into a terrifying netherworld populated by monsters (cf. The Netherworld Vision of an Assyrian Crown Prince) or a despairing one in which "dust is their food, clay their bread" and "they see no light, they dwell in darkness . . . over the door and the bolt, dust has settled" (cf. The Descent of Ishtar to the Netherworld; Dalley, 1998, p. 155). Lucretius' Epicurean analysis, perhaps the earliest explicit attempt to provide a genealogy of religion, lays out the implications of such visions of the afterlife:

> Fear holds dominion over mortality
> Only because, seeing in land and sky
> So much the cause whereof no wise they know,
> Men think Divinities are working there.
>
> —De Rerum Natura

In other words, Lucretius suggests that although religion is driven by an attempt to make sense of the unpredictable perils of nature, the ensuing notion of angry gods only exacerbates the anxiety (see also Colman, 2009).

Even in the more familiar Judeo-Christian traditions, with their emphasis on divine omnibenevolence, the God portrayed in the Bible is anything but

straightforwardly good (Dawkins, 2006; Matthews & Gibson, 2005; Penchansky, 1999), and the afterlife anything but straightforwardly positive, with eternal torment in Hell a subjectively real possibility for (literally) God-fearing Christians. Some Calvinists, for example, experience "salvation anxiety" so entrenched that many ex-fundamentalists still report experiencing intense fear of divine punishment even after they have abandoned such beliefs (Hartz & Everett, 1989). Even in Roman Catholic theology, it is possible that unrepented mortal sin can cause a believer to lose his or her salvation; certainly the more common, venial, variety of sin necessitates a period of purgatorial suffering before the believer may enter Paradise (Catechism of the Catholic Church, nos. 1854–1864). This uncertainty regarding one's post-mortem fate is reflected in various religious practices, such as the sacrament of reconciliation (i.e., the practice of confession), prayers for the dead, and indulgences (Catechism of the Catholic Church, nos. 1422–1498). Thus, the horrific possibility of eternal post-mortem suffering, and the institutionalized doubt about who it will befall, ought to temper the effectiveness of religiosity for relieving existential anxiety: in comparison to some accounts of the afterlife, not existing at all is the less anxiety-inducing outcome.

However, even if the mere possibility of a positive afterlife (when on offer) were sufficient to assuage existential anxiety, the existence of nonbelievers suggests that it is not necessary. Although religious belief, as noted, is a durable feature of human culture, so is atheism, and it is unclear that atheists are any more anxious about their own death than any religious group. Furthermore, because atheism is itself a worldview capable in principle of relieving existential anxiety, thoughts about the afterlife should challenge that worldview and therefore create rather than relieve such anxiety. Indeed, previous empirical research demonstrates that mortality salience (i.e., increased accessibility of death-related cognitions) leads to the bolstering of ingroups and the derogation of outgroups, even when the groups in question are minimally-defined and arbitrarily-assigned (Harmon-Jones et al., 1996; see also Burke, Martens, & Faucher, 2010, for review). If so, then death anxiety should motivate religious belief only among religious believers, in which case it provides little insight into how religious believers came to hold their beliefs in the first place. At the very least, TMT's account of religion as a uniquely powerful buffer against existential anxiety is in tension with its account of worldview defense, and requires a means of regulating these two mechanisms of anxiety reduction when they conflict.

FEAR OF DEATH AND RELIGIOUS BELIEF: EMPIRICAL EVIDENCE

Does religious belief assuage existential anxiety? If so, for whom, and why? Although researchers have only recently begun to ask these questions experimentally, the related question of whether religious *people* are less death-anxious has enjoyed more scholarly attention. The results have been equivocal, though weakly supportive of the claim that the religious people suffer less anxiety

about death. Spilka, Hood, and Gorsuch (1985), for example, found that, of the 36 studies they reviewed, 24 showed that religious people were less anxious about death, three showed that they were *more* anxious about death, and nine showed mixed or inconclusive results. Donovan (1994), reviewing 137 studies conducted between 1897 and 1992, found similar numbers: religious people were less anxious in 57% of studies, more anxious in 9%, and results were inconclusive in 33%.

However, even this weak consensus is suspect due to several methodological issues. As Hood, Hill, and Spilka (2009) observed, the vast majority of the research in this area has been conducted with religious samples (e.g., American college students, who are predominantly religious); we therefore have relatively little information about non-religious individuals, the very ones, as argued above, who might be expected to demonstrate an increase in anxiety with stronger religious belief (which challenges their prevailing worldview). Furthermore, a closer look at the individual studies under review also reveals the diversity in the measurements used, and the imprecision with which "religiosity"—a multidimensional concept with a variety of affective, cognitive, and behavioral components—is often operationalized. Death anxiety may well be correlated with some aspects of religiosity, but not others, or with different aspects of religiosity in different directions. For example, Harding et al. (2005) found that both belief in God and an afterlife were negatively correlated with death anxiety, whereas Dezutter, Luyckx, and Hutsebaut (2009) found that literal religious interpretation was positively correlated with death anxiety. Alvarado et al. (1995) found no relation between death anxiety and absolute levels of religious conviction, but a negative relation when they examined relative religious conviction (i.e., compared to other people's conviction). Cohen et al. (2005) found that fear of death was negatively related to intrinsic religiosity (i.e., internalized religious belief and practice) but positively related to extrinsic religiosity (i.e., religious practice as a means to other ends).

In order to draw a more definitive conclusion about the relation between religiosity and death anxiety, we focused our own research on just one aspect of religiosity, the belief in supernatural agents, places, and events (Boyer, 2011). This approach not only put us in line with recent research on religious cognition (e.g., Atran, 2002; Barrett, 2004; Bering, 2011; Boyer 2001; Pyysiäinen, 2009; Tremlin, 2006; Whitehouse, 2004; Wilson, 2002), which considers belief to be a core component of religiosity, but also permits the operationalization of religiosity in both explicit and implicit terms.

Unfortunately, and surprisingly, we found no straightforward, generalizable measure of religious belief, but rather what Gorsuch (1984, p. 234) called a "hodgepodge" of religiosity scales that conflate religious beliefs, values, experiences, and behaviors (see Hill & Hood, 1999, for review). Among the few belief scales that did exist, most were tailored to specific (usually Christian, if not specifically evangelical) audiences and therefore refer to very specific theological beliefs (e.g., Loving and Controlling God Scale, Benson & Spilka, 1973; Christian Orthodoxy Scale, Fullerton & Hunsberger, 1982; Love and Guilt

Oriented Dimensions of Christian Belief, McConahay & Hough, 1973). Given this methodological gap, our first task became the development and evaluation of a measurement instrument for our variable of interest. Drawing on recent anthropological and psychological research, we identified a set of cross-culturally recurring religious supernatural themes (e.g., an omnipotent being; a benign afterlife; prophecies) and created questionnaire items to assess belief in each. The result was the 10-item Supernatural Belief Scale (SBS; Jong, Bluemke, & Halberstadt, 2013). An exploratory factor analysis and two confirmatory factor analyses across three samples determined that the scale was essentially unidimensional, and that the aggregate score reliably measured religious supernatural belief, as well as predicted self-reported religious identity and behavior.

Armed with a reliable and valid measure of one core aspect of religiosity—belief in supernatural agents, entities, and events—we then examined the statistical relationship between religious belief (via the SBS) and death anxiety (via the Death Anxiety Questionnaire; Conte, Weiner, & Plutchik, 1982). In contrast to the weak and variable associations reported in previous research, we have repeatedly found a curvilinear relationship between religious belief and death anxiety. In one representative study, depicted in Figure 19.1, participants who

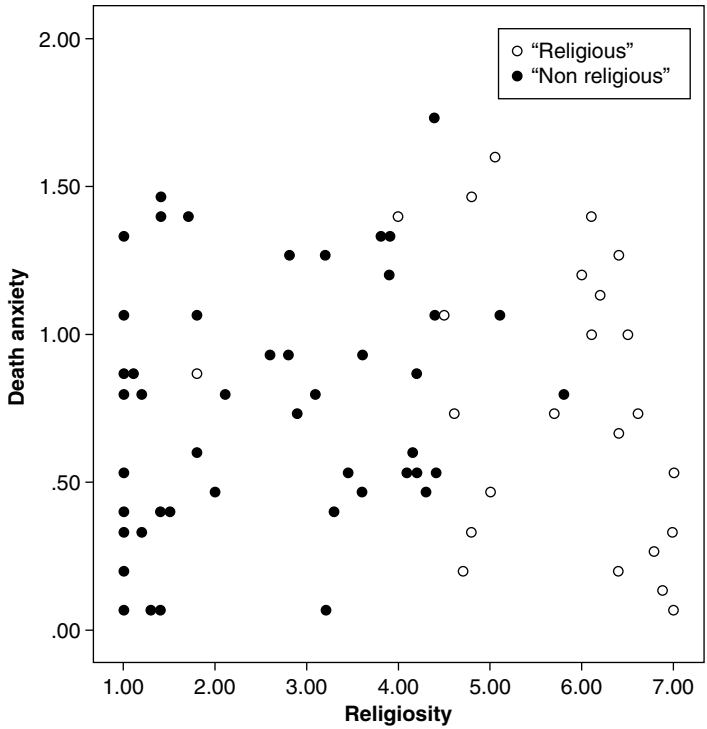

Figure 19.1 Relationship between supernatural belief (SBS) scores and death anxiety (DAQ), as a function of participants' self-categorized religiosity.

expressed relatively strong belief in religious supernatural entities (hereafter "believers") *and* those who expressed relatively strong *disbelief* in such entities ("nonbelievers") expressed less fear of death than those with relatively neutral or ambivalent beliefs. The same relationship was also found when participants were dichotomized in terms of their religious self-identification: among "Christian" participants, stronger belief was associated with less fear of death; among nonreligious participants (including self-described agnostics), stronger belief was associated with *greater* fear of death. Equally important, belief was uniquely associated with death anxiety; neither linear nor quadratic relationships were obtained for other measures of high-arousal negative affect, including any dimension of the Depression Anxiety Stress Scale (Henry & Crawford, 2005) or relevant items on the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Thus, death anxiety appears to be a distinct subtype of negative emotion, whose etiology and cognitive implications are not necessarily the same as other negative affective states (Forgas, this volume).

These correlational data are consistent with the "worldview defense" account of religious belief, in which individuals are buffered against death anxiety to the extent they strongly hold their ingroup beliefs, and not by virtue of strong religious belief per se. Indeed, religious belief was only associated with decreased anxiety among those who described themselves as religious; among nonreligious individuals, greater belief was associated with *greater* anxiety, possibly because such belief was at odds with their prevailing worldview.

Another interpretation, however, is that is the positive relation between religiosity and fear of death reflects not a challenge to nonreligious individuals' worldviews, but rather their motivation to assuage that fear. Similarly, one might argue that, on the "believing" half of Figure 19.1, rather than strong belief reducing death anxiety, it is low anxiety that drives or facilitates strong beliefs (or that high anxiety calls one's religious beliefs into question), supporting precisely the opposite conclusion. The interpretational ambiguity follows directly from the causal ambiguity: it is not clear whether participants' religious beliefs are a cause or a product of their fear of death.

Therefore, to examine the causal relation of anxiety and religious belief, particularly among nonbelievers, we adopted TMT's mortality salience paradigm, in which participants are asked to think and write about the thoughts and feelings they expect to experience at the moment of their death (or, in a control, the thoughts and feelings they expect to experience while watching television). After this priming task, they completed the SBS. Consistent with TMT's worldview defense hypothesis, but inconsistent with a unique role of religious belief, we found an interaction between priming condition and participants' prior religious affiliation (see Figure 19.2): participants who described themselves as "Christians" reported stronger beliefs on the SBS, whereas non-religious participants reported stronger *disbelief* when primed with death, than in the control condition (Jong, Halberstadt, & Bluemke, 2012, Study 1).

Clearly, at least in this study, a reminder of their mortality did not universally motivate participants' religious belief. Other researchers employing the same

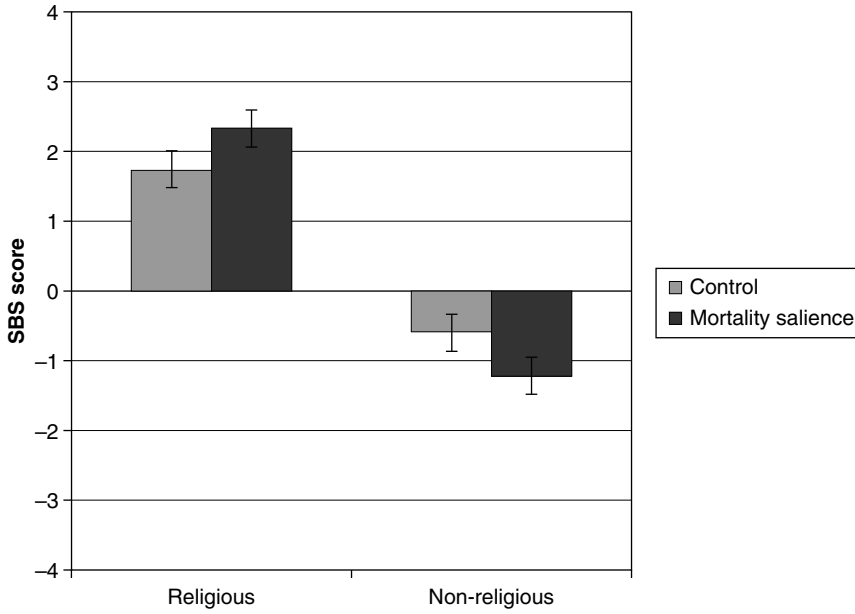

Figure 19.2 Religious supernatural beliefs as a function of self-identified religiosity and death priming condition.

paradigm or variations thereof have also found similar results, albeit with some interesting differences. Norenzayan and Hansen (2006), for example, found that mortality salience increased religious belief among religious individuals, but had no effect on non-religious individuals. Vail, Arndt, and Abdollahi (2012) also found that death-primed religious participants strengthened belief in their gods and, additionally, reduced belief in other religions' gods. From a different theoretical perspective, System Justification Theory would also predict greater entrenchment in one's own worldview following awareness of one's mortality, arguably the ultimate threat to the system (Napier, this volume).

Given the different ways in which group membership and religious belief are operationalized in these paradigms, it is difficult to make sense of the similarities and differences, but it is clear that, at the very least, reminders of one's mortality do not always motivate religious belief; indeed, they may even motivate religious disbelief among non-religious individuals, consistent with a worldview defense interpretation.

RELIGIOUS BELIEF AS AN ANXIETY-MANAGEMENT STRATEGY

Of course, even if thoughts of death change people's beliefs, it does not mean the change occurs for the purpose of reducing anxiety, much less that it is effective in doing so. Although there is now extensive research on defensive responses

to mortality salience, there has been surprisingly little research directly testing whether those responses actually work. The several studies that have examined the issue indirectly suggest, again, a complex situation. For example, Friedman and Rholes (2008) found that participants who scored high on religious fundamentalism engaged in less secular worldview defense after death priming than their counterparts who scored lower on religious fundamentalism (presumably because the former, their anxiety relieved, had no need for worldview defense). Similarly, Norenzayan et al. (2009) found that while non-religious participants reliably engaged in nationalistic worldview defense after a mortality salience induction, religious participants did not; interestingly, religious and non-religious participants did not differ on either self-esteem level or chronic death thought accessibility. Likewise, Dechesne et al. (2003) found that encouraging participants to believe in an afterlife decreased self-esteem striving and defense of values after a mortality salience induction. But, contrary to the worldview defense hypothesis, Heflick and Goldenberg (2012) found that such encouragement to believe in an afterlife mitigated the effects of mortality salience among atheists; discouragement from afterlife belief (i.e., the bolstering of their anti-religious worldviews) had no such positive effect.

If it seems odd that none of these studies measures anxiety per se, it is worth noting that Terror Management theorists generally maintain—rather incongruously given TMT's grand narrative—that it is not consciously experienced affect that drives worldview defense, but rather death thought accessibility itself (e.g., Pyszczynski, Greenberg, & Solomon, 1999; though recall Norenzayan et al.'s. 2009 finding above). To the extent that conscious terror is involved in the process, it is when death is first made salient, at which point individuals respond with "proximal defense" to head off the "ultimate fear of annihilation" (Pyszczynski et al., 1999). Worldview defense, in contrast, is a "distal defense" that is not invoked until thoughts of death leave consciousness (but are still accessible).

Be that as it may, it appears to follow that, if religious belief evolved to manage our existential anxiety, then manipulating religious belief should have measurable effects on it. To test this hypothesis we manipulated religious belief via an indirect persuasive message. Participants, in the context of a "research evaluation task," were instructed to read and rate the quality of three abstracts of published scientific studies. The first and third were identical for all participants and did not mention religiosity. The second, however, differed by experimental condition (pro- versus anti-religion): participants read about a large survey, supposedly published in *Nature*, which revealed that "scientists are getting more religious [atheistic]" because they find that "scientific [religious] explanations are increasingly inadequate to the task of explaining natural phenomena." Then, participants were primed with death, after which they completed the Death Anxiety Questionnaire described above, the PANAS as a state mood measure, and the SBS, used in this case as a measure of chronic religious supernatural belief. Contrary to the notion that religious belief is a uniquely powerful buffer against death anxiety, pro-religious priming only decreased death anxiety among

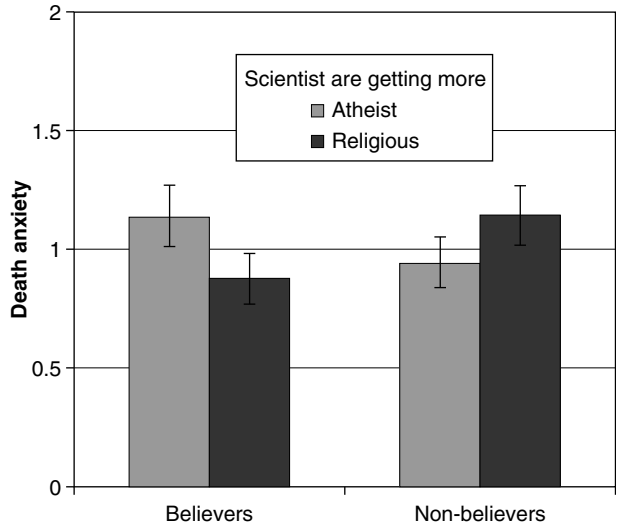

Figure 19.3 Death anxiety as a function of prior religious belief (SBS score, X-axis) and religiosity priming.

religious participants (those above the median on the SBS), but *increased* death anxiety among non-religious participants (see Figure 19.3). The same analysis conducted on general mood, as measured by the PANAS, and on the anxiety-related items on the PANAS, revealed no effects.

So far then, our experimental investigations spell bad news for the venerable idea that death anxiety motivates, and is quelled by, religious belief. Instead, increasing death-related thoughts bolstered individuals' prior beliefs, be they religious or anti-religious; furthermore, encouraging religious belief reduces death anxiety only for those who already believed, while making non-religious participants *more* anxious. The data are more consistent with TMT's worldview defense hypothesis, and with the notion that if participants are seeking immortality, they are doing so symbolically, not literally via an openness to supernatural agents with the power to grant it.

The result, while consistent with TMT, is at odds with much religious and philosophical thought, not to mention the implications of a good deal of empirical research. For example, Vail et al. (2012, Study 3) found that, when primed with death, agnostics abandon their doubt and move toward religious belief, suggesting that religious beliefs are particularly attractive when mortality is salient. Similarly, Norenzayan and Hansen's (2006, Experiment 4) found that death-primed Christians became more willing to endorse even outgroup gods, suggesting that mortality salience enables people to transcend worldview defense to become more open to other religious possibilities in the face of death. Furthermore, the research on the moderating effects of religious and afterlife beliefs on people's social and self-esteem responses to mortality salience suggests that such beliefs provide resources that ward off the negative effects of death-related thoughts.

How can God's existence be both a threat and a comfort to nonreligious individuals facing death?

IMPLICIT BELIEF AND ANXIETY

One possibility is that, while the assertion that "God exists" conflicts with strongly held propositional beliefs to which nonreligious individuals are committed, the concept of God (and religious supernatural beliefs generally) is associated with other, positive concepts. Just as one need not endorse negative attitudes toward African Americans (for example) to be influenced by learned cultural associations with this group, it is conceivable that one might derive some benefits from God without explicitly believing in Him.

Over the last two decades, the notion that our explicit attitudes are dissociable from our implicit attitudes, and indeed, that some attitudes are held or formed automatically and even unconsciously, has established itself as social cognitive orthodoxy. The literature is now replete with dual-process models of cognition, which variously distinguish between the implicit and explicit (e.g., Nosek, 2007), or the automatic and controlled (e.g., Bargh & Chartrand, 1999), or the unconscious and conscious (e.g., Dijksterhuis & Nordgren, 2006), or the heuristic and systematic (e.g., Chen & Chaiken, 1999), or the intuitive and reflective (e.g., Sperber, 1997). The conceptual and empirical relationships among these different distinctions are yet to be fully understood, but it is clear at least that human cognition and emotion are not limited to our conscious, verbalizable experience. The distinction between explicit and implicit cognition has been applied to many domains in social psychology, and indeed forms a core assumption of many theories of self-control, including those presented in this volume (see chapters by Bargh & Huang; Carver & Johnson; Denson; Schmeichel and Tang). Bargh and Huang (this volume) show how motivation itself may be represented, activated, and fulfilled unconsciously, allowing for the very real possibility that individuals could mitigate death anxiety in ways of which they are not aware.

Furthermore, recent research on religious cognition highlights just such a decoupling of reflective, propositional belief from unreflective, implicit beliefs. Barrett and Keil (1996), for example, demonstrated that people often employ theologically incorrect, overly-anthropomorphic assumptions that contradict their explicitly stated religious beliefs, when processing narratives about God in a recall task. There is also increasing evidence that participants who explicitly deny religious belief nevertheless behave like "implicit theists" (Uhlmann, Poehlman, & Bargh, 2008, p. 71). For example, participants who denied belief in the soul nevertheless declined to sell their souls to the experimenter, even though the contract was explicitly marked as bogus (i.e., "not a legal or binding contract, in any way"; Haidt, Björklund, & Murphy, 2000, p. 22). Bering (2002, p. 274) also found that "extinctivists"—people who explicitly affirmed belief that "the self is wholly extinguished at death"—nevertheless implied that certain kinds of psychological functioning persisted after death, when answering a

series of questions about a character in a story who had died. While they had little trouble denying the continuation of biological needs and psychobiological experiences (e.g., hunger), even extinctivists often endorsed statements that implied the post-mortem persistence of emotional (e.g., love for family members), desire (e.g., to be alive), and knowledge (e.g., knowledge that they were dead) states. Furthermore, they took significantly longer to deny the persistence of such psychological states than they did the persistence of biological and psychobiological ones. In a related study, Heywood (2010) interviewed atheists about major events in their lives, and found that they often saw intrinsic meaning or purpose in significant events, as though they occurred in order to teach them something or to convey some important message. These results, Bering (2010) argues, reveal that even trenchant non-believers (e.g., extinctivists, atheists) are subject to implicit and incorrigible tendencies toward afterlife beliefs and teleo-functional reasoning, which are important aspects of religious belief.

Besides implicit attitudes and implicit beliefs, there is also increasing evidence for implicit or unconscious emotions. There is, for example, clinical evidence of dissociations between consciously-experienced feelings and psychophysiological responses in anxiety disorders (Barlow, 1988; Rachman, 1990); indeed, this unconscious anxiety is especially associated with particular patterns of avoidance behavior, such as substance abuse (Kihlstrom et al., 2000). Furthermore, combining Zajonc's (e.g., 1980) work on affective priming and Schwarz and Clore's (1983) work on affect misattribution, Winkielman, Zajonc, and Schwarz (1997) provided evidence that affective priming (via happy and angry faces) could alter subsequent judgments about the valence of Chinese ideographs without detectable changes in consciously-experienced affect. Similarly, Winkielman, Berridge, and Wilbarger (2005) exposed thirsty participants to subliminal affective primes, and measured the amount of a novel beverage they drank as well as their evaluations of the beverage. In this case, the unconscious primes affected participants' attitudes and behavior without affecting consciously-experienced affect; participants primed with happy faces were more willing to drink the beverage and to evaluate it positively.

The research on implicit social cognition, implicit theism, and unconscious emotion opens up the intriguing possibility that there may be a dissociation between explicit and implicit religious beliefs in the face of death, as well as a dissociation between effects of religious belief on conscious and unconscious death anxiety. As a preliminary test of this idea, we first ran a correlational study to examine whether religious beliefs were associated with explicit and implicit death anxiety in different ways. Participants in this study completed the SBS before completing a single-target implicit association test (Wigboldus, Holland, & van Knippenberg, 2006), in which "death" and its synonyms were paired either with words associated with anxiety or (in a different block) with words associated with calmness. Difference in response times between these two blocks reflected implicit death anxiety. Participants also completed the explicit Death Anxiety Questionnaire used previously. Consistent with previous findings on the dissociation between explicit and implicit cognition and emotion, we found

that while the relationship between religious belief and explicit death anxiety was curvilinear as before, the relationship between religious belief and *implicit* death anxiety was linear: stronger religious belief was associated with lower implicit death anxiety.

Given the interpretational ambiguity noted above, we replicated this initial result experimentally. This time, rather than relying on an indirect persuasive message, we took advantage of the affect-as-information effect (Clore, Gasper, & Garvin, 2001). In the pro-religion condition, participants were asked to list twelve reasons that "God does not exist" (a task fewer than 1% of pretest participants accomplish spontaneously), noting that "most atheists find it easy to list 12 reasons," but adding that participants should stop if they themselves cannot think of that many. In the anti-religion condition, participants listed 12 reasons why "God exists," again adding that most religious people can do so, but that participants need not if they are unable. The expectation (validated in a pretest) was that participants would either fail or find it very difficult to list 12 reasons for either proposition, and consequently attribute this difficulty to their own attitudes. That is, the difficulty of the "God does not exist" task would lead to increased religious belief, whereas the difficulty of the "God exists" task would lead to decreased religious belief. Following the manipulation, all participants completed both implicit and explicit measures of death anxiety. In stark contrast to our previous study on self-reported (i.e., explicit) death anxiety, we found that participants who listed—with difficulty—reasons why God does not exist (and therefore inferred greater religiosity) demonstrated less implicit death anxiety than those trying to list why God exists (who inferred lower religiosity), regardless of their explicit religious beliefs (measured on the SBS; see Figure 19.4). Participants' explicit fear of death did not change.

These findings, in turn, raised the question of the effect of mortality salience on implicit religious beliefs. If religious beliefs mitigate implicit death anxiety, we reasoned, perhaps mortality salience might motivate implicit religious belief while also motivating explicit worldview defense. To address this possibility, we ran two studies, employing two different implicit measures of religious belief. In the first study, religious and non-religious participants (self-categorized) either completed the death or control thought listing task, followed by a supernatural belief single-target implicit association test In this case, participants responded to target words that referred to supernatural entities (from the SBS) on the same key as synonyms of "real" or (in a different block) synonyms of "imaginary," with the difference in response times a measure of the implicit association between supernatural entities and existence. Consistent with our hypothesis, and in contrast with our previous experiment on explicit religious belief, mortality salience increased implicit religious belief—the cognitive association between supernatural concepts and existential attributes—regardless of participants' self-reported religious identities (Jong, Halberstadt & Bluemke, 2012, Study 2; see Figure 19.5).

In a second study, we designed and employed a property verification task for religious belief in which participants simply categorized supernatural entities

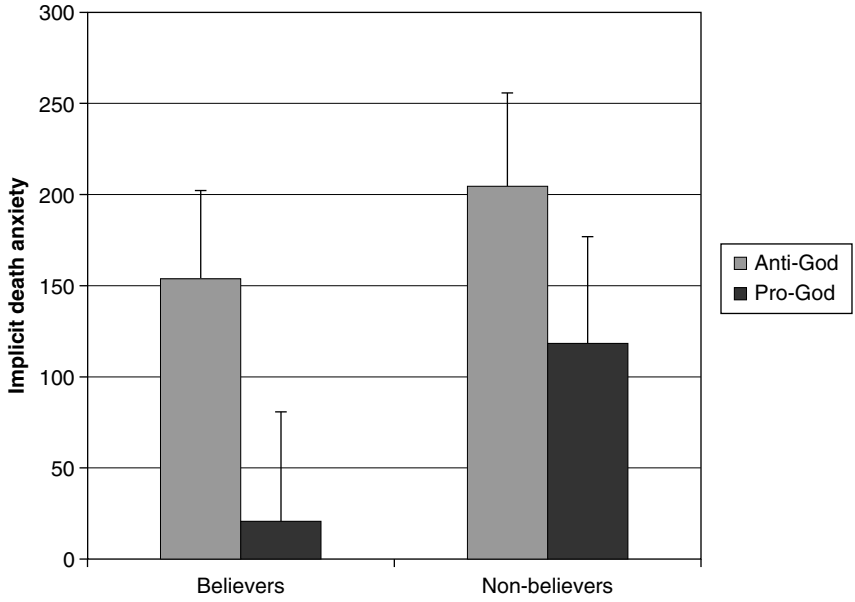

Figure 19.4 Implicit fear of death (ST-IAT score) as a function of the priming of God's existence and preexisting supernatural religious belief.

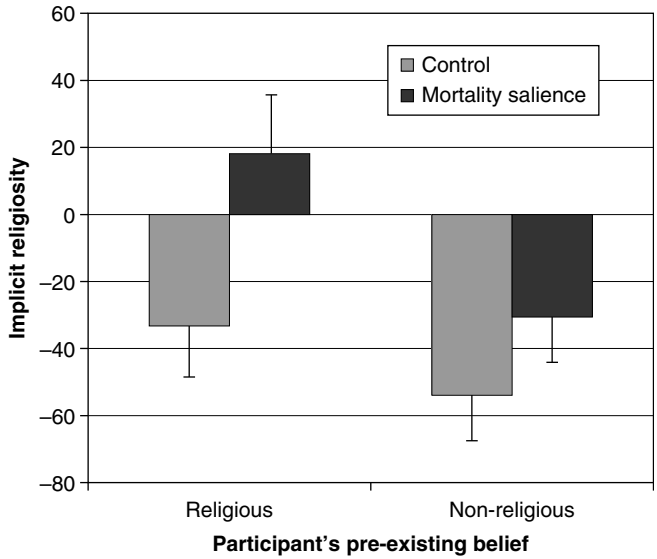

Figure 19.5 Implicit religiosity (ST-IAT score) as a function of religious identity and priming condition.

as being "real" or "imaginary" (Jong, Halberstadt, & Bluemke, 2012, Study 3). This task provides two measures: first, the rate of classification, and second, the speed of classification. As expected, classification rates were highly correlated with self-reported religious belief, as measured via the SBS, regardless of experimental condition: participants who scored high on the SBS also categorized more supernatural entities as real, $r = .86$, $p < .001$. On the other hand, classification latencies depended on experimental condition. In the control condition, these latencies were quadratically related to SBS scores: participants who reported strong religious belief *or* strong religious disbelief scores classified supernatural entities most quickly, whereas more ambivalent participants were slower to respond, $\beta = .49$, $t = -4.14$, $p < .001$. However, after writing about their own death, believers classified more quickly, while nonbelievers classified more slowly (relative to controls), a cubic function indicating strengthened religious belief and weakened religious disbelief among believers and nonbelievers respectively (see Figure 19.6). Note that this pattern is inconsistent with the worldview defense hypothesis, which predicts that mortality salience leads to

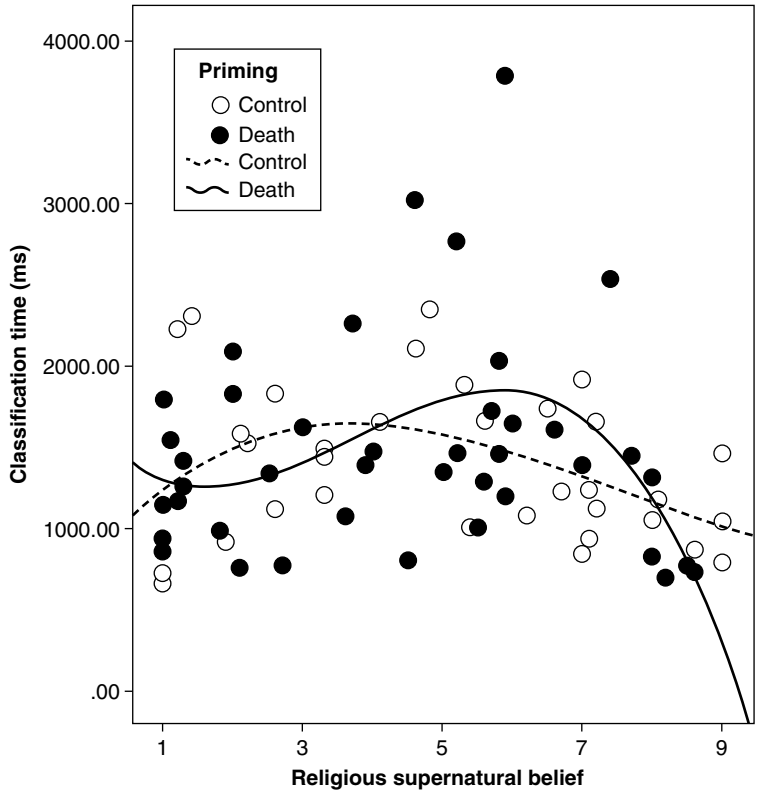

Figure 19.6 Time to classify religious concepts as "real" as a function of prior religious supernatural belief and priming condition.

the bolstering of one's prior beliefs, whether religious or not, and therefore that both religious and non-religious participants would both classify supernatural entities more quickly, in worldview-consistent ways.

Taken together with the previous studies on explicit religious belief and death anxiety, the findings presented here reveal religious belief to be a uniquely powerful buffer of existential anxiety. The dissociation between explicit and implicit religious belief enables people to simultaneously pursue symbolic immortality by engaging in explicit religious (or anti-religious) worldview defense while also pursuing literal immortality via implicit religious belief. Religious belief therefore provides a double-barreled strategy against death anxiety.

CONCLUSION

The research surveyed here suggests that religious beliefs regulate death anxiety in two ways. At an implicit level, religious beliefs reduce death anxiety; religious believers and nonbelievers alike are implicitly attracted to religious belief when they are reminded of death. Whether this common response reflects an evolutionary, now largely unconscious motivation to avoid existentially threatening stimuli (Bargh & Huang, this volume), more general processing changes associated with negative emotion (Forgas, this volume), or "colder" cognitive associations (e.g., spreading activation from "death" to "God"), remains to be seen. However, religious belief also serves a worldview defense function at the explicit level, perhaps via executive functions activated in the face of distress (Inzlicht & Legault, this volume). Together, these two complementary routes to anxiety reduction may help explain the robustness of religious belief in the face of minimal evidence.

If, as William James (1902/1952, p. 138) put it, our mortality is "the worm at the core of all our usual springs of delight," then we are likely motivated to keep mortality at bay, and always have been. The desire for a technological solution to ageing and death runs throughout human history from pre-scientific quests for magical potions to more recent forays into cryonics and regenerative medicine, to aspirations toward so-called "digital immortality" (Cave, 2012; Gray, 2011; Weiner, 2010). However, regardless of their actual efficacy, such attempts are unconvincing, more likely to attract derision than devotion (Gray, 2011; Weiner, 2010). In contrast, billions of people—the vast majority of us—seem to have little trouble believing that we will, in some way, survive our deaths without any medical intervention. Instead, we will do so by the immortality of our souls or the grace of our gods. Regardless of the truth of our religious beliefs, they seem to be, through the mechanisms studied in this chapter, effective psychological technologies against our fears of annihilation.

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20

'It Is Better to Give than to Receive'

The Role of Motivation and Self-control in Determining the Consequences of Ostracism for Targets and Sources

LISA ZADRO
ALEXANDRA GODWIN
AND
KAREN GONSALKORALE

Benjamin Franklin once famously stated: "The only things certain in life are death and taxes." Far be it from us to correct one of the Founding Fathers, but we would also add "ostracism" (the act of excluding and ignoring; Williams, 2007) to the list. After all, ostracism—in all its insidious glory—is ubiquitous throughout life. It is in the schoolyard, where children gleefully exclude each other from playground games and teachers punish students by placing them in "time-out" (Gruter & Masters, 1986); it is in the workplace, where bosses ignore the existence of subordinates and colleagues deliberately keep specific workmates out of the information loop (Jones, Carter-Sowell, Kelly & Williams, 2009); it is even in the home in myriad forms, from the use of the silent treatment between spouses, to teenagers ignoring their parents in favor of playing their latest video game. In fact, in a phone survey of US citizens, 67% reported that they regularly give the silent treatment (a form of ostracism) to others whereas 75% of respondents reported that the silent

treatment had been used on them (Faulkner et al., 1997). Clearly, ostracism, in one form or another, permeates our day-to-day lives.

Researchers have long established that belongingness (i.e. being included in the social group) is a fundamental human motivation and vital to the psychological and physical health of our social species (see Baumeister & Leary, 1995; Williams, 2007). Yet, the prevalence of ostracism within society suggests that excluding and ignoring others also has an adaptive purpose, irrespective of any negative outcomes that it may have for those who receive it or those who implement it (e.g., Gruter & Masters, 1986).

Given our inherent drive for social connectedness, it is important to understand how and why we universally engage in, and respond to, ostracism. As such, this chapter examines the ostracism experience from the perspective of both sources (i.e. the ostracizers) and targets (i.e. the ostracized). Specifically, we will focus on: the motivational forces at play for both roles (i.e. what motivates sources to ostracize? What factors motivate targets to respond to the ostracism episode in a prosocial or antisocial manner?); the consequences of ostracism with respect to primary need threat (i.e. threats to belonging, control, self-esteem, and meaningful existence; Williams, 2007); and finally, the role that self-control plays during the ostracism experience for both targets and sources.

SOURCES OF OSTRACISM: UNDERSTANDING THE MOTIVATIONS TO EXCLUDE AND IGNORE

The ubiquity of ostracism across cultures (Mahdi, 1986), institutions (schools, Lee, 2006; prisons, Hensley, 2000) and situations (Gruter & Masters, 1986), indicates that many of us are likely to be a source of ostracism at some point. Tellingly, the ability to use ostracism as an interpersonal tactic is evident very early in life. Barner-Barry (1986), for instance, documented a case where a group of six-year-old children systematically ostracized a bully—without any form of adult intervention—as a means of changing the bully's behavior. Moreover, Sheldon (1996) describes an incident of ostracism between three preschool girls during a role-play game of "families." One girl tried to exclude another child, who in turn attempted to resist the ostracism and find a role to play during the game. Eventually, the dominant girl gave the other child a role, albeit one that would ensure she could not actively participate ("you can be the baby brother, but you aren't born yet"). According to Sheldon, such forms of "verbally engineered social ostracism" (p. 57) are common between preschool children during such games. Such efficient uses of ostracism indicate that children are not only aware of the value of social inclusion, but are also able to recognize that excluding and ignoring others is an effective form of punishment.

Despite the fact that ostracizing others appears ubiquitous, there has been very little empirical investigation into the nature and consequences of ostracizing others. Rather, the vast majority of ostracism research has focused on ostracism from the perspective of *targets* of ostracism. Although this investigation has yielded valuable information about the consequences of being excluded and

ignored, it only tells half of the story; hence our knowledge of the dynamics underlying ostracism is incomplete at best. To date, our understanding of sources comes primarily from a series of structured interviews with real-world sources of long-term ostracism (e.g., Zadro, 2004, 2013; Zadro, Arriaga, & Williams, 2008) and a handful of experimental studies (e.g., Bastian et al., 2012; Ciarocco, Sommer, & Baumeister, 2001; Poulsen & Kashy, 2011; Zadro, Williams, & Richardson, 2005). The findings of these studies give a tantalizing glimpse into the mind of an ostracism source and provide promising evidence as to the motivations that underlie the use of ostracism in a group or a one-on-one setting.

The Motivations Underlying the Use of Ostracism

When investigating sources of ostracism, one of the first questions is: why do people choose to ostracize rather than use other forms of interpersonal conflict? Part of the answer may lie with the nature of ostracism itself. Unlike physical or verbal forms of interpersonal conflict, ostracism is subtle and often undetectable. It is also (generally) socially condoned, primarily because the adverse psychological consequences of ostracism are not as widely recognized or as physically obvious as verbal or physical abuse. Moreover, unlike other methods of conflict such as argument, where both targets and sources can influence the dynamic of the interaction, a source of ostracism maintains sole control over the exclusionary episode, thereby affording the source a sense of power and command over the target and the situation that is simply not possible in an argument.

Furthermore, ostracism has powerful, aversive consequences for targets. Specifically, Williams (2007) states that ostracism, in contrast to other forms of conflict, uniquely affects four primary human needs: belonging (the need for social connection and acceptance), control (the need for a sense of mastery over one's environment), self-esteem (the need to have a positive feeling of self-worth) and meaningful existence (the need to have a sense of self-significance and purpose; Williams, 2001; 2007). Ostracism's unique threat to the four primary needs enables sources to be assured that the ostracism episode will have a universally aversive and powerful impact on the target (Williams, 2007). Hence, given that ostracism is, for the most part, "invisible" to onlookers, (generally) socially condoned, immensely powerful, and allows the source full control over the interaction, it is unsurprising that ostracism is such a prevalent form of conflict.

Although the nature of ostracism itself may be one possible reason why people choose to ostracize others, it is not the sole motivation for its use. Williams (1997) outlined several "motives" for ostracizing others, which include: punitive, defensive, and oblivious ostracism. First, sources may choose to *punitively* ostracize one or more targets. That is, their motivation is to punish the target for actual or perceived wrong-doing, or to correct an undesirable behavior of a target. Punitive ostracism may occur on a group level in both human and animal species. For instance, Nishida et al. (1996) documented the case of a chimpanzee who was apparently rejected from his group because he did not show the necessary signs of respect (pant-grunting) to the alpha male and also

bullied the females of the group. This "ill-mannered member" (p. 207) was allowed to rejoin the group three months after he had demonstrated a positive change in behavior (Nishida et al., 1995). Similarly, humans physically ostracize rule-breakers, for instance, by sending naughty children to time-out corners until they have demonstrated that they have learnt their lesson, or by sending perpetrators of crimes to prison. Punitive ostracism may also occur in interpersonal relationships, such as when a source gives a romantic partner the silent treatment for not remembering their birthday. Overall, punitive ostracism is meant to punish wrong-doers, showing them what it is like to be separated from the safety and benefits afforded by the group (or interpersonal relationship), and thereby motivating them to change their behavior.

Defensive ostracism is typically motivated by one of two primary aims. The first is the desire to protect oneself—for instance, to avoid unwelcome attention or dangerous individuals. Defensive ostracism is often used by animal and human groups. In the animal kingdom, for instance, members who behave abnormally or who are ill are often excluded by the rest of the group, thereby ensuring the physical safety of the remaining members (Goodall, 1986; Lancaster, 1986). Similarly, humans also physically ostracize those who may present a threat to the health or safety of the group (i.e. we quarantine those who are ill and send perpetrators of violent crimes to prison). By removing undesirable members of the group, or those who pose some form of threat, the safety and security of the remaining group members is ensured.

The second aim of defensive ostracism is preventative in nature, whereby we ostracize the target to protect them or the relationship from further harm by our own hand. For instance, during an argument, we may choose to leave the room rather than stay behind and say something we may regret, thereby avoiding further damage to the relationship (see Rusbult et al., 1991).

Sources may also be motivated to *obliviously* ostracize the target. Oblivious ostracism is not designed as a punishment. Instead, it occurs when the source does not even deign to recognize the target's existence, thereby insinuating that the target is not worth the effort of punishing (Williams, 2001). One real-world source of ostracism stated that he often used oblivious ostracism on those that had committed some irredeemable offense against him. He stated: "(the target) does not exist anymore" (p. 9; Zadro et al., 2008). Ultimately, oblivious ostracism may be performed unconsciously, such as in the way in which society at large ignores the presence of homeless people on the streets, or deliberately as a consequence of some kind of infraction, such as the decision to ignore the very existence of someone who has mistreated you.

CONSEQUENCES OF OSTRACIZING: THE GOOD, THE BAD, AND THE UGLY

Given the multiple motives for ostracizing, it is not surprising that the consequences of being a source of ostracism are not particularly straightforward nor, due to the lack of empirical investigation into sources, well documented. Although Williams's model of ostracism (2001; 2009) asserts that targets

experience a uniform threat to primary needs post-ostracism, the model makes no predictions regarding the primary needs of sources. However, Zadro's (2004) interviews with real-world sources of long-term ostracism, and recent empirical investigations into sources, suggest that ostracizing others may lead to both depletion and fortification of these four needs.

Ostracizing and Primary Need-Threat

Ostracism may be an effective means of removing undesirable members from a group while simultaneously uniting the remaining members against a common enemy or for a common cause (Gruter & Masters, 1986). Empirical findings within the ostracism literature appear to support this view. For example, in a role-play task where two participants played the role of sources and a single participant played the role of the target, Zadro et al. (2005) found that sources of ostracism reported fortification of their sense of control and belongingness compared to sources of argument. Moreover, sources of ostracism reported fortification of their sense of belongingness and self-esteem compared to sources in the inclusion condition. Overall this suggests that ostracizing another individual may serve to unify the group (by fortifying a sense of belonging), and empower and elevate the sources' feeling of self-importance (through increased levels of control and self-esteem).

Similarly, Poulsen and Kashy (2011) conducted a study involving a four-person interaction, whereby participants were randomly assigned to the role of either one of three sources or a target. Participants had a 10 minute interaction and then completed ratings of themselves and others in the group. Poulsen and Kashy found that sources tended to view themselves and their fellow sources as more likeable than the ostracized target. Similarly, targets reported lower levels of liking towards the sources, which was, in turn, reciprocated.

Although elevations in belonging and self-esteem were found as a result of ostracizing in the laboratory, these findings may not tell the whole story. Typically, laboratory studies investigate group-based ostracism, where two or more sources ostracize a single target. Ostracizing in a group may help to increase cohesiveness, but ostracizing the target one-on-one often results in a *loss* of belongingness, particularly if the target is a loved one, such as a child or partner. Real-world sources of ostracism reported that they often had to look elsewhere (friends, family, colleagues etc.) to replenish their sense of belonging that was threatened by the ostracism episode (Zadro, 2004).

Moreover, one-on-one ostracism may also result in threats to self-esteem, as is evident in interviews with sources of real-world ostracism. When ostracizing in a group, there is a diffusion of responsibility for the ostracism episode and the subsequent effects that it may have on the target. However, a sole ostracizer must take full responsibility for the ostracism outcomes. Some ostracizers, termed "Penitent" sources, are often distressed about their use of ostracism and the consequences that it may have for the target. For instance, one Penitent source stated: "I am not proud of giving this treatment, and often feel I have let myself down by doing it . . ." (Zadro, 2004). Penitent sources typically show

remorse for their use of ostracism, finding the experience aversive and guilt-inducing. Moreover, they often state that they feel "disappointed" in themselves for performing the tactic (hence adversely affecting their self-esteem).

Although fundamental needs such as belonging and self-esteem may be either fortified or threatened while ostracizing, it appears that control is universally fortified. Perhaps one of the most fundamental features that distinguish ostracism from other forms of interpersonal conflict is the imbalance of power inherent in an ostracism episode. During other types of interpersonal conflict (such as argument), both targets and sources can defend, retaliate and ultimately engage in actions that influence the dynamic of the interaction. However, during an ostracism episode, it is predominantly the source who wields control over both the target and the interaction. That is, it is the source who decides when the ostracism episode is initiated and if/when they will end the episode and resume interacting with the target. This sense of heightened control over the target and the situation can be rather heady. One source reported that she will use the silent treatment "till the day I die," stating: "the Rolling Stones talk about getting satisfaction—this is how I get mine" (Zadro, 2013).

From the perspective of the source, this enhanced sense of power is arguably a beneficial consequence of engaging in ostracism. The heightened sense of control experienced by sources has been demonstrated in the ostracism literature. For instance, Sommer et al. (2001) asked participants to write about a time when they had been a source of ostracism. From this recall data, they found that ostracism sources' narratives frequently emphasized the utility of ostracism as a means of attaining power and control over the target. Moreover, in an experimental setting, Zadro et al. (2005) used a role-playing paradigm to compare the experiences of targets and sources during an interaction that involved either inclusion, ostracism or an argument. Zadro et al. (2005) found distinct differences between the self-reported experiences of sources of ostracism and argument, such that sources of ostracism reported greater levels of control following the interaction compared to sources of argument.

Finally, within the current literature, there has been little research dedicated to examining how a source's meaningful existence is affected during an ostracism episode. One could argue that acting as a source of ostracism may potentially have fortifying effects on the source's sense of meaningful existence. As previously discussed, initiating ostracism uniquely provides the source with a monopoly over both the dynamic and ultimate outcome of the exclusionary episode. As such, targets often resort to drastic behavioral responses in an attempt to manage or terminate the ostracism episode, including begging the source to speak to them or performing ingratiating behaviors, such as purchasing gifts for the source (Zadro et al., 2008). Thus if implementing the ostracism episode leads to such behavioral responses from the target, this may enhance the source's perception of the inherent influence that their actions have over their environment and others (particularly the target), which may strengthen their sense of meaningful existence. Although such fortification of meaningful existence can be seen as a result of real-world ostracizing, there is little support for

this finding in the experimental literature. For instance, although Zadro et al. (2005) found that sources of ostracism reported experiencing a greater fortification of their sense of meaningful existence compared to sources of argument, this finding was not statistically significant. Hence the links between ostracizing and meaningful existence need to be further explored.

Other Consequences of Ostracizing

Although ostracism is widespread and may result in need-fortification, this does not necessarily mean that ostracizing others is without cost. One such cost may be a sense of self-dehumanization. Bastian et al. (2012) conceptualize self-dehumanization as arising from the recognition that one's own actions have caused unjustified harm to others. Moreover, they argue that when people perceive their behavior to be immoral, they will view themselves as having a diminished sense of humanity. Across four studies, Bastian et al. (2012) found that participants who ostracized another individual reported perceiving themselves as less human and viewed their behavior as more immoral compared to individuals who did not engage in ostracizing behavior.

However, although experiencing self-dehumanization is psychologically aversive for sources, Bastian et al. (2012) proposed that it may also motivate positive behavioral outcomes. That is, when individuals perceive a reduction in their own humanity (via self-dehumanization), they may be motivated to engage in prosocial, self-sacrificing behavior. This possibility is consistent with literature on moral cleansing, whereby reminders of immoral behavior often motivate attempts to re-establish moral status through prosocial and altruistic acts (Jordon, Mullen & Murnighan, 2011). Indeed, Bastian et al. (2012) demonstrated that sources of ostracism who reported a decreased sense of humanity and who perceived their ostracizing behavior as immoral, were more likely to engage in prosocial behavior (volunteering their time for another experiment) following the ostracism episode. Thus, perhaps this increased propensity to engage in prosocial behavior is an ego-protective response to the guilt that a source may experience as a function of ostracizing another individual.

Ostracizing and Self-Control

Many forms of conflict involve emotional, spontaneous exchanges between targets and sources that often included a loss of control (e.g., the passionate exchange of insults and shouted comments that are commonplace during an argument). Ostracizing, however, involves the opposite; being a source of ostracism involves a considerable amount of self-control and an almost pathological vigilance regarding the self-monitoring of one's behavior. Indeed, Zadro et al. (2005) note that being a source of ostracism is a cognitively taxing process, as sources must make a conscious effort to regulate their automatic verbal and non-verbal behavior in the presence of the target (i.e. to ensure that they do not accidentally engage with the target). This process of monitoring one's automatic behavior requires self-regulation.

There is some empirical support for this argument. Ciarocco et al. (2001) found that after engaging in an instance of one-on-one ostracism, sources showed impaired executive functioning on a number of tasks; that is, sources gave up more quickly on an unsolvable anagram and also performed less well on a physical stamina task compared to control participants who did not ostracize. Ciarocco et al. argued that these tasks both required self-control to override the impulse to quit due to frustration/fatigue, yet sources were less able to override these impulses (compared to participants who did not ostracize others) because their self-regulatory resources had already been depleted during the ostracizing interaction. This explanation is also consistent with the research discussed by Denson (this volume), which suggests that engaging in acts of self-control may temporarily impair any subsequent attempts at self-control. Thus, although being on the receiving end of ostracism is an undoubtedly aversive experience, the cognitive effort and self-restraint required to maintain the ostracism episode also appears to have negative outcomes for those who initiate this tactic.

Despite the need to maintain a high level of self-control to conduct an ostracism episode, sources—particularly if they are the sole ostracizer—often lose control over the ostracism episode itself. Several long-term sources have reported that there are often times when they want to start speaking to the target but cannot do so, with many stating that ignoring the target becomes a difficult habit to break (Zadro et al., 2008). For instance, one source ostracized his son after an argument for over two weeks. After he observed the aversive effect that ostracism was having on his son, he decided to break his silence, only to find that it was close to impossible. He stated: "ostracism can be like a whirlpool, or quicksand if you, the user, don't extract yourself from it as soon as possible, it is likely to become impossible to terminate regardless of the emergence of any subsequent will to do so" (p. 97, Zadro, 2004).

There may be several reasons why the source loses control of the episode. First, sources may fear a "loss of face" if they start speaking to the target again, particularly if the initial reason for ostracizing the target is trivial. They may thus be forced to extend the ostracism episode to make the cause of the ostracism appear more legitimate. Second, sources may enjoy being the focus of the target's attention during the ostracism episode, particularly if the target attempts to reconcile by ingratiating themselves or offering tokens (e.g., buying the source presents or performing chores; see Zadro et al., 2008). Such actions may be both gratifying and enjoyable, and hence the source may drag out the ostracism episode long after they have already forgiven the target and/or wish to reconcile. Finally, some real-world sources stated that they eventually habituated to not acknowledging the target and consequently had to literally re-learn how to interact with the target once again. Thus, although ostracizing may initially appear to give sources the upper hand in a conflict and imbue them with a sense of control over the interaction, ultimately sources may find themselves just as helpless in the situation as the target.

TARGETS OF OSTRACISM: UNDERSTANDING THE MOTIVATIONS OF THOSE WHO ARE EXCLUDED AND IGNORED

It has been well established that being a target of ostracism has a host of detrimental psychological ramifications (see Williams, 2007). Within the literature, perhaps the most theoretically fundamental consequence of being ostracized is the depletion of the four primary human needs. The functionality of ostracism's unique primary need depletion is similar to that of the affect alarm model of control (see Inzlicht & Legault, this volume). First, primary need depletion is psychologically aversive and evolutionarily disadvantageous and thus it alerts the target to the fact that they are being excluded (Williams, 2007; 2009). Additionally, primary need depletion is thought to act as a catalyst for targets to engage in behavioral responses which aim to fortify their depleted needs and assist them in managing and recovering from the ostracism episode (Williams, 2007).

Recent research has found that the way in which the four primary needs are depleted may motivate different behavioral outcomes—primarily, whether ostracized targets respond in a pro- or antisocial manner (Warburton & Williams, 2005).

Prosocial Responding

Baumeister and Leary (1995) argue that people are motivated to maintain stable and on-going social connections. Our inbuilt propensity to live in communities and to seek out others for social interactions is thought to be an evolutionary advantage; it increases our access to resources and possible mates, and ultimately increases our chances of survival (Neuberg et al., 2005). As such, when an individual is ostracized, they experience a loss of social connection which consequently threatens this fundamental need to belong.

Warburton and Williams (2005) argue that when an ostracized target experiences this depleted sense of belonging, they are motivated to implement either reparative strategies aimed to initiate their re-inclusion back into the group, or strategies which will minimize any further exclusion and foster re-inclusion into *new* social groups. Typically, these strategies take the form of prosocial, affiliative behaviors which foster positive social connections. For example, Williams, Cheung and Choi (2000) found that compared to included participants, ostracized targets were more likely to conform to group standards. Moreover ostracized targets have been found to be better able to recognize and process socially relevant information (Bernstein et al., 2008; Gardner, Pickett & Brewer, 2000) which may enhance their ability to effectively socialize and connect with others.

Moreover, post-ostracism prosocial responding may also be motivated by a target's attempts to recover their depleted self-esteem. Targets may try to fortify depleted self-esteem by engaging in behaviors that may enable them

to be more noticed by others or to appear more attractive and likeable. For example, ostracized targets have been shown to unconsciously mimic body language (Lakin, Chartrand & Arkin, 2008) and to engage in social compensation behaviors, such as working harder in cooperative group tasks (although this latter finding is only evident in women; see Williams & Sommer, 1997). Thus, choosing to behave prosocially post-ostracism allows targets to regain specific needs (e.g. belonging, self-esteem) and to (potentially) regain membership in a social group.

Antisocial Responding

At the other end of the spectrum, ostracized targets have also been shown to exhibit myriad antisocial post-ostracism behaviors (see Williams, 2007; Williams & Nida, 2011). There are a number of hypotheses as to what motivates targets to respond in such a negative way. Initially one may assume that antisocial behavioral responding may be driven by the target's desires for revenge and retaliation against the ostracism source(s). This justification would certainly seem logical in instances when a target's antisocial responding was directed toward the source(s) of ostracism (Chow, Tiedens & Govan, 2008).

However, there are also documented cases of ostracized targets exhibiting antisocial and aggressive responses which are directed toward neutral third parties (e.g., Warburton, Williams & Cairns, 2006). In this case, the antisocial and aggressive responding becomes more difficult to justify as mere revenge-seeking. Hence, Williams and Nida (2011) argue that antisocial and aggressive post-ostracism responses may also stem from the target's depleted sense of meaningful existence, which leaves the target feeling invisible and unable to generate any kind of response from others. Consequently, the primary goal of the target purely becomes to be noticed—regardless of whether or not they are liked by others.

In addition, targets are thought to engage in aggressive and antisocial behavior as a means of regaining their depleted sense of control (Williams & Nida, 2011). As previously discussed, ostracism uniquely diminishes a target's sense of control because the ostracism is imposed on the target—that is, any attempt the target makes to respond or interact with the source is ultimately futile as it is the source who dictates if and when the ostracism episode will be terminated. This suggests that targets may attempt to regain control by lashing out at neutral third parties. Indeed, Warburton et al. (2006) found that only participants who were ostracized *and* whose control was further depleted post-ostracism (by being forced to listen to loud noise blasts) exhibited significantly more aggressive behavior compared to both included participants and participants who were ostracized but whose control was not further depleted.

Pro- or antisocial responding post-ostracism may also be influenced by self-regulatory capacity. Just like sources of ostracism, ostracized targets have been shown to exhibit depleted self-regulatory abilities following ostracism. For example, Oaten et al. (2008) found that ostracized targets consumed a

significantly greater quantity of unhealthy food and significantly lower quantity of a healthy drink compared to included counterparts. Similarly, in a study examining ostracism in a child sample, Hawes et al. (2012) found that ostracized girls tend to perform worse on subsequent cognitive tasks compared to girls who were not ostracized. Twenge et al. (2001) suggest that social exclusion may weaken the normal social restraints on selfish and aggressive behavior, thus leading socially excluded individuals to be less able to override aggressive impulses. For instance, Baumeister, Twenge and Ciarocco (2003) suggested that because social exclusion may lead to emotional numbness, cognitive overload and self-regulatory deficits, it may also lead to aggression as individuals' resources are too depleted to restrain aggressive impulses. This is consistent with the findings of Denson (this volume), who provides empirical evidence demonstrating that individuals with depleted self-regulation are more likely to display aggressive responding following social provocation compared to participants whose self-regulation is not depleted. Therefore, given the detrimental impact that ostracism appears to have on a target's self-regulatory capacity, depleted cognitive resources may also be a contributing factor which exacerbates an ostracized target's propensity to behave aggressively or antisocially.

Regulatory Responses of Targets During Ostracism

Although researchers have investigated the self-regulatory deficits that occur post-ostracism, there has been little research on the regulatory behavior that targets engage in during the ostracism episode. In some situations, targets may attempt to mask their emotional reactions to being ostracized, particularly if they think that showing a negative emotional response (e.g., despair, sadness, anger) will: a) make their situation worse; for instance, the target may believe that the ostracism episode will be prolonged further if the source knows that the target is adversely affected; or b) incite a positive reaction in the source. For instance, the target may hide their reaction to the ostracism episode so that the source does not have the satisfaction of seeing them upset. Thus, it seems plausible that in some ostracism situations, targets may be motivated to consciously monitor their verbal and physical reactions to being excluded and ignored. Although we expect that many targets engage in emotion regulation while in the presence of sources, there has been no empirical research to date in this area, possibly because many of the popular ostracism paradigms do not allow targets and sources to be face-to-face during the ostracism episode (for an exception, see Williams & Sommer, 1997).

Previous studies have examined post-ostracism affect in targets, with many demonstrating that being rejected and excluded results in a variety of negative affective states including sadness, anger and hurt feelings (Gerber & Wheeler, 2009; Smart Richman & Leary, 2009). However, the majority of these studies rely on self-reported measures of affect that either ask participants to reflect back on their emotions during the episode or ask participants how they feel

after the ostracism episode (e.g. the PANAS in Twenge, Catanese & Baumeister, 2003). Thus, these studies do not gauge the more instantaneous emotions that ostracized targets experience during the episode, nor do they examine any attempts that targets may make to conceal their feelings during the interaction; for instance, by consciously displaying positive emotion expressions (namely smiling) that are not actually being felt (Ekman, 2001).

Thus to examine emotional regulation during ostracism, Svetieva et al. (2013) coded the emotion expressions (using EMFACS—an abbreviated version of the Facial Action Coding System; Ekman, Irwin & Rosenberg, 1994) displayed by targets during ostracism or inclusion induced by the O-Cam paradigm. In this paradigm, participants are included or ostracized by two ostensible participants during a web-conference which is actually pre-recorded (see Goodacre & Zadro, 2010). Unlike other ostracism paradigms (e.g., Cyberball; Williams, Cheung & Choi, 2000), participants are face-to-face with the sources of ostracism.

Interestingly, Svetieva et al. did *not* find that ostracized participants displayed more facial expressions of negative affect compared to included counterparts during the experimental interaction. Rather, ostracized participants showed greater frequency of emotion management expressions during the interaction, specifically in the form of "management smiles" (Ekman, 2001); this was despite the fact that ostracized participants reported greater need-threat and hence were psychologically distressed during the study. Svetieva et al. (2013) argue that this use of control in ostracized participants' smile expressions indicates a concerted effort by these participants to regulate and manage their emotional expressions during the ostracism episode—simply speaking, targets did not wish to show sources the extent of their distress and hence controlled their facial expression, plastering on a smile in the face of exclusion.

FUTURE DIRECTIONS: TARGETS, SOURCES, MOTIVATION AND SELF-CONTROL

The findings reviewed in this chapter suggest exciting directions for future research on the motivations of sources and targets, which in turn have implications for current models of ostracism.

Accounting for the Motivations, Psychological Reactions and Behavioral Responses of Ostracism Sources

Williams's current model of ostracism (2009) focuses predominantly on targets and does not provide a complete account of ostracism from the perspective of sources. For instance, although earlier versions of the model delineated different types of ostracism that can be employed by sources as a function of particular motives (e.g., punitive ostracism, Williams, 2001), even these models did not

account for the psychological responses or behavioral reactions that the source experiences throughout the ostracism episode, nor whether such responses and reactions differ as a function of the type of ostracism that sources choose to conduct.

However, the evidence reviewed in this chapter demonstrates that ostracism does have important effects on sources once it has been enacted. As is the case with receiving ostracism, the act of ostracizing affects primary needs (e.g., Poulsen & Kashy, 2011; Zadro et al., 2005). Moreover, the psychological ramifications of ostracizing someone have been found to influence the source's propensity to engage in particular behavioral responses (e.g., increased prosocial responding, Bastian et al., 2012). Thus, Williams's current model (2009) should be extended to account for how sources' primary needs are affected during and after an ostracism episode, and, moreover, how sources behaviorally respond as a function of their primary need levels after the ostracism episode. In addition, the model should also incorporate how particular behavioral responses may facilitate sources in exacerbating, managing or terminating the ostracism episode. These additions to the model would provide a more comprehensive account of how sources are affected both during and following an ostracism episode, moving theory beyond its current focus on the motivations and reactions of ostracized targets.

Examining the Effects of Self-Regulatory Responses During The Ostracism Episode

Recent work suggests that targets of ostracism display more "management smiles" than included individuals in an ostensible face-to-face interaction (Svetieva et al., 2013). This finding provides valuable insight into the ways in which targets control their emotional expressions during ostracism. Given that sources essentially control the ostracism interaction—that is, they decide when to begin and end the episode, as well as the type and severity of ostracism that the target will experience—one of the only aspects of the episode that targets can control is the way in which they respond to the episode while in the presence of the source. Future research could explore the implications of this self-presentational strategy, for example, whether targets who display management smiles are perceived as more attractive interaction partners, and thus are more likely candidates to successfully achieve future belonging, than targets who do not display management smiles, or whether specific personality traits can predict whether targets are better at managing their responses to ostracism (e.g., self-monitoring). Moreover, it may be intriguing to examine whether targets who are able to control their emotional responses differ in terms of their physiological response to being excluded and ignored. Investigating the ways in which targets exert self-control during the ostracism episode—as well as the benefits and costs of these strategies—will assist us in further understanding the processes underlying the effects of being excluded and ignored.

CONCLUSIONS

Ostracism is still an emerging field—it was only a decade ago that the first systematic experimental research program investigating the nature and consequences of ostracism was conducted. Although researchers have, until now, been biased toward targets in their investigation of this phenomenon, the recent move toward examining the ostracism experience from the perspective of both targets and sources will allow us not only to attain a better understanding of this complex phenomenon, but also to use this knowledge to develop strategies to assist in the amelioration of aversive outcomes for both target and sources.

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