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SOCIAL POWER AND THE ADVENT OF ACTION

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Power—the ability to influence the outcomes of other people—is a key variable that regulates a wide range of human social interactions. Although previous research has demonstrated that power leads people to become approach-oriented, most studies have focused on how this orientation manifests itself in conscious, higher-order aspects of social behavior. The current study presents evidence that priming the concept of power has a direct influence on low level processes within the motor system. Participants performed a task in which they responded to auditory cues by moving their hand either toward the immediate environment (approach) or away from the environment (avoidance). Priming the concept of power facilitated the initiation of approach responses and, to a lesser degree, interfered with initiation of avoidance responses. This study supplements theories of power and approach, and fits with recent work suggesting fundamental links between cognitive processes and motor behavior.

The social structures of many species are organized hierarchically, with some individuals exhibiting power and dominance over others (e.g., Archer, 1988; de Waal, 1982; Eibl-Eibesfeldt, 1989). Indeed, power (the capacity to influence the outcomes of other people) is a key variable regulating human social interactions. As a consequence, power can have profound effects on a wide variety of psychological and interpersonal processes (Galinsky, Magee, Inesi, & Gruenfeld, 2006; Guinote, Judd, & Brauer, 2002; Smith, Dijksterhuis, & Wigboldus, in press; Smith & Trope, 2006; see Keltner, Gruenfeld, & Anderson, 2003 for a review).

Having power provides a relatively unconstrained ability to administer (or to withhold) resources, rewards, and punishments. Moreover, powerful individuals tend not to be highly susceptible to punishment from others. Hence, powerful individuals enjoy the luxury of acting without concern of serious reprisal or consequence. As a result of this disproportionate exposure to reward versus punishment, power tends to evoke a pronounced orientation toward behavioral approach (e.g., Galinsky, Gruenfeld, & Magee, 2003; Smith & Bargh, 2008; Smith, Jost,

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& Vijay, 2008). An emerging body of research suggests that granting people power, or experimentally priming the concept of power, leads people to become more approach-oriented, to take risks, to exert greater influence in social interactions, to become sexually forward, and to act out against aversive stimuli (e.g., Anderson & Berdahl, 2002; Anderson & Galinsky, 2006; Bargh, Raymond, Pryor, & Strack, 1995; Galinksy et al., 2003; Galinsky, Magee, Gruenfeld, Whitson, & Liljenquist, in press; Maner, Gailliot, Butz, & Peruche, 2007).

Although the link between power and approach is well-documented, nearly all of the studies examining this link have focused on processes that involve higher-order forms of cognition and behavior: explicit actions, conscious choices, and deliberate decisions. Much less is known about whether links between power and approach exist at relatively automatic, lower-order stages of action initiation and execution—links that involve basic processes within the human motor system. The current study therefore investigates the link between power and approach by examining activation and inhibition within low-level processes involving physical movement and the initiation of motor action.

Many studies at the interface of cognitive psychology and social psychology suggest that the motor system is inextricably linked with the way people process information (e.g., Kaschak & Maner, 2009). Cognition and action are functionally and neuroantonomically integrated, such that the activation of particular concepts within the cognitive system affects the brain systems responsible for producing motor behavior. As Hommel, Müsseler, Aschersleben, and Prinz (2001) put it, "… perception, attention, intention, and action share, or operate on, a common representational domain" (p. 859). Indeed, activation and inhibition of basic processes within the motor system are tied to the psychological accessibility of particular concepts (e.g., Neumann, Förster, & Strack, 2003). Förster and Strack (1996), for example, demonstrated that people efficiently encoded and remembered words when the valence of the words were compatible with motor actions being performed during encoding (nodding one's head up and down when encoding positive words; shaking one's head from side to side when encoding negative words; see also Wells & Petty, 1980). When the words were incompatible with the actions, people were less able to remember the words, in part because encoding them required greater attention and cognitive resources. Thus, executing particular movements can activate the concepts implied by those movements. The converse is true as well: the activation of particular concepts can facilitate the initiation and execution of movements that are compatible with those concepts (e.g., Glenberg & Kaschak, 2002; Zwaan & Taylor, 2006). Such findings suggest fundamental associations between particular actions and the psychological meanings they connote.

Associations between action and meaning can involve people's basic motivational orientations toward approach and avoidance. Cacioppo, Priester, and Bernston (1993), for example, showed that people exposed to neutral stimuli while pulling their arm up against a desk (which mimics the movement involved in drawing something closer to the self), evaluated those stimuli more positively than did people who evaluated the stimuli while pushing their arm down against a table (as in pushing something away from the self; see also Priester, Cacioppo, & Petty, 1996). Thus, approach versus avoidance oriented movements elicited positive versus negative attitudes toward stimuli that otherwise were neutral. This suggests that people's motivational orientations toward approach and avoidance literally are linked to the pushes and pulls of the human body.

Such findings may extend to the domain of social power. For example, producing certain kinds of bodily movements, such as making a fist, have been shown to activate the concept of social power (Schubert, 2004). If power promotes an approach orientation that manifests at basic levels of motor action, then priming the concept of power should elicit patterns of physical movement that reflect approach-oriented action tendencies. Such action tendencies are presumed to mirror the operation of basic neurological systems associated with behavioral approach (Gray, 1990; Carver & White, 1994).

The current study assessed the extent to which activating the concept of power influences behavioral systems of approach and avoidance, as reflected in basic motor behavior and action initiation. Consistent with recent evidence for a link between power and approach, we hypothesized that priming the concept of power would facilitate a state of approach-readiness—a state that would be reflected in the initiation of approach-oriented physical movement.

The study was conducted in three phases. The first phase (baseline phase) involved the execution of a series of basic motor responses. Participants were asked to press and hold down a button to start each trial. Shortly thereafter, they were presented with one of two tones. Participants were instructed to execute an action away from their body (i.e., to move their arm outward to push a response button) for one tone, and to execute an action toward their body (i.e., to move their arm inward to push a response button) for the other tone. The second phase of the study was a priming procedure in which participants were presented with a set of words that either primed the concept of power or was neutral with respect to power. The third phase of the study repeated the first, with participants executing a series of outward and inward hand movements, so that any effects of priming could be examined.

How is power expected to affect the initiation and execution of simple motor responses toward and away from the body? The answer depends on how these actions are mapped onto the dimensions of approach and avoidance. Early explorations of this issue seemed to suggest that the approach dimension mapped onto responses executed toward the body. For example, Chen and Bargh (1999) showed that participants were faster to respond to positive words when pulling a lever toward their body, and faster to respond to negative words when pushing the lever away from their body.

More recent studies have shown that the mapping of approach and avoidance processes varies with the nature of the task (e.g., Eder & Rothermund, 2008). Indeed, the links between cognition and action are not rooted merely in a person's overt muscle movements but, rather, in the way people symbolically represent their actions vis-à-vis their own location in space (Markman & Brendl, 2005), as well as their proximity to their goals (Förster, Higgins, & Idson, 1998). In contrast to Chen and Bargh (1999), for example, Wentura, Rothermund, and Bak (2000) showed that pushing a button was associated with approach-oriented cognitive processes, even though pushing the button required a movement away from the body.

Frenia, Baroni, Borghi, and Nicoletti (in press) demonstrated that the mapping of approach and avoidance onto actions toward and away from the body depends in part on the posture of the participant's hand. When a participant's hand is configured as if grasping something (e.g., grasping a ball or holding a joystick, as in Chen & Bargh, 1999), responses toward the body are mapped onto behavioral approach. This reflects the fact that when one is holding something, approach is manifested as bringing that object closer to the body.

A different situation emerges when the participant's hand is open (as in the present experiment). Here, approach is reflected in movements away from the body, as when one is reaching out to grasp something (Frenia et al., in press). Conversely, responses toward the body reflect avoidance or withdrawal, as in drawing one's hand away from a painful stimulus. Because the current study relied on a method involving an open-hand posture, we refer to responses away from the body as "approach" responses, and responses toward the body as "avoidance" responses.

Our primary prediction was that priming power would facilitate the initiation and execution of motor responses away from the body (i.e., approach responses). Notably, Smith and Bargh (2008) reported that priming individuals with power activated systems responsible for behavioral approach, but did not affect systems responsible for behavioral avoidance. Consequently, our predictions regarding the initiation and execution of responses toward the body (i.e., avoidance responses) were less strong, although some current theories of power (Keltner et al., 2003) would suggest that power should inhibit avoidance, thus slowing the initiation and performance of actions toward the body.

METHOD

PARTICIPANTS

Participants were 68 undergraduate psychology students. They received course credit in exchange for their participation.

PROCEDURE

Upon arriving at the lab, participants were told that they would be seeing a variety of words and other stimuli flash on the screen, and that they should do their best to identify them as they were presented. They were also told that they would be executing various responses using the keyboard based on sounds they would hear via headphones.

Participants were seated in front of a computer monitor, and the computer keyboard was placed on their lap. The keyboard was oriented such that the "Q" key was away from their body and the "P" key was closer to their body. Participants were instructed to respond as quickly as possible to high (440 Hz) and low (220 Hz) tones by making a designated motor response with their hand. Each trial began with participants pressing and holding the "Y" key, which initiated presentation of the high or low tone (timing of the tone onset was varied, so as to prevent anticipatory motor responses). Participants were told to press the "Q" key, thus moving their hand outward toward the immediate environment (approach response) whenever they heard the high tone, and to press the "P" key, thus drawing their hand back (avoidance response) whenever they heard the low tone. The pairing of response type (approach versus avoidance) and tone (high versus low) was counterbalanced across participants. Participants performed a series of 80 trials (40 approach, 40 avoidance), which provided baseline measures of response time.

Following these trials, participants were foveally primed with either 12 power-related words (e.g., *authority*, *boss*, *control*, *executive*, *influence*, *macho*) or 12 neutral control words (e.g., *apple*, *commute*, *couch*, *drive*, *napkin*, *narrow*). Priming words were presented for 90 ms, and immediately replaced by a backwards mask consisting of three rows of non-alphanumeric symbols (e.g., !@#$%^&**). The priming procedure was similar to one used by Bargh et al., (1995); the priming words were the same, although Bargh et al. primed people with parafoveal word presentation. After priming, participants again performed 80 motor response trials (40 approach, 40 avoidance).

DEPENDENT MEASURES AND ANALYTIC STRATEGY

Two dependent measures were evaluated: (1) the latency between the presentation of the high or low tone and the participant's lift-off from the Y key (Initiation time); (2) the time between the lift-off from the Y key and the pressing of the P or Q key (Movement time). Initiation time is an index of the time required to initiate the appropriate motor response. Movement time is an index of the time required to actually execute the movement. It should be noted that the error rate in this study was very low (< 2% of trials), and incorrect trials were eliminated from the data prior to analysis.

We analyzed the last 20 trials (10 approach responses, 10 avoidance) from the first motor phase and the first 20 trials from the second motor phase, because we wished to compare motor performance from immediately before the priming phase of the study (once participants were well-practiced on the task) to performance immediately after the priming phase (when participants were most likely to be affected by the priming manipulation). Extreme response times (< 100 ms and > 4000 ms) were excluded, as were remaining response times greater than 3 *SD*s from the participant's mean in each of the 4 within-participants cells of the design (Pre-priming, approach response; Pre-priming, avoidance response; and so on). Data were then analyzed with a 2 (Time: Pre-priming vs. Post-priming) x 2 (Response direction: Approach vs. Avoidance) x 2 (Priming: Power vs. Neutral) mixed-factor ANOVA, with Priming as a between-participants factor.

RESULTS

Preliminary analysis revealed no significant effects associated with counterbalancing condition. We therefore collapsed across counterbalancing condition for all subsequent analyses.

INITIATION TIMES

The mean Initiation times are presented in Table 1. We observed a main effect of Time, $F(1, 66) = 7.13$, $p < .01$, reflecting a general slow-down in responding from

TABLE 1. Mean Latency and Move Times by Priming Condition, Response Type, and Time (Standard Deviations in Parentheses)

	Power Priming		Neutral Priming	
	Approach	Avoidance	Approach	Avoidance
Initiation Times				
Pre-priming	611(214)	560(124)	640(227)	625(217)
Post-priming	634(180)	621(179)	712(214)	660(214)
Difference	23	61	72	35
Movement Times				
Pre-priming	363(122)	338 (84)	361(83)	347(114)
Post-priming	365(139)	354(103)	375(93)	360(95)
Difference	2	16	14	13

Note. Differences are computed as Post-priming – Pre-priming.

pretest (M = 609 ms) to posttest (M = 657 ms); this presumably reflects the cost of re-engaging in the motor task after the priming procedure. There was also a main effect of Response direction, $F(1, 66) = 9.50$, $p < .01$, with avoidance responses (M = 617 ms) being generally faster than approach responses (M = 649 ms).

The critical result from this experiment was a three-way interaction of Time, Response direction, and Priming, $F(1, 66) = 6.31$, $p = .01$. We tested the simple effects of priming separately for approach and avoidance responses. Relative to the baseline provided by the Neutral priming condition, Power priming facilitated the initiation of approach responses (i.e., responses away from the body) from the pre-priming phase to the post-priming phase, $F(1, 66) = 5.20$, $p = .026$, $d = .56$ (see Figure 1). Power priming did not significantly affect the initiation of avoidance responses (i.e., responses toward the body), $F(1, 66) = 1.61$, $p = .208$, $d = .31$, although the pattern was in the opposite direction of approach responses.

MOVEMENT TIMES

The movement times are presented in Table 1. There were no statistically reliable effects on movement time (all Fs < 1.76, p > .18). Thus, priming the concept of power had an effect on the initiation of an action (as indexed by the Initiation times), but not on the actual execution of the motor movement.

WAS THE EFFECT DUE TO PRIMING ANIMACY?

Although the observed effect on response initiation suggests an effect of power priming, it is important to consider and rule out possible alternative explanations. In particular, because the power-related words from Bargh et al. (1995) could be used to describe people or actions whereas the control words generally could not, the priming words may have activated concepts associated with animacy or possibly the self, in addition to the concept of power. Thus, we collected additional data

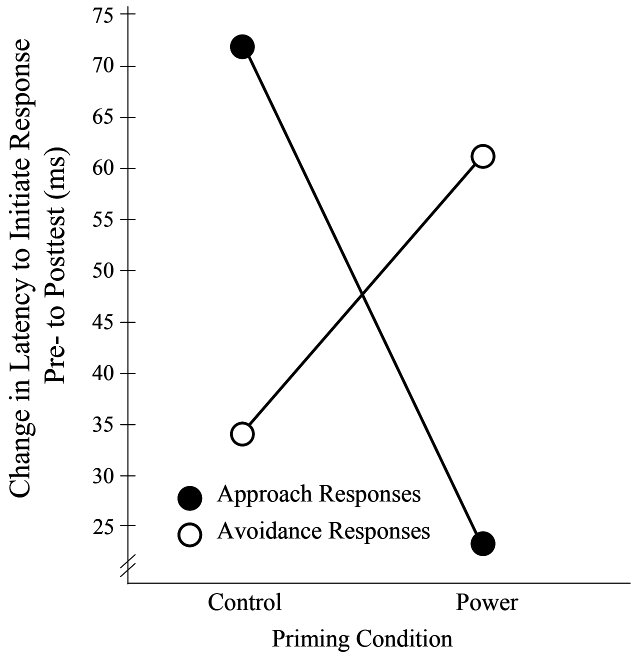

FIGURE 1. Change in response initiation times from Pre-priming to Post-priming as a function of movement type and priming condition. Power priming significantly facilitated the initiation of approach responses.

from 39 participants using 12 priming words that were comparable to the original power words on dimensions of animacy and possible self-relevance (*happy*, *kind*, *painter*, *chastity*, *satisfy*, *hairy*, *grainy*, *poke*, *roomy*, *safe*, *charter*, *position*). After being primed with these words, participants completed the motor action task.

The pattern of latency times for this condition did not resemble that obtained for the power priming condition. Priming participants with words denoting animacy appeared to inhibit response initiation for approach responses, relative to avoidance responses, although the changes from pre- to posttest did not reach statistical significance (Fs < 2.33, $p > .14$). Whereas response initiation times for avoidance responses slowed down from pre- to posttest by 2 ms, response initiation times for approach responses slowed down somewhat more (13 ms). Thus, priming participants with power words facilitated the initiation of approach-oriented actions, but priming participants with words denoting animacy did not (and, if anything, produced a relative inhibition of approach-oriented responses).

DISCUSSION

The current research suggests a fundamental link between power and approach that exists at a basic level of the motor system. Priming the concept of power facilitated the initiation of approach-oriented motor actions and, to a lesser (and statistically nonsignificant) degree, interfered with the initiation of avoidance-oriented motor actions. The current findings suggest that the proclivity for action among powerful individuals is firmly embedded within the architecture of the human mind. Power is linked with action at a fundamental level of cognition and motor behavior. Notably, priming the concept of power affected the facility with which approach-oriented motor responses were initiated, rather than the speed with which those movements were actually executed. This implies that power shapes an individual's degree of action-readiness (how prepared one is to act) rather than the speed of one's overt muscle movements.

The action-readiness observed in this experiment is consistent with the hypothesis that power promotes the differential operation of behavioral activation and inhibition systems within the central nervous system. These systems provide a foundation for a broad array of goal-directed social behaviors involving close relationships, social affiliation, and social dominance. Indeed, low-level approach- and avoidance-oriented muscle movements have been shown to affect a range of high-level psychological outcomes such as creativity (Friedman & Förster, 2000, 2002) and attentional flexibility (Förster, Friedman, Özelsel, & Denzler, 2006; Friedman & Förster, 2005). From aggression and intragroup competition to prosocial behavior and the formation of social alliances, the current findings may provide a basis for understanding the mechanisms through which power influences a broad range of social behaviors.

The current findings go beyond previous research suggesting a propensity for action among powerful people. Although previous studies provide evidence for higher-order behaviors seeming to reflect a proclivity for goal-directedness and approach (e.g., Galinsky et al., 2003; Smith & Bargh, 2008), research has until now fallen somewhat short of examining the behavioral consequences of power at more basic levels of motor activity. Indeed, in exploring the links between power and approach, previous work has relied largely on behavioral dependent variables that are highly overt and conscious. In contrast, all participants in the current research were instructed to perform the task as quickly and accurately as they could. Thus, there is some reason to think that the behavioral effects we observed were relatively more automatic and unintentional and did not rely on conscious or deliberate strategies.

Findings from the current study are consistent with previous studies linking approach- and avoidance-oriented movement with motivational mindsets of promotion and prevention (Förster et al., 1998). Regulatory-focus theory (e.g., Higgins, 1997) suggests that while some people focus on advancement, incentive, and approaching positive outcomes (promotion focus), other people focus relatively more on security, safety, and avoiding negative outcomes (prevention focus). Approach-oriented movements of the sort investigated in the current studies have been linked with a promotion focus (Förster et al., 1998). Thus, it is possible that power priming elicits a promotion-focused regulatory style, which is reflected in the facilitation of approach-oriented motor action. Future research is needed to test this directly.

The current data are among the first to demonstrate that power has a direct effect on low-level action initiation. When these findings are placed alongside evidence suggesting that motor activity and perceptual information affects one's response to power-related stimuli (Schubert 2004, 2005), they suggest that people's understanding of social power is grounded in their bodies' systems of perception and action planning. This conclusion is consistent with embodied approaches to cognition (e.g., Barsalou, 1999; Glenberg, 1997; Glenberg & Kaschak, 2002; Kaschak &

Maner, 2009; Lakoff & Johnson, 1980). An embodiment perspective implies that cognition is firmly rooted in bodily systems responsible for perception and action. In thinking about and understanding particular concepts—such as the notion of picking up a cup of coffee or approaching a friend on campus—the cognitive system co-opts portions of the cortex responsible for actually perceiving those events and producing those movements (e.g., Kan, Barsalou, Solomon, Minor, & Thompson-Schill, 2003; Kaschak et al., 2005; Zwaan & Taylor, 2006).

Although our data go only far enough to show that priming the concept of power can affect the motor system, this finding hints at the larger possibility that abstract concepts like social power may be understood via the pushes and pulls of bodily action (e.g., the exertion of social power is understood as the exertion of physical force). This possibility fits with research on the development of the concept of causality, where it appears that young children learn about causality by observing their bodies exert physical force on objects in the environment (Novick & Cheng, 2004). It is clear that we have only scratched the surface in understanding how psychological processes (such as those involved in power) are linked to basic systems responsible for perception and motor behavior. This area of research is an extremely fertile ground for further investigation, and our hope is that the current study provides a useful springboard for future empirical work.

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