Journal of Personality and Social Psychology
2006, Vol. 90, No. 4, 578–596

0022-3514/06/$12.00 DOI: 10.1037/0022-3514.90.4.578

You Focus on the Forest When You're in Charge of the Trees: Power Priming and Abstract Information Processing

Pamela K. Smith
University of Amsterdam

Yaacov Trope
New York University

Elevated power increases the psychological distance one feels from others, and this distance, according to construal level theory (Y. Trope & N. Liberman, 2003), should lead to more abstract information processing. Thus, high power should be associated with more abstract thinking—focusing on primary aspects of stimuli and detecting patterns and structure to extract the gist, as well as categorizing stimuli at a higher level—relative to low power. In 6 experiments involving both conceptual and perceptual tasks, priming high power led to more abstract processing than did priming low power, even when this led to worse performance. Experiment 7 revealed that in line with past neuropsychological research on abstract thinking, priming high power also led to greater relative right-hemispheric activation.

Keywords: social power, priming, abstract thinking, construal level theory, hemispheric activation

> To manage a system effectively, you might focus on the interactions of the parts rather than their behavior taken separately.
>
> —Russell L. Ackoff

One afternoon over coffee, a friend of the first author related her mixed feelings about her new job. After 2 years in the same position at an advertising agency, she was lured to a rival company with promises of new responsibilities and opportunities for advancement. Now she worked as a midlevel supervisor with 4 employees answering to her.

> It's like I have to think differently, to use a different part of my brain, now that I'm a supervisor. It's nice because now everything has more purpose. I'm thinking about the agency's 5-year plan, not just what I need to do to get through the week. But I feel so removed from what's going on in the office. I give my employees tasks, and they complete them. I just have no idea how they do it—and I used to have their job!

Power changes people, both positively and negatively (e.g., Chen, Lee Chai, & Bargh, 2001). Having control over other people's outcomes, or having others control your own outcomes, affects the very way you view the world. Leaders have vision: They transform the many activities of an organization into a cohesive and coherent mission. Followers, meanwhile, focus on carrying out the details contained within the larger plan. In this way, power is fundamentally linked to abstract thinking. We propose that this connection carries beyond the boardroom into all aspects of life. Merely activating the concept of power should cause people to view stimuli in terms of the "big picture," to focus on the gist and categorize broadly, even if these stimuli are unrelated to power itself.

Previous Theorizing on Power and Information Processing

In recent years, research on how power affects cognition has been based on two ideas: the link between power and stereotyping (Fiske, 1993) and the link between power and the behavioral approach and inhibition systems (Keltner, Gruenfeld, & Anderson, 2003). The power-as-control (PAC) model (e.g., Fiske, 1993; Goodwin, Gubin, Fiske, & Yzerbyt, 2000) postulates that powerful people tend to stereotype those below them. This stereotyping occurs via two routes: (a) effortlessly or by default, via decreased attention to stereotype-disconfirming information, and (b) more intentionally or by design, via increased attention to stereotype-confirming information. By definition, *stereotyping by default* occurs unconditionally, but *stereotyping by design* should occur only when those in power feel entitled to judge others (Goodwin et al., 2000). In other words, this more effortful processing by the powerful occurs only under particular circumstances. In contrast, those lacking in power are expected in general to effortfully seek individuating information about those above them so that they may better understand these powerful people and predict their behavior (Depret & Fiske, 1999; Stevens & Fiske, 2000).

More recently, Keltner et al. (2003) proposed an approach/inhibition theory of power. In this model, elevated power activates the behavioral approach system (BAS), which regulates behavior associated with rewards (e.g., Carver & White, 1994; Sutton & Davidson, 2000). Lower power activates the behavioral inhibition system (BIS), which regulates behavior in response to threats and punishments. Those with power are thus expected to experience more positive emotion, to be less inhibited, and to perceive their environment as less threatening and more rewarding than are those

Pamela K. Smith, Social Psychology Program, University of Amsterdam, Amsterdam, the Netherlands; Yaacov Trope, Department of Psychology, New York University.

This research was supported in part by a National Science Foundation Graduate Student Fellowship to Pamela K. Smith and National Institute of Mental Health Grant 1R01MH59030-01A1 to Yaacov Trope. We thank Ap Dijksterhuis, Ken Fujita, Eric Igou, Ravit Levy, and Kathleen McCulloch for comments and critiques. We also thank Ap Dijksterhuis for translating all stimuli and instructions used in the Netherlands. This article is based in part on Pamela K. Smith's doctoral dissertation.

Correspondence concerning this article should be addressed to Pamela K. Smith, who is now at Social and Organizational Psychology, Leiden University, P.O. Box 9555, 2300 RB Leiden, the Netherlands. E-mail: psmith@fsw.leidenuniv.nl

without power. Various theories (e.g., Schwarz & Clore, 1996) link positive mood to less effortful, more automatic information processing. Thus, high-power people should reason in less cognitively complex ways and be more prone to stereotype others than do low-power people.

Though differing in scope, these two theories reach the same conclusion: Those with power generally think about the social world in a less effortful, less deliberate, more heuristic, and more top-down fashion than those without power. However, the idea that the social cognition of those in power is more automatic has never been directly tested. In fact, none of the four indicators of automatic versus controlled processing—intention, awareness, efficiency, or control (Bargh, 1994)—have been measured in power research. The processes that have been upheld as evidence of automaticity (e.g., increased stereotyping) may also be driven by effortful processes (e.g., deliberate direction of attention; Fiske, 1993). These theories also address a specific area of information processing: social cognition, primarily person perception. But in their daily life, powerful people encounter not just the people below them in the hierarchy, but rather a whole host of stimuli, many of them not directly relevant to power. The same holds for those lacking in power. Considering the various motivations that powerful and powerless people may have (e.g., Goodwin et al., 2000), models developed to explain how people interact with others above and below them in a hierarchy may not necessarily apply to how people perceive and interact with all stimuli in their environment. It would also be highly maladaptive for powerful people to process everything in their environment—including stimuli relevant to maintaining their own power—in a simplistic fashion (see Overbeck & Park, 2001, for a similar argument).

The Abstraction Hypothesis

We propose that, rather than processing information less effortfully, those with power tend to process information in a more abstract manner than those without power. The ability to see the bigger picture, to plan ahead, to keep an eye on higher goals, may be prerequisites for obtaining power as well as requirements for maintaining it.

Power may facilitate this abstract information processing by predisposing individuals to take a psychologically distal perspective on the situation. Power involves differences in dependency (e.g., Emerson, 1962; Thibaut & Kelley, 1959). When Person A can control what happens to Person B (e.g., Person B's receipt of rewards and punishments) more than Person B can control what happens to Person A, Person A is said to have power over Person B. Person A is also less dependent on Person B to obtain what Person A wants (i.e., asymmetrical dependency; Depret & Fiske, 1993). In this way, feeling dependent on others is associated with being powerless, and feeling independent from others is associated with being powerful (Lee & Tiedens, 2001; Overbeck & Park, 2001). For example, spouses with more power in their marriage behave more independently, in a way more consistent with their own identities and more resistant to identities imposed on them (Cast, 2003). In contrast, when relationship partners become more emotionally similar, it is the lower power relationship partner that does most of the changing (Anderson, Keltner, & John, 2003). In general, those who have power are more able to "be themselves," whereas those without power must accommodate social norms and others' dictates (e.g., DePaulo & Friedman, 1998; Keltner et al., 2003).

Greater independence from others may thus foster a greater sense of distinctiveness from them (e.g., Stapel & Koomen, 2001a). Moreover, in any given social group, high-power roles are ordinarily held by fewer individuals than are low-power roles. This structural difference may further enhance the tendency of individuals with high power to feel distinct, and thus psychologically distant, from other people (Lee & Tiedens, 2001). Consistent with this idea, the social identity theory of leadership suggests that over time group leaders become psychologically separate[1] from the rest of the group (Hogg & Reid, 2001).

On the basis of construal level theory (Trope & Liberman, 2003), we further propose that the psychologically distant perspective associated with power may predispose powerholders to form more abstract construals of the available information. According to this theory, any factor that increases a person's psychological distance from an object (such as increased temporal distance; Liberman, Sagristano, & Trope, 2002) will also increase the tendency to form more abstract representations of the object. Such effects occur even when such distance is manipulated indirectly. For example, individuals demonstrated more abstract thinking on a later unrelated task when they first thought about their life in 1 year versus their life tomorrow (Förster, Friedman, & Liberman, 2004).

Abstract information processing involves extracting the gist, the core aspects of information about an event or object (e.g., Levy, Freitas, & Salovey, 2002; Liberman et al., 2002). Gist reflects what is perceived as the deeper essence or meaning of a stimulus. Gist also represents a step above and beyond the exact details of any particular manifestation of a stimulus, so abstract construals are more general than are concrete construals. That is, gist goes beyond the given data to distill what is primary. For example, if Person A hears that Person B exercises five times a week, is registered to run the New York City Marathon, and spent $400 on a heart-rate monitor, and then infers that Person B is athletic, Person A has engaged in abstract processing. Developing an elegant theory that encompasses a variety of findings in a particular area of science (Kruglanski, 2004) is another, more difficult form of abstract processing.

Because abstract processing entails extracting the gist, it involves focusing on the important, central aspects of an object as well as detecting relationships in a set of data. In moving away from the specifics of any particular stimulus, abstract processing focuses on the structural relations underlying stimuli (e.g., deep structure in implicit learning; Reber, 1989). Moreover, because the attributes associated with higher level categories tend to be more central or primary, involving functions or genetically based features (e.g., Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976),

[1] Social identity theory proposes that when group membership is salient, the most prototypical group members emerge as leaders. This may seem to imply that the least distinct members of a group become its leaders. However, highly prototypical group members provide an observer with the most information about the group: They stand for the group itself. Thus, within a group context, they attract the most attention. In this way, the most prototypical members of a group may also be the group's most distinct members (Hogg & Reid, 2001).

stimuli viewed in an abstract manner are categorized at a more superordinate, inclusive level.

In short, the abstraction hypothesis suggests that because power involves a sense of being distinct from others, and thus involves more psychological distance from them, having power, relative to lacking power, leads an individual to process information more abstractly. Those with power (a) should tend to extract the gist from data, focusing on central aspects and detecting structure and thus (b) should tend to categorize data at a more superordinate level.

The abstraction hypothesis makes unique predictions about power's effects on information processing. Abstract processing is orthogonal to top-down processing (Kimchi, 1992). Abstract processing is not necessarily more likely to be driven by preexisting knowledge and concepts than is concrete processing. In other words, the distinction between abstract and concrete processing involves the level at which individuals focus on information rather than their use of internal knowledge (see Gasper, 2004, for a similar point). Abstract processing involves representing the interrelations between the parts of a whole (i.e., the overall structure of a stimulus). For example, to perceive the overall shape of a stimulus, one must consider the data at hand on the configuration of its individual elements. Perceiving that the overall shape of a Navon (1977) letter is a large S does not require any more reliance on preexisting concepts than perceiving it is made up of small Ts.

The abstraction hypothesis does not imply that powerful perceivers do not attend to details or that they process information less thoroughly. Abstract versus concrete processing "does not amount to a distinction between stages of attention. It is, rather, a claim about perceptual analysis of whatever is *attended to*" (Navon, 1977, p. 355). In fact, sometimes processing a stimulus more abstractly may lead one to recall it more accurately. Gasper and Clore (2002) found that participants placed in a happy mood not only reproduced a drawing more globally or abstractly than did participants placed in a sad mood, but their reproductions were also judged to be more similar to the original drawing. In the cognitive literature, researchers have acknowledged that abstraction does not have to be the result of inadequate or partial processing of exemplars (e.g., Barsalou, Niedenthal, Barbey, & Ruppert, 2003; Reyna & Brainerd, 1995). Thus, abstract processing is neither a more simplistic way to view the world, nor is it, by definition, less effortful than more concrete processing. The process of extracting the gist or structure from a set of raw data may be even more effortful than simply absorbing the details (Liberman et al., 2002).

Though the abstraction hypothesis has not been directly tested, there is some research that supports it. For example, in Overbeck and Park's (2001) experiments, high- and low-power participants interacted via e-mail with several different targets holding the opposite power role and received various kinds of information from them. Some of this information was relevant to the task at hand (e.g., *Jim waited until the last minute to try to schedule a meeting*), and some was irrelevant (e.g., *Jim just started a jazz ensemble*). Not only did participants in the high-power role recall more information overall than did the low-power participants, but they were especially superior at recalling relevant information. Thus, high-power participants focused more on primary information, a hallmark of abstract thinking.

Each target also behaved in a consistent way so that he or she had a "personality" characterized by one trait (e.g., competent). To discern this personality (i.e., individuate each target), participants had to extract a general pattern in the tone and behavior of a target; in other words, they had to think abstractly. High-power perceivers were better at extracting this gist: They rated targets higher on the characteristic trait and lower on uncharacteristic traits than did low-power participants.

Powerful people also seem to use more abstract language. Portuguese participants used more abstract language to describe both their ethnic group and an outgroup when they were part of the majority (i.e., a higher power group) than when they were part of the minority (i.e., a lower power group; Guinote, 2001). Similarly, participants who played the role of judges during a task used more abstract, trait-like language in referring to themselves than did participants who were workers (Guinote, Judd, & Brauer, 2002).

The Present Research

To remove issues of conscious awareness and intent, we primed high or low power in the following experiments rather than giving participants the actual experience of high- or low-power roles. Priming power should function in the same manner as actually experiencing it. Like any other concept, power is linked in memory to a host of characteristics and behavioral tendencies. When the construct of power is activated, whether via actual experience of a powerful or powerless role, or by mere exposure to cues related to power or powerlessness, those same associated concepts and tendencies should also be activated (Bargh, 1997). Indeed, when power was both experientially manipulated and primed in the same line of research (e.g., Galinsky, Gruenfeld, & Magee, 2003), similar effects were found. Thus, if there is a link between power and abstract thinking, it should be activated by both consciously experiencing power and by being primed with the concept.

Priming power also allows us to mimic the natural ebb and flow of power that occurs in everyday life. Though sometimes power is endowed at birth (e.g., membership in a majority group), many other kinds of power emerge in particular situations. In a single day, an individual may transition several times between having power (e.g., delegating work to employees) and lacking it (e.g., waiting desperately for tech support to solve a computer problem). Even one's "endowed" power may change, as when one moves to another country with a different population and political situation.

In the present experiments, we focus on the implications of the abstraction hypothesis for primary conceptual-level and perceptual-level effects. We seek to demonstrate that priming participants with the concept of having power (i.e., high power) leads them to (a) extract the gist from data, focusing on central aspects and detecting structure; and (b) categorize data at a higher level, relative to priming them with lacking power (i.e., low power).

In Experiments 1–4, we investigate the conceptual-level effects of priming high versus low power on abstract thinking. We examine how priming affects the breadth or inclusiveness of categorization (Experiment 1), the level of action identification (Experiment 2), the perception of relationships between stimuli (Experiment 3), and the use of gist-based processing (Experiment 4). We also try to address alternative explanations. In Experiment 3, the stimuli were either objectively interrelated (i.e., coherent) or unrelated (i.e., incoherent) so that we could rule out basic response biases. To explore whether accuracy motivation rather than abstract thinking might better explain our results, we pit these ideas against each other in Experiment 4. Here extracting the gist is effortful but actually leads to worse performance.

In Experiments 5 and 6, we examine more perceptual abstraction. Because abstract thinking involves pattern perception, participants primed with power should be better at identifying fragmented stimuli (Experiment 5). They should also identify them at a higher level. In Experiment 6 participants do Embedded Figures Test (Witkin, Oltman, Raskin, & Karp, 1971), a task in which certain aspects of stimuli are more task relevant (i.e., central). Because abstract thinking involves a focus on central aspects, power priming should lead to superior performance.

Finally, in Experiment 7 we explore a potential neural correlate of the relationship between power and abstract thinking. The right hemisphere of the brain is associated with more abstract, global, holistic representations and processes than is the left hemisphere (e.g., Bowden & Beeman, 1998; Fink et al., 1996; Martin, 1979). If priming high power leads to more abstract thinking than priming low power, priming high power should also lead to greater relative right-hemispheric activation. In Experiment 7, we test for relative hemispheric activation by using a line bisection paradigm (Milner, Brechmann, & Pagliarini, 1992).

Throughout all seven experiments, we also test whether the link between power and abstraction could be explained by a third factor. Mood was the most obvious possibility: Any effects of power priming on abstract thinking could simply be a result of power priming changing our participants' moods (Keltner et al., 2003). However, our hypothesis proposes a direct link between power and abstract thinking, one that does not require the mediation of mood. Thus various affect measures (i.e., positive vs. negative affect, approach-related vs. avoidance-related affect) were included to rule out mood mediation.

Additionally, in most of the experiments we also included a control condition in which participants completed a version of the priming task unrelated to power. Past theories of power and cognition have spoken of power's effects in bidirectional terms: Having power has one effect, and lacking power has the opposite effect (Keltner et al., 2003). However, few data exist that speak to direction of effects because most power research has used a two-group, low-versus-high-power design (Moskowitz, 2004). Therefore we did not make specific predictions about how control participants would perform compared with the low-power-primed (LPP) and high-power-primed (HPP) participants. Our inclusion of control groups was exploratory, to determine whether having power increases abstract processing, lacking power decreases it, or both.

Experiment 1

In this experiment, we tested whether elevated power is linked to greater breadth of categorization. The priming manipulation was a writing task adapted from Galinsky et al. (2003). Participants wrote about a time when either they had power over others or others had power over them. A third, control group of participants did a power-neutral writing task. Then participants completed a measure of inclusiveness of categorization (Isen & Daubman, 1984; Rosch, 1975), indicating to what degree atypical exemplars (e.g., *purse*) were good members of a given category (e.g., "clothing"). If priming high power leads to more abstract thinking, HPP participants should be more inclusive in their categorization than LPP participants. Thus, HPP participants should rate these atypical exemplars as better category members than LPP participants.

Powerfulness has been linked to positive affect, and powerlessness to negative affect (Keltner et al., 2003). Because our predictions mirror what has been found with affect (e.g., Isen & Daubman, 1984), changes in mood could potentially mediate our priming effects. In other words, priming power could merely serve as an effective mood manipulation and have no independent effects on information processing. However, orthogonal to the issue of valence, affect also has a motivational component (e.g., Higgins, 1997). That is, emotions may be distinguished by whether they are appetitive/approach-related, reflecting a focus on achievement and gains (e.g., happiness, discouragement), or aversive/avoidance-related, reflecting a focus on security and losses (e.g., relaxation, nervousness). Because high and low power have been linked with approach and avoidance, respectively (Keltner et al., 2003), as well as with positive and negative mood, our effects could be driven by differences in positive, negative, approach-related, or avoidance-related mood. To address mood as a potential mediator, we had participants report their mood on several dimensions to assess all these factors separately.

Method

Participants. Seventy-eight students from the University of Amsterdam took part in the experiment in partial fulfillment of a course requirement or for a payment of 7 euros (U.S.$8.41). Five participants were dropped from the analyses: 1 for not following directions, 3 for indicating they did not have a powerful or powerless experience to write about for the priming task, and 1 for indicating in the funnel debriefing that the experiment was about power. Thus, 73 participants (16 men, 57 women; age: $M = 21.94$, $SD = 3.56$)[2] were included in the final analyses.

Procedure and materials. This experiment was conducted in individual sessions with all instructions and tasks on computer. The introduction screen explained that the experiment was investigating how different verbal abilities are related to other cognitive processes. Participants first completed the priming writing task, which used the same instructions as Galinsky et al. (2003). Participants in the LPP condition were asked to write about a particular time or incident in which someone else had control over them. Participants in the HPP condition wrote about a particular time or incident when they had control over another individual or individuals. Participants in the control condition wrote about their day yesterday. Participants had 4 min to write about the given topic and were instructed to provide as much detail as possible. Immediately afterward, they answered five mood questions. They indicated on an 11-point scale how they felt overall at the moment (-5 = *very negative*, $+5$ = *very positive*). On 9-point scales they indicated how "tense," "calm," "happy," and "discouraged" they felt (0 = *not at all*, 8 = *very much*).

Participants then completed the categorization task (e.g., Isen & Daubman, 1984). They were told to rate items on a 10-point scale (1 = *definitely does not belong to the category*; 5 = *does not belong to the category, but is very similar to members of that category*; 6 = *does belong to the category, but is not a very good example of it*; 10 = *definitely does belong to the category*). Thus, any rating over 5 indicated that the item belonged to the category.

For each item, participants saw the general category at the top of the screen, a specific item below it, and finally the 10-point rating scale, with 1, 5, 6, and 10 labeled accordingly. Eighteen items were presented for each

[2] In this and all following experiments, participant gender did not significantly moderate the effects of priming condition, and thus this factor is not discussed further.

of three categories: "vehicle," "furniture," and "clothing." The categories were presented in random order, and all items were given for a particular category before the next category was presented. For each category, the critical items were six weak or atypical exemplars (e.g., *tractor*, *feet*, *sled*, *tank*), based on Rosch's (1975) norms and pretesting with a Dutch sample. The remaining items were typical exemplars: six strong exemplars (e.g., *car*, *bus*) and six moderate exemplars (e.g., *truck*, *boat*). As in Isen and Daubman (1984), these typical exemplars were included as fillers only. The first item for a category was always a strong exemplar, with the remaining items presented in random order.

After the categorization task, participants rated on 9-point scales how much they enjoyed the priming task and how difficult it was (0 = *not at all*, 8 = *very much*). Finally, they were probed for suspicion and debriefed.

Results and Discussion

Manipulation check. Two independent judges blind to condition coded the priming writing for how much power the participant seemed to have in the situation using a 7-point scale (0 = *no power at all*, 6 = *a lot of power*). The judges also categorized what type of relationship (e.g., manager–subordinate) was involved (see Appendix A for a breakdown of the power relationships described in the priming writing from Experiments 1, 4, and 6). A third judge settled any disagreements about relationship classification. Because the control writing almost never involved power and often did not involve any one relationship, it was not included in this coding. The power ratings were highly reliable ($\alpha = .91$). As expected, HPP participants ($M = 3.98$, $SD = 1.01$) were judged to have had more power in the situation they described than did LPP participants ($M = 0.74$, $SD = 0.46$), $F(1, 45) = 209.85$, $p < .001$.

We also checked whether our items were correctly labeled as strong, moderate, or weak exemplars of the categories. Participants indeed saw the strong items ($M = 9.21$) as the best exemplars, the moderate items ($M = 6.54$) as less good, and the weak items ($M = 4.06$) as the worst, $F(2, 144) = 758.70$, $p < .001$.

Categorization. First we examined whether priming affected how many of the 18 weak items were included in the categories. Items were considered included if they were rated 6 or higher. Because we predicted that HPP participants would include significantly more items than would LPP participants, with control participants falling in between, we used a linear contrast analysis. Priming condition significantly influenced inclusion, $F(1, 70) = 5.72$, $p = .02$. HPP ($M = 6.23$, $SD = 3.90$) and control participants ($M = 6.00$, $SD = 3.68$), who did not differ ($p = .82$), rated more weak items as category members than did LPP participants ($M = 3.88$, $SD = 2.33$; both ps $< .03$).

We next considered the actual ratings of the weak exemplars to determine whether priming also affected their rated prototypicality. Because we had the same directional predictions, we again used a linear contrast analysis. Priming indeed had a significant effect, $F(1, 70) = 4.61$, $p = .04$. In line with the previous results, LPP participants ($M = 3.55$, $SD = 1.07$) saw the weak exemplars as less prototypical than did HPP participants ($M = 4.38$, $SD = 1.53$; $p = .04$) and control participants ($M = 4.26$, $SD = 1.36$; $p = .06$). HPP and control participants did not differ ($p = .75$). Whether categorization was analyzed dichotomously or as a continuum of prototypicality, LPP participants were less inclusive than were HPP or control participants.

Of course, this effect could be due to a simple response bias. As a check of this alternative explanation, we also analyzed responses to the typical exemplars (included as fillers). The use of the same linear contrast analyses for the typical exemplars yielded no significant results for categorization or ratings (ps $> .15$). Thus, the difference between LPP and HPP participants does not seem reducible to a response bias.

Self-report measures. Four composite indices of mood were calculated to differentiate between positive versus negative affect and approach-related versus avoidance-related affect. Responses to "happy" and "calm" were averaged to measure positive affect, and responses to "tense" and "discouraged" were averaged for negative affect. Approach-related affect was calculated by averaging responses to "happy" and (reverse scored) "discouraged," and avoidance-related affect was calculated by averaging responses to "calm" and (reverse scored) "tense." Priming condition did not affect any of these affect indices or the overall mood item (Fs < 1). Furthermore, these mood indices were not correlated with the inclusion measures (ps $> .16$).

To summarize, HPP participants showed more inclusive categorization of atypical exemplars than did LPP participants. Furthermore, LPP participants also were less inclusive than were control participants. These effects were not mediated by mood.

Experiment 2

In Experiment 2, we again examine the relation between power priming and level of categorization. Participants first completed a scrambled sentences task (Bargh & Chartrand, 2000) to prime high power, low power, or nothing (control condition). Then the Behavior Identification Form (BIF; Vallacher & Wegner, 1989) was used to measure level of categorization. Just as objects (e.g., *car*) can be categorized at a higher (e.g., "vehicle") or lower (e.g., "Maserati") level, behaviors can also be identified at varying levels of abstractness. For example, *voting* may be described as "changing the government" or "marking a ballot." Higher level action identifications address why the action is performed. Thus, the higher the level at which an action is identified, the more the identification focuses on the meaning or gist of the action. We would expect HPP participants to identify behaviors at a higher level than LPP participants.

Method

Participants. Seventy-eight students from the University of Amsterdam took part in the experiment in partial fulfillment of a course requirement or for a payment of 7 euros (U.S.$8.41). Two participants were dropped from the analyses: 1 for not following directions and 1 for suspecting that the experiment was about power. Thus, 76 participants (16 men, 60 women; age: $M = 22.07$, $SD = 3.79$) were included in the final analyses.

Procedure and materials. The setup and cover story were the same as in Experiment 1. First, participants answered a series of questions. Embedded within several filler questions were the same five mood items as in Experiment 1. Then participants completed a scrambled sentences priming task consisting of 16 items. Five words for each item were listed, and participants were told to use four of the words to make a grammatically correct sentence. For the high-power prime, 8 of the 16 sets of words contained a word related to having power (i.e., *authority*, *captain*, *commands*, *controls*, *dominates*, *executive*, *influenced*, *privileged*). For the low-power prime, those same 8 sets contained a word related to lacking power (i.e., *complied*, *janitor*, *obey*, *passive*, *servant*, *submits*, *subordinate*, *yield*). For the control prime, all 16 sets contained only power-irrelevant words. Immediately after this task, participants again answered the same five mood items.

Finally, participants completed a Dutch translation of the BIF (Vallacher & Wegner, 1989). Each of the 25 items listed an action followed by two alternative ways of identifying that action, one lower level and one higher. Participants were asked to choose the alternative that best described the action for them. For example, for *reading* participants chose between the lower-level identity "following lines of print" and the higher-level identity "gaining knowledge." A participant's score on the BIF was the number of higher level alternatives chosen. The higher the number, the more abstract were the choices the participant made. Finally, participants were probed for suspicion and debriefed.

Results and Discussion

BIF. Because we predicted that HPP participants would choose significantly more higher level alternatives than would LPP participants, with control participants falling in between, we used a linear contrast analysis. As predicted, priming condition affected the number of higher level responses, $F(1, 73) = 4.74$, $p = .03$. HPP participants ($M = 14.83$, $SD = 4.62$) chose more higher level descriptions than did LPP participants ($M = 11.88$, $SD = 4.75$; $p = .03$) and also tended to choose more higher level descriptions than did control participants ($M = 12.69$, $SD = 4.95$; $p = .12$). LPP and control participants did not differ ($p = .54$).

Self-report measures. The four composite indices of mood used in Experiment 1 were calculated twice: once for responses prior to the priming task and once for responses after it. Then prepriming indices (including the overall mood item) were subtracted from post-priming indices, resulting in five measures of how the priming task altered participants' mood. Priming condition tended to affect both participants' overall reported mood, $F(2, 73) = 2.42$, $p = .10$, and their reported positive affect, $F(2, 73) = 2.53$, $p = .09$. HPP participants felt better overall ($M = 0.38$, $SD = 0.82$) and reported more positive affect ($M = 0.29$, $SD = 0.61$) after the priming task than before it; control participants' overall mood did not change ($M = 0.04$, $SD = 0.72$), but they also reported more positive affect ($M = 0.37$, $SD = 0.86$); and LPP participants felt worse ($M = -0.23$, $SD = 1.27$) after the priming task and reported less positive affect ($M = -0.12$, $SD = 0.96$). However, the mood indices were uncorrelated with BIF responses ($ps > .50$). When overall mood or positive affect were included as covariates, the effect of priming condition on BIF responses remained significant ($ps < .05$).

Again HPP participants used higher levels of categorization than did LPP participants. This time, however, HPP participants tended to differ from control participants. As before, these results were not mediated by mood.

Experiment 3

The previous two experiments demonstrate that power leads people to identify stimuli more abstractly, reflecting a focus on the gist and on the perception of relationships. Such abstract information processing may facilitate intuitive judgments of coherence (e.g., Brainerd & Reyna, 2001). Bowers, Regehr, Balthazard, and Parker (1990) distinguished between two stages of intuition: a *guiding* stage in which coherence is implicitly perceived and an *integrative* stage in which a plausible representation of coherence is generated and made conscious. If power priming increases the use of abstract information processing, it should improve people's ability to perceive coherence, even if they cannot consciously explain the reason behind their judgment.

In Experiment 3, we used a variation (Bolte, Goschke, & Kuhl, 2003) of a task originally developed by Bowers et al. (1990). Participants were presented with a series of word triads and asked to classify them as semantically coherent or incoherent. A word triad was coherent if each of its three words was associated with a common fourth word that was not presented. For example, the triad *salt*, *deep*, and *foam* was considered coherent because all three words are associated with the word *sea*, but the triad *deep*, *nose*, and *wood* was considered incoherent. Participants were asked to respond intuitively, according to their "gut feeling." Later participants also indicated a solution word for the triad. Because this experiment includes both stimuli that were objectively coherent and stimuli that were objectively incoherent, it allows us to test whether our previous findings are due to a response bias. If priming high power leads individuals to see relationships indiscriminately, then it should not lead to better performance on this task.

Method

Participants. Seventy undergraduate students from New York University took part in the experiment in partial fulfillment of a course requirement or for a payment of $10.00. Seventeen participants were dropped from the analyses. Seven nonnative English speakers were excluded because the intuition task relied so heavily on knowledge of the semantic relations between English words. Six were excluded because their data were lost as a result of computer errors, 2 because they did not finish the intuition task in the time allotted, and 2 because they fell asleep during the experiment. Thus, 53 participants (17 men, 36 women; age: $M = 19.77$, $SD = 1.22$) were included in the final analyses.

Procedure and materials. The experimenter stated that the study was about whether prior creative thinking improved intuitive decisions. Participants were told that everyone would complete a verbal task on paper and an intuition task on computer but that different people would complete different verbal tasks that varied in the amount of creative thinking involved. In reality, all participants first completed either a low- or high-power version of the scrambled sentences task from Experiment 2. Then participants rated how well they thought they would do on the next task (0 = *not well at all*, 7 = *extremely well*). In addition, they completed three mood measures: how good they felt (0 = *not good at all*, 7 = *extremely good*), how bad they felt (0 = *not bad at all*, 7 = *extremely bad*), and how they felt overall (−5 = *very bad*, +5 = *very good*).

Participants next completed the intuition task (Bolte et al., 2003). The instructions indicated that they would see a series of sets of three words and would need to decide whether each set was semantically coherent, that is, whether the three words seemed to "go together" or "hang together well." It was emphasized that they should rely on their intuition and not worry if they could not generate a specific reason why the set was coherent. In each trial, three words were presented, one above the other, in the center of the screen for 4 s. Then the words were replaced by the question, *Does this set of words feel coherent?* Participants pressed either the *?/* key to indicate that the set felt coherent or the *Z* key to indicate that it felt incoherent. As soon as they responded, they were asked to indicate their confidence in this judgment on a 4-point scale (1 = *low confidence*, 4 = *high confidence*).[3] Finally, participants typed in a possible solution word for the set of words. They were told to type the word *nothing* if they thought there was no solution.

There were 60 trials in total, 30 coherent word triads and 30 incoherent word triads. The coherent triads (e.g., *goat, pass, green* [solution word: *mountain*]) were all moderately to highly semantically convergent, mean-

[3] Confidence was generally high ($M = 2.83$) and unrelated to the sensitivity of coherence judgments, so it is not discussed further.

ing that the solution word meant the same thing in relation to each of the three triad words (Items 3, 4, 6, 7, 8, 11, 14, 15, 17, 18, 20, 21, 25, 27, 29, 37, 39, 40, 41, 44, 45, 46, 47, 48, 50, 52, 53, 56, 57, and 58 from Bowers et al., 1990). The 30 incoherent triads (e.g., *silk, stone, goat*) were taken from these same items.

Then participants completed a second set of self-report measures. On 8-point scales (0 = *not at all*, 7 = *very much*), they rated how much they liked the intuition task, how difficult it was, how hard they worked at it, and how motivated they were to do well. In addition, they rated how well they thought they did (0 = *not well at all*, 7 = *extremely well*) and how well they thought they did compared with most people (−3 = *much worse*, 0 = *about the same*, +3 = *much better*). Next, they completed two mood measures: the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) and a single item on how they felt at the moment (−5 = *very bad*, +5 = *very good*). Finally, participants were probed for suspicion and debriefed.

Results and Discussion

Solved triads. A coherent triad was scored as solved when participants gave the appropriate solution word or an exact synonym. The mean rate of correct solutions was 30.9%, which is comparable to previous research (Baumann & Kuhl, 2002; Bowers et al., 1990). By definition, incoherent triads were unsolvable.[4] HPP and LPP participants did not differ in how many correct solutions they gave for coherent triads (Fs = 1) or in how many incorrect solutions they gave for coherent or incoherent triads (Fs < 1).

Coherence judgments. According to the abstraction hypothesis, HPP participants should be better at distinguishing coherent from incoherent triads, regardless of whether they can explicitly solve them. (Solved coherent triads were almost always classified as coherent [$M = 93.21\%$], and this tendency did not differ between priming conditions [$F < 1$].) We ran a 2 (Triad Type: coherent vs. incoherent) × 2 (Priming Condition: low-power vs. high-power) mixed-model analysis of variance (ANOVA) on responses of "coherent," with triad type as the within-subjects variable. Participants labeled more coherent triads as "coherent" than incoherent triads, indicating they did the task correctly, $F(1, 51) = 197.78$, $p < .001$, but this effect was moderated by priming condition, $F(1, 51) = 4.04$, $p = .05$. HPP participants' hit rate ($M = 64.4\%$, $SD = 21.0$) was essentially the same as that of LPP participants ($M = 62.6\%$, $SD = 16.2$; $F < 1$). However, HPP participants' false-alarm rate ($M = 31.1\%$, $SD = 16.2$) tended to be lower than that of LPP participants ($M = 37.6\%$, $SD = 19.9$), though the difference did not reach standard levels of significance ($p = .20$). It appears that HPP participants' superior performance was mainly driven by their ability to detect when triads were not coherent.

Another way to calculate accuracy in this task is to use a standard measure of sensitivity calculated from a participant's hit rate (the proportion of coherent triads correctly classified as coherent) and false-alarm rate (the proportion of incoherent triads incorrectly classified as coherent). Because of the limited number of trials involved per participant, d' was not used (Pollack, 1970). Instead, a nonparametric signal detection measure of discriminability, A', was used (see Snodgrass & Corwin, 1988, for appropriate formulas). An A' of .50 indicates chance performance, and an A' of 1.00 indicates perfect discrimination. HPP participants ($M = 0.56$, $SD = 0.04$) had higher discrimination rates than did LPP participants ($M = 0.54$, $SD = 0.03$), $F(1, 51) = 5.00$, $p = .03$.

Differences in discrimination could be due to a speed–accuracy trade-off, so we also analyzed the amount of time people took to respond to each item. We ran a 2 (Triad Type: coherent vs. incoherent) × 2 (Judgment of Coherence: correct vs. incorrect) × 2 (Priming Condition: low-power vs. high-power) mixed-model ANOVA on response latencies,[5] with triad type and judgment of coherence as within-subjects variables. The main effects of triad type and judgment were significant, as was their two-way interaction (ps $< .05$). Participants were faster to make correct than incorrect responses, and this was especially true for coherent triads. However, none of the effects involving priming condition even approached significance (Fs < 1), indicating that our effects were not due to a speed–accuracy trade-off.

Self-report measures. HPP participants ($M = 2.60$, $SD = 1.32$) felt worse immediately after the priming task than did LPP participants ($M = 3.36$, $SD = 1.22$), $F(1, 51) = 4.68$, $p = .04$. However, post-priming mood was unrelated to participants' discrimination ability (A'), $r(51) = -.15$, $p = .30$. Additionally, when mood was included as a covariate, the effect of priming condition on A' remained significant, $F(1, 50) = 3.97$, $p = .05$. Priming condition had no effect on any of the other self-report measures (ps $> .19$).

As predicted, HPP participants were better at distinguishing between coherent and incoherent word triads than were LPP participants. This pattern was found for both a lax (i.e., analyzing all triads) and a strict (i.e., analyzing only unsolved triads) criterion of intuition. Though the simple effects were not statistically significant, it appears that the difference in performance between HPP and LPP participants was based more on differences in false alarms than on differences in hits. That is, the better discrimination shown by HPP participants seems mainly due to their ability to correctly identify incoherent triads. This result confirms again that power does not merely lead people to see patterns and structure everywhere. Priming participants with high power did not lead them to see everything as coherent. Instead, it was LPP participants who were somewhat more prone to seeing triads as coherent when in reality they were not.

Experiment 4

In the previous experiments, responding in a more abstract manner led either to improved performance (Experiment 3) or to performance that could not be evaluated as better or worse (Experiments 1 or 2). The previous results could then be potentially explained by power leading to increased accuracy or achievement motivation. Power is indeed associated with doing more (Galinsky et al., 2003) and, more generally, with increased ability to achieve one's goals (e.g., Keltner et al., 2003). Perhaps priming individuals with high power increased their desire to do well on the tasks, and these individuals only seemed to be thinking more abstractly

[4] The likelihood of participants generating a good solution to the incoherent triads was remote, as no appropriate solution has been found in previous research (Bowers et al., 1990). Nonetheless, two independent judges examined all responses to the incoherent triads. As expected, none of the proposed solutions for these triads were judged valid.

[5] One participant was excluded because he had false alarm and hit rates of 0%.

because this was the most appropriate response for the tasks used thus far.

To rule out accuracy or achievement motivation as an alternative explanation, we selected a task in which the use of more abstract thinking would lead to worse performance. In the Deese–Roediger–McDermott (DRM) false recognition paradigm (Deese, 1959; Roediger & McDermott, 1995), participants are presented with lists composed of words (e.g., *door*, *glass*, *pane*, *shade*, *ledge*, *sill*, *house*, *open*, *curtain*, *frame*) that are highly associated with a critical, nonpresented word (e.g., *window*). This nonpresented word is known as the *critical lure*. On subsequent memory tests, participants tend to falsely recognize these critical lures, often to the same degree that they recognize the words that were actually presented.

This false recognition of critical lures has been explained in part as involving a reliance on gist (e.g., Brainerd & Reyna, 2002; Payne, Elie, Blackwell, & Neuschatz, 1996). Individuals who rely more on gist-based processes, such as older adults (Norman & Schacter, 1997; Tun, Wingfield, Rosen, & Blanchard, 1998), have higher rates of false recognition; and individuals who have difficulty extracting the gist from sets of stimuli (e.g., DRM word lists), such as young children (Brainerd, Reyna, & Forrest, 2002), have far lower rates. Thus, if priming individuals with power increases their tendency to think abstractly, then it should also lead to higher rates of false recognition—that is, to worse performance. However, this incorrect responding should be limited to the critical lures because only these lures are supported by gist-based processes. Priming participants with high power should not increase false recognition of words that are unrelated to the presented words (i.e., distractors).

We used a variant of the DRM paradigm to downplay the association between list items. In the standard paradigm, lists are blocked by thematic groups during encoding. That is, participants see a list of words associated with *window*, then perform a memory test, then see a list associated with *soft*, then perform another test. This presentation format increases the likelihood of false memories by emphasizing the critical underlying theme. In contrast, we presented the words in random order so that the underlying theme or gist would be more difficult to detect (Mather, Henkel, & Johnson, 1997; McDermott, 1996; Toglia, Neuschatz, & Goodwin, 1999). Thus, “here the burden of forming associations between individual items required a certain amount of self-initiated, effortful processing” (Tun et al., 1998, p. 238). Exerting this effort, ironically, should then lead to worse performance on the task (i.e., more false recognition of critical lures). In other words, for HPP participants to show evidence of abstract thinking in this task, they had to both work hard and be less accurate.

Method

Participants. One hundred twenty-three students from the University of Amsterdam took part in the experiment in partial fulfillment of a course requirement or for a payment of 7 euros (U.S.$8.41). Ten participants were dropped from the analyses. Five nonnative Dutch speakers were excluded because the task relied so heavily on knowledge of the semantic relations between Dutch words. Three participants were excluded because they did not follow instructions, and 2 were excluded because they indicated that they did not have a powerful or powerless experience to write about for the priming task. Thus, 113 participants (34 men, 79 women; age: $M = 21.94$, $SD = 4.81$ years) were in the final analyses.

Procedure and materials. The setup, cover story, and priming task were the same as in Experiment 1, except participants were given 5 min to write. Participants received either a high-power, low-power, or control version of this task. Participants then completed a variation of the DRM false recognition paradigm (Deese, 1959; Roediger & McDermott, 1995), modeled after Mather, Henkel, and Johnson (1997). They were first presented with a series of 100 words, 1 at a time, and told to study each word and try to remember it. The words were presented for 2 s each with a 500-ms ITI. After answering several filler questions, participants next did a recognition test consisting of 75 words: 40 old items that had been previously presented on the study list and 35 new items that had not been presented. For each word, participants pressed either the *K* key to indicate that the word had been presented in the study list (i.e., it was old) or the *D* key to indicate that it had not been presented previously (i.e., it was new). After a 2-s ITI, the next word appeared.

To create the 15 ten-word lists we used in this experiment, we translated into Dutch 15 fifteen-word lists originally normed in English by Stadler, Roediger, and McDermott (1999). The critical lures for the 15 lists were *bread*, *chair*, *city*, *cold*, *foot*, *man*, *mountain*, *music*, *needle*, *river*, *slow*, *sleep*, *smoke*, *sweet*, and *thief*. Some words were replaced to make the lists more appropriate for Dutch participants (e.g., on the *river* list, the word *Mississippi* was replaced by *Rijn* [Rhine]). Then pretesting and the de Groot (1980) association norms were used to select the 10 words in each list that were most strongly associated with the critical lure. The lists were divided into three groups of five lists for counterbalancing purposes. For each participant, two of these groups (i.e., 10 lists of 10 words each) were presented in the study session, and one group was used only during the recognition test. Thus, there were three possible combinations of these groups in the experiment, which we refer to as *sets*.

In the study portion of the task, the words from the 10 lists were interspersed and presented in random order. In the recognition test, the 40 old words consisted of the 4 words ranked as first, fourth, sixth, and eighth in associative strength from each of the 10 presented lists. The 35 new words consisted of the 10 critical lures for the presented lists and 25 unrelated distractors. The unrelated distractors were 4 words (those ranked as first, fourth, sixth, and eighth in associative strength) from each of the 5 lists that were not presented in the study session, plus the critical lures from these lists.

After the recognition test, participants answered a series of questions on 9-point scales (0 = *not at all*, 8 = *very much*). They rated how much they enjoyed the priming task and how difficult it was. Then they indicated how much they enjoyed the “memory task,” how difficult it was, how hard they worked at it, how well they thought they did, and how motivated they were to do well. Finally, participants were probed for suspicion and debriefed.

Results and Discussion

Manipulation check. The priming writing was coded as in Experiment 1, excluding control participants. The reliability for power ratings was high ($\alpha = .89$). As expected, HPP participants ($M = 4.13$, $SD = 0.80$) were judged to have had more power in the situation they described than did LPP participants (M = 0.77, $SD = 0.60$), $F(1, 73) = 422.00$, $p < .001$.

Recognition test. According to the abstraction hypothesis, HPP participants should falsely recognize critical lures more frequently than should LPP participants. HPP participants should not differ in terms of correct recognition of studied (old) words or false recognition of unrelated distractors. Table 1 gives the proportion of studied items, critical nonpresented lures, and unrelated distractors that were recognized (i.e., categorized as presented in the study list). We performed a 3 (Item Type: studied vs. critical lure vs. unrelated distractor) × 3 (Priming Condition: low power vs. control vs. high power) × 3 (Set) mixed-model ANOVA on these

Table 1
Mean Proportion of Items Recognized by Priming Condition in Experiment 4

Test item	Low power		Control		High power	
	M	*SD*	*M*	*SD*	*M*	*SD*
Studied words	0.65	0.20	0.67	0.14	0.69	0.16
Critical lures	0.42	0.20	0.56	0.19	0.53	0.19
Unrelated distractors	0.08	0.08	0.10	0.12	0.11	0.11

proportions, with item type as the within-subjects variable. A main effect of item type showed that participants recognized more studied words than critical lures and recognized the smallest proportion of unrelated distractors, $F(2, 208) = 438.74$, $p < .001$. Participants who studied different sets of words varied in how many items they recognized, $F(2, 104) = 2.83$, $p = .06$, and this effect was stronger for studied items and critical lures than for distractors, $F(4, 208) = 3.37$, $p = .01$. Most pertinent to our hypothesis, a main effect of priming condition indicated that LPP participants tended to recognize fewer items than did HPP and control participants, $F(2, 104) = 3.60$, $p = .03$. However, this effect was moderated by a Item Type × Priming Condition interaction, $F(4, 208) = 2.43$, $p < .05$. LPP, control, and HPP participants did not differ in their recognition of studied items or distractors (Fs < 1), but they did differ in their recognition of the critical lures, $F(2, 104) = 5.81$, $p = .004$. LPP participants were less likely to falsely recognize the critical lures than both HPP and control participants, ps $< .01$. HPP and control participants did not differ ($p = .63$).

Self-report measures. Priming condition significantly affected enjoyment of the writing task, $F(2, 110) = 5.40$, $p = .006$: Control participants ($M = 4.26$, $SD = 1.54$) enjoyed it more than either LPP ($M = 3.24$, $SD = 1.85$) or HPP participants ($M = 3.03$, $SD = 1.85$; ps $< .02$). Priming condition also significantly affected motivation, $F(2, 110) = 3.29$, $p = .04$: Control participants ($M = 5.08$, $SD = 1.57$) were less motivated to do well on the recognition task than either LPP ($M = 5.86$, $SD = 1.40$) or HPP participants ($M = 5.82$, $SD = 1.50$; ps $< .04$). In both cases, HPP and LPP participants did not differ (ps $> .59$). Enjoyment was unrelated to responses to studied items, lures, or distractors (ps $> .40$). Increased motivation was significantly related both to more old responses to studied items, $r(111) = .23$, $p = .01$, and to fewer old responses to distractors, $r(111) = -.19$, $p = .04$. However, when either enjoyment or motivation were included as a covariate, the effect of priming condition on responses to critical lures remained significant (ps $< .01$), and its effects on responses to studied items and distractors remained nonsignificant (Fs < 1). Priming condition did not affect any other self-report measures (Fs < 1).

In this experiment, we presented the stimuli in such a way that the underlying gist was more challenging to discern. Furthermore, the extraction and use of this gist led to worse rather than better or even neutral performance. Nonetheless, participants primed with high power used more gist—and falsely recognized more critical lures—than did participants primed with low power. Control participants also had higher rates of false recognition than did LPP participants. The priming conditions did not differ in their recognition of the other items, suggesting that they varied only in whether they extracted the gist of the words.

An open question is whether extracting the gist of the lists was equally effortful for all participants. Though previous researchers (e.g., Tun et al., 1998) have hypothesized that false recognition in this paradigm involves some degree of effortful processing, Experiment 4 does not provide evidence that HPP participants put more effort, or equivalent effort, into extracting the gist than did LPP or control participants. In fact, if abstract thinking is inherently linked to having power, then priming participants with high power may have led them to extract the gist automatically, whereas it would have required effort on the part of the other participants. However, this experiment does provide evidence that the use of abstract thinking by HPP participants is neither driven nor constrained by concerns about performance.

Experiment 5

The first four experiments focus on the conceptual effects of priming power on abstract information processing. The next two experiments examine more perceptual effects. In Experiment 5, participants had to detect the structure partially present in fragmented visual stimuli in order to identify them. In other words, while they had to use the data at hand as a basis, they also had to go beyond what they saw.

Here participants performed a computerized variation of the Gestalt Completion Task (GCT; Eckstrom, French, Harman, & Derman, 1976). Participants saw a series of fragmented pictures and were asked to identify them. These pictures were "random" fragmented pictures, created from pieces of other fragmented pictures.[6] These random pictures were designed to look coherent but not to resemble any particular object precisely. All responses to these pictures were then coded by judges for how well they fit the data. If HPP participants are better at detecting real structure—structure inherent in the data itself—as opposed to merely tending to assume that structure is there, they should not show an overall heightened tendency to say that the random pictures are real objects, but the responses they do offer should fit the data better than those offered by LPP participants. Additionally, because participants generated their own idiosyncratic responses, their answers were coded for level of categorization.

[6] The task also included fragmented versions of pictures of familiar objects. However, almost all responses to these pictures were correct ($M = 91.1\%$), and this did not differ between priming conditions. Apparently these stimuli were too obvious for differences between groups to emerge, so they are not discussed further.

Method

Participants. One hundred forty-eight undergraduate students from New York University took part in the experiment in partial fulfillment of a course requirement or for a payment of $10. Eight participants were dropped from the analyses: 4 for suspicion regarding the scrambled sentences task, 3 for not following experimental instructions, and 1 for not completing the tasks in the time allotted. Thus, 140 participants (40 men, 100 women; age: $M = 20.27$, $SD = 3.23$ years) were included in the final analyses.

Procedure and materials. The experimenter explained that the study was investigating whether computer use alters the way people detect patterns in the environment. Participants were told that they would complete two standardized tasks that involved detecting patterns. The first task was the scrambled sentences task from Experiments 2 and 3. Participants received a high-power, low-power, or control version. Then they answered a series of questions. Some of these questions were about computer use to bolster the cover story. They also answered a series of critical questions on 8-point scales (0 = *not at all*, 7 = *extremely/a lot*). They rated how much they liked doing the scrambled sentence task, how easy it was, how well they thought they would do on the next task, how good they felt, and how bad they felt. They also indicated on an 11-point scale how they felt overall (−5 = *very bad*, +5 = *very good*). The critical questions were interspersed with the computer questions.

The second visual detection task was a computerized variation of the GCT. Participants were told that they were supposed to try to see a whole picture even though only part of the picture was drawn. Specifically, they would see a series of incomplete pictures on the computer, one at a time, and their task was to decide what each picture was and type their answer in the box provided. It was emphasized that there were no right or wrong answers for the items and that different people often gave different responses for each item. In addition, it was explained that some of the incomplete pictures were not actually pictures of anything real but were simply random lines. Participants were told that they should enter the word *nothing* if they thought a particular picture was not a picture of anything real and the phrase *don't know* if they simply did not know what it was.

In the task, participants were presented with 25 "random" fragmented pictures (see Figure 1 for an example) in random order. These pictures were created by putting together fragments from different fragmented real pictures from a larger database (Snodgrass, Smith, Feenan, & Corwin, 1987). Care was taken so that the random pictures suggested some sort of coherent, continuous shape without clearly looking like any real object. They were also piloted to ensure that at least 60% of individuals gave a response of *nothing* or *don't know* to each one and that no random picture was consistently (i.e., greater than 15% of the time) said to resemble any particular real object. Each picture was centered in the bottom half of the screen with a dialogue box above it containing the question, *What is this picture?* and a space where participants could type their response.

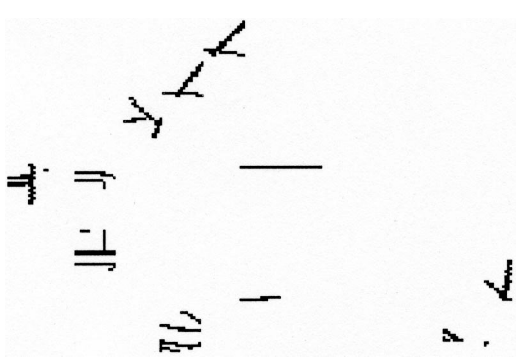

Figure 1. Example of a "random" fragmented picture shown to participants.

Afterward, participants completed a series of self-report measures on 8-point scales (0 = *not at all*, 7 = *extremely/a lot*). They rated how much they liked doing the detection task, how difficult it was, how much effort they put into it, how motivated they were to do well on it, and how well they thought they did. They also rated how well they thought they did compared with most people (−3 = *much worse*, 0 = *about the same*, +3 = *much better*). Next, they completed two mood measures: the PANAS and a single item on how they felt at the moment (−5 = *very bad*, +5 = *very good*). Finally, participants were probed for suspicion and debriefed.

Results and Discussion

Coding of responses to detection task. All responses to the detection task were coded by four independent judges blind to condition. They looked at all responses other than *nothing* and *don't know*, which we refer to as *guesses*, and rated how plausible each guess was or how well it fit the random picture on a 3-point scale (0 = *implausible*, 1 = *sort of plausible*, 2 = *very plausible*; see Table 2 for an example). Reliability was high ($\alpha = .89$) so the mean plausibility rating for each guess was used in the analyses.

All guesses[7] were also coded by two independent blind judges for level of categorization (see Table 2) on the basis of Rosch's criteria (Rosch et al., 1976) and available listings of superordinate, basic, and subordinate levels of categorization (e.g., Lin, Murphy, & Shoben, 1997; Markman & Wisniewski, 1997). Responses were coded as 1 for subordinate, 2 for basic, and 3 for superordinate so that higher numbers indicated higher level categories. Agreement between the 2 judges was very high (greater than 95%), and a 3rd judge resolved any disagreements. The majority of guesses (68.7%) were classified as basic level.

Identification of random pictures. First we tested whether participants primed with high power did not tend to make more guesses but did tend to make *better* guesses (i.e., ones that fit the data better) than participants primed with low power. Because of the directional nature of our prediction, we used linear contrast analyses. About 94% of participants made a guess for at least one random picture, and this percentage did not differ by priming condition, $\chi^2(2, N = 140) = 1.79$, $p = .41$. On average, participants made guesses for about 27% of the random picture trials, or almost seven pictures, which also did not differ between priming conditions ($F < 1$). However, priming condition did influence how plausible these guesses were, $F(1, 129) = 7.87$, $p = .006$. HPP participants ($M = 1.00$, $SD = 0.45$) and control participants ($M = 0.98$, $SD = 0.44$; who did not differ, $p = .90$) made more plausible guesses than did LPP participants ($M = 0.76$, $SD = 0.31$; $ps < .01$). In other words, LPP participants made guesses that did not fit the data as well as the guesses made by the HPP and control participants.

To check for speed–accuracy trade-offs, we analyzed the amount of time participants took to respond to each picture. Priming conditions did not differ in response time ($F < 1$).

Then we considered the level of categorization of the guesses to test whether HPP participants made higher level guesses than did

[7] Responses that were conjunctions of nouns (e.g., "the sun and the beach," "river and trees": 1.38% of responses to random pictures) were omitted from categorization-level analyses because it was not clear how they should be classified. The priming conditions did not differ in the proportion of conjunction responses they made ($F < 1$).

Table 2
Responses Given for One of "Random" Fragmented Pictures in Experiment 5

Response	Plausibility	Level[a]
Airplane	1.50	Basic
BB gun	0.50	Subordinate
Boat	1.50	Basic
Car	0.25	Basic
Car door	0.25	Basic
Firetruck	0.50	Subordinate
Fish	0.25	Basic
Gate	0.25	Basic
Igloo	0.25	Subordinate
Interior of house	0	Superordinate
Plane	1.50	Basic
Sailboat	1.50	Subordinate
Shed	0	Basic
Subway	0	Subordinate

Note. Higher numbers indicate greater plausibility.
[a] Level = level of categorization.

LPP participants. Again we used a linear contrast analysis. Priming condition tended to affect the level of participants' guesses, $F(1, 129) = 3.41$, $p = .07$. HPP participants ($M = 1.97$, $SD = 0.29$) made higher level guesses than did LPP participants ($M = 1.87$, $SD = 0.20$, $p = .07$), and control participants ($M = 1.85$, $SD = 0.29$, $p = .03$). LPP and control participants did not differ, $p = .76$. In other words, not only did HPP participants make more plausible guesses than did LPP participants, but their guesses were also at a higher level of categorization as predicted by the abstraction hypothesis.

To explore this effect, guesses were split into superordinate, basic, and subordinate categories (see Table 3). Priming condition did not affect the proportion of guesses made at the basic level (e.g., *mouse*; $F < 1$) but did tend to affect the proportion at the superordinate (e.g., *an animal*) versus the subordinate level (e.g., *rocking chair*), $F(2, 129) = 2.35$, $p = .10$. Both LPP participants ($p = .005$) and control participants ($p = .004$) made more responses at the subordinate level than at the superordinate level, but this was not the case for HPP participants ($F < 1$). Superordinate responding also tended to increase from LPP participants to control participants to HPP participants, $F(2, 129) = 2.81$, $p = .06$.

Could the greater abstraction of HPP participant's responses explain their greater plausibility? The overall correlation between plausibility and level of categorization was nonsignificant, $r(130) = .10$. However, when examined separately by priming condition, higher level responses made by HPP participants were indeed rated as more plausible, $r(43) = .31$, $p = .04$. There was no association between plausibility and level of categorization for either control participants, $r(41) = -.06$, or LPP participants, $r(42) = -.12$. When these three correlations were compared directly, the HPP correlation significantly differed from the LPP correlation ($p = .04$) and also tended to differ from the control correlation ($p = .08$; the LPP and control correlations did not differ from each other, $p = .79$.) It appears that the higher level nature of HPP participants' responses was functional, leading to more plausible responses for the data at hand. However, such a relationship was unique to this group: Higher level responses neither helped nor hurt the other participants.

Self-report measures. Priming condition had no effect on any of the self-report measures ($ps > .14$).

HPP participants' guesses for the random pictures fit the data better and were at a higher level than were the LPP participants' guesses. Together these results indicate that priming people with power helps them to perceive structure in the environment. The data also suggest an important functional relationship between these results. For HPP participants, higher level responding was associated with more plausible responses. HPP participants also did not make more guesses than did LPP participants, indicating that the performance of HPP participants does not merely reflect a risky bias or a tendency to find patterns that are not really there.

Is it possible that LPP participants generated more creative solutions to the random pictures than did HPP participants and that these responses were thus rated as less plausible? Such a result would not only be surprising, it could be seen as a direct refutation of the proposed link between power and abstraction. Abstract information processing should increase creativity (Förster et al., 2004) rather than inhibit it. We do not think that this interpretation of the data is plausible. The judges were asked to rate how well responses fit the data at hand, that is, how well they described the fragments of the picture. Such criteria are not in opposition to the criteria for a creative response. In fact, a creative response must necessarily integrate or "bring together" the elements of a problem to create a new, unique representation (Schooler & Melcher, 1995). A response deemed "creative" still accounts for all the data at hand; it is the way it restructures the data that makes the response creative. Creative responses would have been more novel or surprising to the judges, but there is no a priori reason to expect them to be seen as less plausible.

The judges were also encouraged to work hard to see how a given response might map onto a picture. It is interesting to note that some of the judges spontaneously commented that the responses differed mostly in whether they accounted for some or all of the fragments of a picture. In other words, responses that were rated as more plausible created a gestalt that encompassed all the data at hand, whereas responses rated as less plausible tended to ignore chunks of the data. Thus, the ability of HPP participants to generate better responses to the random fragmented pictures was linked to their ability to think abstractly and extract structure from the data. In line with this idea, level of categorization (another marker of abstract thinking) and plausibility were significantly correlated only for HPP participants.

Table 3
Mean Percentage of Guesses at Different Levels of Categorization by Priming Condition in Experiment 5

	Low Power		Control		High Power	
Level	*M*	*SD*	*M*	*SD*	*M*	*SD*
Subordinate	15.30	16.00	19.10	22.30	12.80	14.50
Basic	78.80	16.80	71.10	22.20	74.40	23.70
Superordinate	4.70	7.40	7.90	11.40	11.80	20.40

Experiment 6

Abstract processing involves distinguishing between primary and secondary or incidental data. People extract gist by distilling what is most important. Sometimes what is primary and what is secondary is inherent in an object: For example, being comfortable to sit on is a more primary aspect of a chair than what color it is (Barsalou, 1983; Murphy & Medin, 1985). Similarly, when pursuing a goal (e.g., performing well on an exam), the desirability of that final outcome (e.g., whether doing well affects whether one passes a class) is more primary than the feasibility of that final outcome (e.g., how much available time one has to study; Liberman & Trope, 1998).

In other cases, what is primary and what is secondary is highly contextualized. When one considers objects or activities in the context of goal pursuit (e.g., Trope & Liberman, 2000), for example, aspects that are relevant to goal pursuit become primary, and aspects that are irrelevant become secondary (Gollwitzer & Moskowitz, 1996). In other words, if a couple wants to coordinate the furniture in their living room, suddenly the color of a chair will be more primary than the comfort of sitting in it. If power leads to more abstract processing, then powerful people should be better at distinguishing between the primary and secondary aspects of a stimulus than powerless people, even if these categories are determined by temporary task goals.

In this experiment, the task itself defined what was primary and what was secondary. Participants were primed with power and then completed. In this task, they were given a complex pattern and had to find a simple figure within it. Normally, the smaller figure would be considered a secondary aspect of this larger, complex pattern. In this case, though, the smaller figure is much more task-relevant than is the rest of the larger pattern, and it thus becomes primary. We expected that HPP participants would accurately identify more simple figures within the complex patterns than would LPP participants.

The EFT also taps into one aspect of creativity, that is breaking the context-induced mental set (Friedman & Förster, 2000; Schooler & Melcher, 1995). To respond correctly in this task, participants must break up a complex pattern to find the simple figure hidden within it. Because abstract thinking improves or increases creativity (e.g., Förster et al., 2004), this alternative interpretation of the task also implies that being primed with high power would improve one's performance, relative to being primed with low power.

Method

Participants. One hundred thirty-four undergraduate students from New York University took part in the experiment in partial fulfillment of a course requirement or for a payment of $10. Nine participants were dropped from the analyses: 3 because they had participated in a similar experiment earlier in the semester, 4 because they did not understand how to complete the embedded figures task, and 2 for not following experimental instructions. Thus, 125 participants (24 men, 101 women; age: M = 20.36, SD = 2.15 years) were included in the final analyses.

Procedure. The experimenter explained that the study was investigating how people's verbal and visual abilities can change as a function of practice. Participants first completed two writing tasks. The first topic was "a recent time or incident when you spent a lot of time outdoors" and was included solely to bolster the cover story. The second topic was the same priming manipulation as in Experiments 1 and 4, with participants receiving a high-power, control, or low-power version. Participants were given 7 min for each topic.

Participants then performed the group EFT. The experimenter explained that this was a test of participants' ability to find a simple form when it is hidden within a complex pattern. Participants were given a booklet containing the instructions, two example problems, and the actual task. The experimenter read the instructions aloud as participants followed along. For each item, participants were given a complex geometrical pattern and asked to locate a simple figure within it. Participants had to look at the back cover to determine which specific simple figure they needed to find for an item. They were not allowed to remove the back cover from the booklet. Once they located the figure in the complex pattern, they traced its form. As explained to participants, these figures were the same size and facing the same direction within the pattern as they were on the back cover. Participants were given a total of 18 items comprising two sections of 9 items each, with 5 min provided for each section.

Afterward, participants completed various self-report measures. First they rated on 11-point scales (-5 = *very bad*, $+5$ = *very good*) how they felt after they completed the writing task and how they felt at the present moment. Then they answered a series of questions on 7-point scales (1 = *not at all*, 7 = *extremely/a lot/definitely*). For the writing task, they rated how well they had expected to perform on it, how much they liked it, how difficult it was, and whether they had enough time to write what they wanted. For the EFT, they indicated how well they had expected to perform, how easy it was, how much they enjoyed doing it, how hard they worked at it, whether they had enough time to find the figures, and how motivated they were to do well. Finally, participants were probed for suspicion and debriefed.

Results and Discussion

Manipulation check. The priming writing was coded as in Experiment 1, excluding control participants. The reliability for power ratings was high (α = .91). As expected, HPP participants (M = 5.26, SD = 0.85) were judged to have had more power in the situation they described than were the LPP participants (M = 1.18, SD = 0.78), $F(1, 81) = 517.81$, $p < .001$.

Group EFT. It was hypothesized that participants primed with high power would make more correct responses than would participants primed with low power, with control participants falling in between. Because of the directional nature of the hypothesis, we used a linear contrast analysis. The main effect of priming condition was significant, $F(1, 122) = 5.10$, $p = .03$. As predicted, HPP participants (M = 14.52, SD = 2.81) made more correct responses than did LPP participants (M = 12.85, SD = 3.94; p = .03) and also tended to make more correct responses than did control participants (M = 13.43, SD = 3.27; p = .14). LPP and control participants did not differ from each other (p = .44).

Self-report measures. Priming condition did affect the perceived difficulty of the writing task, $F(2, 122) = 4.06$, $p = .02$. HPP participants (M = 2.31, SD = 1.33) considered this task more difficult than did either LPP participants (M = 1.78, SD = 0.99) or control participants (M = 1.69, SD = 0.84; ps < .03). LPP and control participants did not differ (p = .70). However, perceived difficulty was not related to group EFT performance, $r(123) = .12$, $p = .17$. When perceived difficulty was included as a covariate, the main effect of priming condition remained significant (p = .04). Priming condition did not affect any other self-report measure (Fs < 1).

As predicted, HPP participants were better at distinguishing primary from secondary information and made more correct responses on the group EFT than did LPP or control participants. This result was not mediated by reported mood, efficacy, motivation, or effort.

Experiment 7

Various types of abstract thinking have been associated with the right hemisphere of the brain. Neurological and physiological studies have demonstrated right hemisphere superiority in global processing of hierarchical visual stimuli and left hemisphere superiority in local processing of the same (e.g., Fink et al., 1996; Martinez et al., 1997; Van Kleeck, 1989). Creative thinking also seems to be linked to the right hemisphere (e.g., Bowden & Beeman, 1998; Seger, Desmond, Glover, & Gabrieli, 2000). The abstraction hypothesis would therefore lead us to expect high-power priming to produce greater relative right hemispheric activation than low-power priming.

We used a variation of the line bisection task as a behavioral measure of hemispheric activation. The line bisection task can be administered in multiple ways. In one type, participants are asked to indicate the center of a series of lines. Normal (i.e., nonclinical) individuals generally mark a location to the left of center, signifying an attentional bias toward the left visual field (LVF; i.e., they think the left side of the line is longer than it really is; Milner et al., 1992). This LVF bias is interpreted as increased relative right hemispheric activation. In another variation of the task, participants are shown a series of lines already bisected at the center and must indicate whether the line is bisected closer to its left or right end. Normal participants tend to say the line is bisected closer to the right end (Milner et al., 1992). Here a *right* response reflects an LVF bias (and greater relative right hemispheric activation) because it means that the left side of the line is perceived as longer than it really is. In the present experiment we used the latter version of the task. Therefore we predicted that priming participants with high power would lead them to respond more frequently that the lines were bisected to the right, indicating greater relative right hemispheric activation, as compared to priming participants with low power.

Method

Participants. One hundred and eight students from the University of Amsterdam took part in the experiment in partial fulfillment of a course requirement or for a payment of 7 euros (U.S.$8.41). Trials with noncentrally bisected lines were used as a check to ensure that participants took the task seriously, followed directions, and were not seated in such a way as to bias their responses. Eleven participants were dropped because they made errors on more than 20% of the left-bisected or right-bisected trials. These participants were evenly distributed between the three priming conditions. Thus, 97 participants (20 men, 77 women; age: $M = 21.49$, $SD = 4.06$ years) were included in the final analyses.

Procedure and materials. This experiment was conducted in individual sessions with all instructions and tasks on computer. The introduction screen explained that the experiment was investigating people's verbal and visuospatial–perceptual skills. First, participants answered a series of 13 mood questions. They indicated on an 11-point scale how they felt overall at the moment (-5 = *very negative*, $+5$ = *very positive*). On 9-point scales (0 = *not at all*, 8 = *very much*) they indicated how "happy," "content," "joyful," "sad," "disappointed," "depressed," "calm," "relieved," "relaxed," "nervous," "worried," and "tense" they felt. The mood questions were presented in random order, except that the overall item always appeared first. Then participants completed the same scrambled sentences task used in Experiments 2, 3, and 5, receiving a high-power, low-power, or control version. Immediately afterward, they again answered the same 13 mood items.

Participants next completed a measure of perception accuracy. They were presented with a series of 60 lines, each 20 cm in length and 1.5 mm thick. These lines were prebisected with vertical marks that were 10 mm in length and 1 mm thick. Participants were asked to choose which end of the line, the left or the right, was closest to the mark (cf. Milner et al., 1992). To give their response, participants pressed either the *8* or the *2* key on the keyboard's number pad. One key was labeled *left*, the other *right*. Assignment of labels to keys was counterbalanced. Participants were instructed to sit up straight and keep their body centered in front of the computer during the task.

Participants were randomly presented with 20 centrally bisected lines (the critical trials), 20 lines bisected 5 mm left of center, and 20 lines bisected 5 mm right of center. The left- and right-bisected lines were included to bolster the cover story, giving the appearance that all lines might be asymmetrically bisected, and to ensure that participants were completing the task correctly.

After the perceptual task, participants rated on 9-point scales (0 = *not at all*, 8 = *very much*) how much they had enjoyed the task, how difficult it was, and how well they thought they did. They also indicated whether they were left- or right-handed. Finally, they were probed for suspicion and debriefed.

Results and Discussion

Line bisection. The number of times the right end was chosen for the 20 centrally bisected lines was calculated. As explained earlier, indicating that the mark was closest to the right end implies a LVF bias signifying greater relative right hemispheric activation. Thus, the more responses of *right*, the more right hemispheric activation (relative to left; Milner et al., 1992). Because we predicted that HPP participants would make more *right* responses than would LPP participants, with control participants falling in between, we used a linear contrast analysis. The effect of priming condition was significant, $F(1, 94) = 5.44$, $p = .02$. HPP participants ($M = 10.85$, $SD = 5.07$) thought the mark was to the right more often than did LPP participants ($M = 8.32$, $SD = 4.17$; $p = .02$) or control participants ($M = 8.64$, $SD = 3.61$; $p = .04$). LPP and control participants did not differ ($p = .77$). Supplementary analyses indicated that this effect was not moderated by the position of the key labels or handedness. Thus, HPP participants showed greater relative right hemispheric activation than did LPP or control participants.

Self-report measures. As in Experiment 2, two sets of four composite indices of mood were calculated to differentiate between positive versus negative affect and approach-related versus avoidance-related affect measured before versus after the priming task. Responses to "happy", "content," "joyful," "calm," "relieved," and "relaxed" were averaged to measure positive affect, and responses to "sad," "disappointed," "depressed," "nervous," "worried," and "tense" were averaged for negative affect. Approach-related affect was calculated by averaging responses to "happy," "content," and "joyful" with (reverse scored) "sad," "disappointed," and "depressed," and avoidance-related affect was calculated by averaging responses to "calm," "relieved," and "relaxed" with (reverse scored) "nervous," "worried," and "tense." Then prepriming indices (including the overall "How do you feel?" mood item) were subtracted from postpriming indices, resulting in five measures of how the priming task affected participants' mood.

Out of all the self-report measures, priming condition only affected negative affect, $F(2, 94) = 2.72$, $p = .07$. LPP participants ($M = -0.31$, $SD = 0.51$) felt less negative affect after the priming task than before it, whereas the mood of HPP ($M = -0.01$, $SD = 0.71$) and control participants ($M = -0.03$, $SD = 0.49$) did not change. However, none of the mood indices, including negative affect, were correlated with BIF responses ($ps > .50$). When negative affect was included as a covariate, the effect of priming condition on bisection responses remained significant ($p = .03$).

The results of Experiment 7 support the notion that priming high power engenders greater relative right hemispheric activation as compared with priming low power or a control group. As in all previous experiments, these effects were not mediated by mood. These data provide tentative evidence for a neural correlate for the abstraction hypothesis.

General Discussion

We argue that the greater independence and sense of distinctiveness associated with power predisposes those with power to adopt a more distal perspective. On the basis of past work on perspective-dependent construals (e.g., Trope & Liberman, 2003), we further propose that this more distal perspective leads those with power to process information in a more abstract fashion, to better see the forest beyond the trees. Consistent with this abstraction hypothesis, the first six experiments showed that priming high power leads people to process information in a more abstract fashion—focusing on central aspects and perceiving structure to extract the gist and categorizing stimuli at a higher level—than does priming people with low power. Experiments 1 and 2 demonstrate that participants primed with high power categorize stimuli at a higher level than do participants primed with low power. HPP participants used more inclusive categories and preferred to identify actions at a higher level than did LPP participants. In Experiment 3, HPP participants judged the coherence of stimuli more accurately than did LPP participants. Experiment 4 demonstrates that priming high power leads to more abstract thinking, even when such thinking also leads to worse performance. Here the tendency for HPP participants to extract the gist led them to falsely recognize certain kinds of words more frequently than did LPP participants.

The effects of power priming on abstract thinking were not limited to verbal stimuli. In Experiment 5, HPP participants made more superordinate categorizations of fragmented pictures and were more accurate at detecting the structure in them and thus made responses that better fit the data at hand as compared with LPP participants. In Experiment 6, HPP participants were better able to distinguish between primary and secondary features and thus performed better on an EFT than did LPP participants.

Across two different priming manipulations, a variety of stimuli, and multiple measures of abstract processing, the results of these six studies converge on the idea that power is linked to abstract information processing. In the seventh experiment we showed initial evidence for a neural correlate. With a behavioral measure of relative hemispheric activation, we found that priming people with high power led to greater relative right hemispheric activation than did priming people with low power or not priming them at all (the control condition).

Alternative Explanations

Throughout these experiments, we attempted to rule out alternative explanations. Mood was an obvious possibility, as having or lacking power may alter one's mood (Keltner et al., 2003). However, in most cases our priming manipulations did not affect reported mood or more specific types of affect (i.e., positive, negative, approach-related, avoidance-related). Even when priming had affective consequences, these changes did not mediate our effects.

Another potential critique is that our results are due to greater effort or motivation on the part of HPP participants. Priming people with roles and concepts related to powerlessness may be demotivating, and priming people with roles and concepts related to power may be motivating. These differences in motivation would then lead to differences in performance. Several aspects of the present research argue against this interpretation. In our experiments, participants answered questions about the motivation they had to do well and the amount of effort they put into the tasks. Priming generally did not affect responses to these questions, and these responses were never related to actual performance on the tasks. For some of the tasks, there was no right or wrong answer. Participants had no reason to think that higher level responses were more appropriate for the tasks in Experiments 1 and 2. It is not clear then why motivation or effort would lead to more abstract responses for these tasks.

The strongest evidence against this interpretation comes from Experiment 4. Here abstract thinking was pitted against motivational concerns with accuracy: Abstract thinking actually led to more errors on the recognition test. If HPP participants were simply more motivated to do well on the task and tried harder than did LPP participants, then they would not have shown such a heightened level of false recognition. The data from this experiment also speak against the converse of this explanation; that is, priming people with high power decreases their motivation. HPP participants only made more errors on words that represented the gist of the lists, not on words that were unrelated.

The (A)symmetry of Power's Effects

Our data generally showed an asymmetric effect of power priming. In most cases (Experiments 2, 5, 6, and 7), HPP participants differed from both LPP and control participants, but control and LPP participants did not differ from each other. Though little research on power has included control participants, the few experiments that have included them have found a similar asymmetry (e.g., Galinsky et al., 2003). This may reflect a tendency to resist powerlessness. When people believe they should have power but feel that they do not, they may resist this lack of power and even compensate for it. For example, when parents do not feel they have power over their children, they assert power even more in an attempt to repair their status (Bugental & Happaney, 2000). Similarly, when participants who were placed in a subordinate role desired a dominant one, they actually behaved as dominantly and were perceived as being as dominant as participants assigned to a dominant role (Schmid Mast & Hall, 2003).

In the previous experiments, however, participants were primed with the concept of power or powerlessness rather than being assigned to roles. Could an individual resist being primed with the concept of powerlessness? Research on contrast effects (see Stapel & Koomen, 2001b, for a recent review) suggests one could. When individuals are primed with a category or concept, they behave in line with that category or concept unless it is seen as a standard of comparison. In that case, they behave in a way opposite to that suggested; that is, they show a contrast effect (e.g., Dijksterhuis et al., 1998). One case in which a concept may elicit contrast is when it is associated with an outgroup (Spears, Gordijn, Dijksterhuis, & Stapel, 2004). When the concept of neatness was primed but linked to an outgroup (i.e., students with a different major), participants actually became messier.

Individuals generally desire control, and they are willing to misperceive reality in order to maintain the illusion that they have control (e.g., Langer, 1975). If people have a relatively high need for control, they may view low power or powerlessness as something that occurs to other people. In this way, low power would then be dissociated from the ingroup and the self, and priming power would then lead to contrast. If the contrast effect is not strong (i.e., does not lead to overcorrection), it will result in an apparent null effect, as we found several times with the comparison between LPP participants and control participants. To explore this possibility, future research should include measures of individuals' willingness to be in superordinate and subordinate roles, including their need for power.

However, in the remaining experiments that had a control group (Experiments 1, 4, and 5), LPP participants differed from HPP and control participants, but control and HPP participants did not differ from each other. How can we understand this inconsistent pattern of results? One possible explanation is the method used to prime high and low power. When participants were primed by writing about their actual experience of having or lacking power, LLP participants (but not HPP participants) differed from the control condition. Such a result may reflect the differential experience of low- and high-power roles by our undergraduate participants. At this point in their lives, they may have experienced some very low-power roles (e.g., being bullied by a classmate as a child), but they may not have experienced high-power roles that are comparable in extremity. In other words, their own experience may have been a much stronger, more effective prime of low rather than high power. This is reflected in the judges' ratings of this writing. Low-power writing for Experiments 1 and 4 was rated on average about 0.75 on a scale ranging from 0 to 6, whereas high-power writing from these same Experiments was rated only a 4. Notably, in Experiment 6, which also used the writing task but in which HPP participants tended to differ from control participants, the high-power writing was judged as involving much more power (5.3 on the same scale).[8]

Meanwhile, in most of the experiments in which HPP participants (but not LPP participants) differed from the control condition, the scrambled sentences task was used. Here participants were not actively connecting the concept of low or high power to the self; they were merely being passively exposed to them. Thus, it may have been easier for participants to resist the low-power priming (out of the aforementioned innate need for control), as it was not directly linked to the self.

In short, future research that uses power priming needs to consider individual differences both (a) in the desire or need for control and power and (b) in past experience with having or lacking power. Furthermore, exactly how the concepts of having and lacking power are activated must be considered. If low power is activated without also being linked to the self, it will be easier for an individual with a strong control motive to correct for such priming.

Implications of the Abstraction Hypothesis

Person perception. As much of the previous research on power and cognition has focused on the issue of stereotyping, it is important to address what our ideas have to say on this subject. The abstraction hypothesis does not imply that those with power inherently stereotype more (or less). The abstract construal of actions may lead to more or less stereotyping, depending on the situation. Most research on power and stereotyping has had participants interact with, or gain information about, a series of people and then rate each of them individually. We would predict that if a powerful person were to observe a single individual, he or she would be more likely to perceive that person in terms of higher level or abstract, rather than lower level or concrete, constructs. However, it is important to note that higher level, more abstract constructs include traits (Nussbaum, Trope, & Liberman, 2003) as well as group identities or stereotypes. Thus, in a situation in which no group identities are provided, high-power individuals would be more likely to view others in terms of overarching traits, whereas low-power individuals would not move beyond concrete behaviors (Overbeck & Park, 2001). When group identities are present, high-power individuals might be inclined to use both stereotypes and traits more than might low-power individuals. That is, if information about a target is given that implies stereotype-irrelevant traits in addition to information that implies stereotypical traits (e.g., stereotype-consistent and stereotype-inconsistent behaviors), individuals in high-power roles would be more likely to extract both the stereotypical traits and the irrelevant ones. Because past research has generally used such a method (e.g., Goodwin et al., 2000), this may explain why effects of power on actual stereotyping have been difficult to find.

When multiple persons are assessed simultaneously, an important factor is whether these people are from the same or different groups. If a person perceives a collection of members of different social groups in an abstract fashion, then he or she should construe these people at a higher, inclusive "group" level and thus perceive greater similarity across these different groups, which is a characteristic of less biased intergroup cognition (e.g., Gaertner & Dovidio, 2000). This same abstract thinking, when applied to members of the same group, should again lead these people to be construed at a higher, inclusive "group" level, but in this case it should result in greater perceived similarity within this one group, which is a characteristic of stereotyping (e.g., Fiske, 1998). The research by Levy, Freitas, and Salovey (2002) on action identifi-

[8] This experiment was run in the United States, whereas the other two were run in the Netherlands. Differences between the two cultures in competitiveness as well as support of and comfort with hierarchies may explain why participants in Experiment 6 already had experience with more high-power roles.

cation and empathy has provided an elegant demonstration of these phenomena. They found that individuals who thought about actions more abstractly (i.e., preferred to identify actions at a higher level) perceived more homogeneity within social groups but also perceived greater self–other similarity and between-groups similarity.

In short, the same general tendency for powerful people to use higher level categories can have distinctly different intergroup effects. That is, high-power individuals should be more likely to view members of the same group as a coherent whole than should low-power individuals. Here higher level categorization should lead to increased stereotyping. However, if high-power individuals view a collection of members of various social groups, they should also see more commonalities among these various groups. In this case, higher level categorization should lead to reduced stereotyping. Unfortunately, we could not locate any research that addressed either of these hypotheses. Future research needs to move beyond ratings of single targets to investigate how power affects group-level perceptions.

Decision making. The abstraction hypothesis suggests that low-power and high-power individuals should differ in the criteria they focus on when making decisions. Objects and activities often have many features, some of which are more relevant to their primary goal or purpose and others that are more incidental. For example, when selecting a new assistant professor, a candidate's primary or most goal-relevant features would be his or her research and teaching skills, and more secondary features would include his or her social skills. Thinking abstractly means that one focuses on the primary features of an object. Thus, a high-power individual would tend to evaluate an object more in terms of its primary or goal-relevant aspects as compared with the evaluation of a low-power individual. That is, a professor on the hiring committee would be more interested in a candidate with an impressive curriculum vitae and less concerned about whether that person was friendly and outgoing than would a student on that same committee.

Actions may also be evaluated in terms of the feasibility and desirability. *Desirability* refers to the value of an action's end state, and *feasibility* refers to the ease or difficulty of reaching that end state. That is, desirability involves why one would take an action, whereas feasibility involves how one would take an action. In this way, desirability is a more abstract issue than is feasibility (Liberman & Trope, 1998). We would thus predict that a high-power individual would focus more on desirability concerns and less on feasibility concerns when choosing a course of action as compared with a low-power individual.[9] If the professor and the student now have to decide whether to attend a conference, the professor would be more concerned with whether the conference topic is relevant to his or her research, and the student would be more concerned with whether it is inconvenient to travel to the conference site.

It may seem that we are trying to claim that having power leads one to make better decisions. After all, it seems most logical and profitable to make decisions that are driven by goals and values rather than by the small details. However, such "big picture" decision making brings hazards of its own. For instance, it puts one at risk of overcommitment (see Liberman & Trope, 1998, Study 5). Time constraints are a feasibility issue, so high-power individuals should be less likely to take them into account when deciding whether to take on yet another task. In other words, when a new professor complains about how his or her schedule is so much busier than when he or she was a postdoctoral researcher, the problem may be more than the extra responsibilities involved in his or her new job. It may also be this new, more abstract way of thinking that leads him or her to lose touch with whether it is actually possible to be on five different committees.

Self-regulation. The abstraction hypothesis suggests that the possession of power should affect people's self-regulatory tendencies. Thinking abstractly implies that one takes a high-level perspective on behavior, focusing on why one does something rather than how one does it. Powerholders, more than the powerless, should thus be guided by their primary, overriding goals rather than by subordinate, incidental concerns. This would mean that powerholders are more likely to act in accordance with their core attitudes and values (Chen et al., 2001). Indeed, individuals placed in high-power roles or those higher in personality dominance have been found to express their true attitudes more during a discussion than have participants lower in power or dominance (Anderson & Berdahl, 2002). Such goal-driven behavior also has implications for stereotyping. Powerholders should be more likely to stereotype those beneath them when such stereotyping is seen as an effective means to their goals. Evidence for this has already been found in the context of the Social Influence Strategy × Stereotype Match hypothesis (Vescio, Snyder, & Butz, 2003).

If each person in a group is able to pursue his or her own goals, then individuals are likely to behave very differently from each other and to follow their own paths in pursuit of their unique preferred outcomes. It follows then that if high-power individuals are more likely to behave in line with their own idiosyncratic goals, they should be especially likely to behave differently from each other. That is, high-power individuals, when viewed as a group, should act in more idiosyncratic and variable ways than should low-power individuals. Guinote et al. (2002) indeed found that the behavior of participants in a high-power group was more heterogeneous than that of participants in a low-power group. Similarly, high-status and high-power individuals displayed more variable forms of teasing than did lower status and lower power participants (Keltner, Young, Heerey, Oemig, & Monarch, 1998).

However, we do not predict that high-power individuals will always do whatever they want, regardless of circumstances. After all, high-power individuals are also better at perceiving the gist of a situation. If a particular context compels or strongly affords a particular action, then powerholders should be more responsive to that environmental context and act accordingly. Initial support for this idea was recently obtained by Guinote and Trope (2004). For example, they found that in work situations, participants with power (compared with those lacking power) were more inclined to engage in work-related activities and less inclined to engage in distracting (but more pleasurable) social activities. The reverse was true in social situations. Correspondingly, on weekdays participants with power were more inclined to engage in mundane activities and less inclined to engage in distracting (but more appealing) leisure activities, whereas the reverse held true for weekend days.

Finally, contrary to models that characterize those with power as disinhibited (e.g., Keltner et al., 2003), we predict that having

[9] Thanks to Kentaro Fujita for pointing this out to us.

power should make it easier for people to exercise self-control. Self-control is often conceptualized as the ability to forgo short-term rewards (e.g., eating delicious cake) for the sake of desired long-term goals (e.g., losing weight; Baumeister & Vohs, 2004; Trope & Fishbach, 2000). These long-term goals are ordinarily at a higher level than are the short-term goals. If those with power are guided more by higher level goals, then they should be superior at self-control to those without power.

Conclusion

This research demonstrates how power shares the same underlying processes with other basic social psychological phenomena. Positive mood (e.g., Fredrickson, 2001) and approach tendencies (Friedman & Förster, 2000), among others, have also been linked to more abstract thinking. Through careful measurement of potential confounds, this research also shows that power's effects can be independent of changes in affect, effort, or motivation. That is, power has its own unique and basic effects on human information processing. In this way, power is returned to its rightful place as a fundamental psychological phenomenon.

References

Anderson, C., & Berdahl, J. L. (2002). The experience of power: Examining the effects of power on approach and inhibition tendencies. *Journal of Personality and Social Psychology, 83,* 1362–1377.

Anderson, C., Keltner, D., & John, O. P. (2003). Emotional convergence between people over time. *Journal of Personality and Social Psychology, 84,* 1054–1068.

Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In R. S. Wyer, Jr., & T. K. Srull (Eds.), *Handbook of social cognition, Vol. 1: Basic processes* (2nd ed.; pp. 1–40). Hillsdale, NJ: Erlbaum.

Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer, Jr., (Ed.), *Advances in social cognition, Vol. 10* (pp. 1–61). Mahwah, NJ: Erlbaum.

Bargh, J. A., & Chartrand, T. L. (2000). The mind in the middle: A practical guide to priming and automaticity research. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 253–285). New York: Cambridge University Press.

Barsalou, L. W. (1983). Ad hoc categories. *Memory & Cognition, 11,* 211–227.

Barsalou, L. W., Niedenthal, P., Barbey, A. K., & Ruppert, J. A. (2003). Social embodiment. In B. H. Ross (Ed.), *The psychology of learning and motivation, Vol. 43* (pp. 43–92). San Diego, CA: Academic Press.

Baumann, N., & Kuhl, J. (2002). Intuition, affect, and personality: Unconscious coherence judgments and self-regulation of negative affect. *Journal of Personality and Social Psychology, 83,* 1213–1223.

Baumeister, R. F., & Vohs, K. D. (Eds.). (2004). *Handbook of self-regulation: Research, theory, and applications.* New York: Guilford Press.

Bolte, A., Goschke, T., & Kuhl, J. (2003). Emotion and intuition: Effects of positive and negative mood on implicit judgments of semantic coherence. *Psychological Science, 14,* 416–421.

Bowden, E. M., & Beeman, M. J. (1998). Getting the right idea: Semantic activation in the right hemisphere may help solve insight problems. *Psychological Science, 9,* 435–440.

Bowers, K. S., Regehr, G., Balthazard, C., & Parker, K. (1990). Intuition in the context of discovery. *Cognitive Psychology, 22,* 72–110.

Brainerd, C. J., & Reyna, V. F. (2001). Fuzzy-trace theory: Dual processes in memory, reasoning, and cognitive neuroscience. *Advances in child development and behavior, 28,* 41–100.

Brainerd, C. J., & Reyna, V. F. (2002). Fuzzy-trace theory and false memory. *Current Directions in Psychological Science, 11,* 164–169.

Brainerd, C. J., Reyna, V. F., & Forrest, T. J. (2002). Are young children susceptible to the false-memory illusion? *Child Development, 73,* 1363–1377.

Bugental, D. B., & Happaney, K. (2000). Parent–child interaction as a power contest. *Journal of Applied Developmental Psychology, 21,* 267–282.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS Scales. *Journal of Personality and Social Psychology, 67,* 319–333.

Cast, A. D. (2003). Power and the ability to define the situation. *Social Psychology Quarterly, 66,* 185–201.

Chen, S., Lee Chai, A. Y., & Bargh, J. A. (2001). Relationship orientation as a moderator of the effects of social power. *Journal of Personality and Social Psychology, 80,* 173–187.

Deese, J. (1959). On the prediction of occurrence of particular verbal intrusions in immediate recall. *Journal of Experimental Psychology, 58,* 17–22.

de Groot, A. M. B. (1980). *Mondelinge woordassociatienormen: 100 woordassociaties op 460 Nederlandse zelfstandige naamwoorden.* [Oral word association norms: 100 word associations to 460 Dutch nouns]. Lisse, the Netherlands: Swets & Zeitlinger.

DePaulo, B. M., & Friedman, H. S. (1998). Nonverbal communication. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology, Vol. 2* (4th ed., pp. 3–40). New York: McGraw-Hill.

Depret, E., & Fiske, S. T. (1993). Social cognition and power: Some cognitive consequences of social structure as a source of control deprivation. In G. Weary, F. Gleicher, & K. L. Marsh (Eds.), *Control motivation and social cognition* (pp. 176–202). New York: Springer.

Depret, E., & Fiske, S. T. (1999). Perceiving the powerful: Intriguing individuals versus threatening groups. *Journal of Experimental Social Psychology, 35,* 461–480.

Dijksterhuis, A., Spears, R., Postmes, T., Stapel, D., Koomen, W., van Knippenberg, A., et al. (1998). Seeing one thing and doing another: Contrast effects in automatic behavior. *Journal of Personality and Social Psychology, 75,* 862–871.

Eckstrom, R. B., French, J. W., Harman, H. H., & Derman, D. (1976). *Kit of factor-referenced cognitive tests.* Princeton, NJ: Educational Testing Service.

Emerson, R. M. (1962). Power-dependence relations. *American Sociological Review, 27,* 31–41.

Fink, G. R., Halligan, P. W., Marshall, J. C., Frith, C. D., Frackowiak, R. S. J., & Dolan, R. J. (1996). Where in the brain does visual attention select the forest and the trees? *Nature, 382,* 626–628.

Fiske, S. T. (1993). Controlling other people: The impact of power on stereotyping. *American Psychologist, 48,* 621–628.

Fiske, S. T. (1998). Stereotyping, prejudice, and discrimination. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology, Vol. 2* (4th ed., pp. 357–411). Boston: McGraw-Hill.

Förster, J., Friedman, R. S., & Liberman, N. (2004). Temporal construal effects on abstract and concrete thinking: Consequences for insight and creative cognition. *Journal of Personality and Social Psychology, 87,* 177–189.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56,* 218–226.

Friedman, R. S., & Förster, J. (2000). The effects of approach and avoidance motor actions on the elements of creative insight. *Journal of Personality and Social Psychology, 79,* 477–492.

Gaertner, S. L., & Dovidio, J. F. (2000). *Reducing intergroup bias: The common ingroup identity model.* Philadelphia: Psychology Press.

Galinsky, A. D., Gruenfeld, D. H., & Magee, J. C. (2003). From power to action. *Journal of Personality and Social Psychology, 85,* 453–466.

Gasper, K. (2004). Do you see what I see? Affect and visual information processing. *Cognition and Emotion, 18,* 405–421.

Gasper, K., & Clore, G. L. (2002). Attending to the big picture: Mood and global versus local processing of visual information. *Psychological Science, 13,* 34–40.

Gollwitzer, P. M., & Moskowitz, G. B. (1996). Goal effects on action and cognition. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 361–399). New York: Guilford Press.

Goodwin, S. A., Gubin, A., Fiske, S. T., & Yzerbyt, V. Y. (2000). Power can bias impression processes: Stereotyping subordinates by default and by design. *Group Processes and Intergroup Relations, 3,* 227–256.

Guinote, A. (2001). The perception of group variability in a non-minority and a minority context: When adaptation leads to outgroup differentiation. *British Journal of Social Psychology, 40,* 117–132.

Guinote, A., Judd, C. M., & Brauer, M. (2002). Effects of power on perceived and objective group variability: Evidence that more powerful groups are more variable. *Journal of Personality and Social Psychology, 82,* 708–721.

Guinote, A., & Trope, Y. (2004). *Power differences in responsiveness to situational affordances.* Manuscript submitted for publication.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52,* 1280–1300.

Hogg, M. A., & Reid, S. A. (2001). Social identity, leadership, and power. In A. Y. Lee-Chai & J. A. Bargh (Eds.), *The use and abuse of power: Multiple perspectives on the causes of corruption* (pp. 159–180). Philadelphia: Psychology Press.

Isen, A. M., & Daubman, K. A. (1984). The influence of affect on categorization. *Journal of Personality and Social Psychology, 47,* 1206–1217.

Keltner, D., Gruenfeld, D. H., & Anderson, C. (2003). Power, approach, and inhibition. *Psychological Review, 110,* 265–284.

Keltner, D., Young, R. C., Heerey, E. A., Oemig, C., & Monarch, N. D. (1998). Teasing in hierarchical and intimate relations. *Journal of Personality and Social Psychology, 75,* 1231–1247.

Kimchi, R. (1992). Primacy of wholistic processing and global/local paradigm: A critical review. *Psychological Bulletin, 112,* 24–38.

Kruglanski, A. W. (2004). The quest for the gist: On challenges of going abstract in social and personality psychology. *Personality and Social Psychology Review, 8,* 156–163.

Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology, 32,* 311–328.

Lee, F., & Tiedens, L. Z. (2001). Is it lonely at the top?: The independence and interdependence of power holders. *Research in Organizational Behavior, 23,* 43–91.

Levy, S. R., Freitas, A. L., & Salovey, P. (2002). Construing action abstractly and blurring social distinctions: Implications for perceiving homogeneity among, but also empathizing with and helping, others. *Journal of Personality and Social Psychology, 83,* 1224–1238.

Liberman, N., Sagristano, M. D., & Trope, Y. (2002). The effect of temporal distance on level of mental construal. *Journal of Experimental Social Psychology, 38,* 523–534.

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology, 75,* 5–18.

Lin, E. L., Murphy, G. L., & Shoben, E. J. (1997). The effects of prior processing episodes on basic-level superiority. *Quarterly Journal of Experimental Psychology: Human Experimental Psychology, 50*(A), 25–48.

Markman, A. B., & Wisniewski, E. J. (1997). Similar and different: The differentiation of basic-level categories. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 23,* 54–70.

Martin, M. (1979). Hemispheric specialization for local and global processing. *Neuropsychologia, 17,* 33–40.

Martinez, A., Moses, P., Frank, L., Buxton, R., Wong, E., & Stiles, J. (1997). Hemispheric asymmetries in global and local processing: Evidence from fMRI. *Neuroreport: An International Journal for the Rapid Communication of Research in Neuroscience, 8,* 1685–1689.

Mather, M., Henkel, L. A., & Johnson, M. K. (1997). Evaluating characteristics of false memories: Remember/know judgments and memory characteristics questionnaire compared. *Memory & Cognition, 25,* 826–837.

McDermott, K. B. (1996). The persistence of false memories in list recall. *Journal of Memory and Language, 35,* 212–230.

Milner, A. D., Brechmann, M., & Pagliarini, L. (1992). To halve and to halve not: An analysis of line bisection judgments in normal subjects. *Neuropsychologia, 30,* 515–526.

Moskowitz, D. S. (2004). Does elevated power lead to approach and reduced power to inhibition? Comment on Keltner, Gruenfeld, and Anderson (2003). *Psychological Review, 111,* 808–811.

Murphy, G. L., & Medin, D. L. (1985). The role of theories in conceptual coherence. *Psychological Review, 92,* 289–316.

Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. *Cognitive Psychology, 9,* 353–383.

Norman, K. A., & Schacter, D. L. (1997). False recognition in younger and older adults: Exploring the characteristics of illusory memories. *Memory & Cognition, 25,* 838–848.

Nussbaum, S., Trope, Y., & Liberman, N. (2003). Creeping dispositionism: The temporal dynamics of behavior prediction. *Journal of Personality and Social Psychology, 84,* 485–497.

Overbeck, J. R., & Park, B. (2001). When power does not corrupt: Superior individuation processes among powerful perceivers. *Journal of Personality and Social Psychology, 81,* 549–565.

Payne, D. G., Elie, C. J., Blackwell, J. M., & Neuschatz, J. S. (1996). Memory illusions: Recalling, recognizing, and recollecting events that never occurred. *Journal of Memory and Language, 35,* 261–285.

Pollack, I. (1970). A nonparametric procedure for evaluation of true and false positives. *Behavior Research Methods and Instrumentation.*

Reber, A. S. (1989). Implicit learning and tacit knowledge. *Journal of Experimental Psychology: General, 118,* 219–235.

Reyna, V. F., & Brainerd, C. J. (1995). Fuzzy-trace theory: An interim synthesis. *Learning and Individual Differences, 7,* 1–75.

Roediger, H. L., III, & McDermott, K. B. (1995). Creating false memories: Remembering words not presented in lists. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21,* 803–814.

Rosch, E. (1975). Cognitive representations of semantic categories. *Journal of Experimental Psychology: General, 104,* 192–233.

Rosch, E., Mervis, C. B., Gray, W. D., Johnson, D. M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology, 8,* 382–439.

Schmid Mast, M., & Hall, J. A. (2003). Anybody can be a boss but only certain people make good subordinates: Behavioral impacts of striving for dominance and dominance aversion. *Journal of Personality, 71,* 871–891.

Schooler, J. W., & Melcher, J. (1995). The ineffability of insight. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 97–134). Cambridge, MA: MIT Press.

Schwarz, N., & Clore, G. L. (1996). Feelings and phenomenal experiences. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 433–465). New York: Guilford Press.

Seger, C. A., Desmond, J. E., Glover, G. H., & Gabrieli, J. D. E. (2000). Functional magnetic resonance imaging evidence for right-hemisphere involvement in processing unusual semantic relationships. *Neuropsychology, 14,* 361–369.

Snodgrass, J. G., & Corwin, J. (1988). Pragmatics of measuring recognition memory: Applications to dementia and amnesia. *Journal of Experimental Psychology: General, 117,* 34–50.

Snodgrass, J. G., Smith, B., Feenan, K., & Corwin, J. (1987). Fragmenting pictures on the Apple Macintosh computer for experimental and clinical applications. *Behavior Research Methods, Instruments and Computers, 19,* 270–274.

Spears, R., Gordijn, E., Dijksterhuis, A., & Stapel, D. A. (2004). Reaction in action: Intergroup contrast in automatic behavior. *Personality Social Psychology Bulletin, 30,* 605–616.

Stadler, M. A., Roediger, H. L., III, & McDermott, K. B. (1999). Norms for word lists that create false memories. *Memory & Cognition, 27,* 494–500.

Stapel, D. A., & Koomen, W. (2001a). I, we, and the effects of others on me: How self-construal level moderates social comparison effects. *Journal of Personality and Social Psychology, 80,* 766–781.

Stapel, D. A., & Koomen, W. (2001b). Let's not forget the past when we go to the future: On our knowledge of knowledge accessibility. In G. B. Moskowitz (Ed.), *Cognitive social psychology: The Princeton Symposium on the Legacy and Future of Social Cognition* (pp. 229–246). Mahwah, NJ: Erlbaum.

Stevens, L. E., & Fiske, S. T. (2000). Motivated impressions of a powerholder: Accuracy under task dependency and misperception under evaluation dependency. *Personality and Social Psychology Bulletin, 26,* 907–922.

Sutton, S. K., & Davidson, R. J. (2000). Prefrontal brain electrical asymmetry predicts the evaluation of affective stimuli. *Neuropsychologia, 38,* 1723–1733.

Thibaut, J. W., & Kelley, H. H. (1959). Power and dependence. In J. W. Thibaut & H. H. Kelley (Eds.), *The social psychology of groups* (pp. 100–125). New York: Wiley.

Toglia, M. P., Neuschatz, J. S., & Goodwin, K. A. (1999). Recall accuracy and illusory memories: When more is less. *Memory, 7,* 233–256.

Trope, Y., & Fishbach, A. (2000). Counteractive self-control in overcoming temptation. *Journal of Personality and Social Psychology, 79,* 493–506.

Trope, Y., & Liberman, N. (2000). Temporal construal and time-dependent changes in preference. *Journal of Personality and Social Psychology, 79,* 876–889.

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review, 110,* 403–421.

Tun, P. A., Wingfield, A., Rosen, M. J., & Blanchard, L. (1998). Response latencies for false memories: Gist-based processes in normal aging. *Psychology and Aging, 13,* 230–241.

Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology, 57,* 660–671.

Van Kleeck, M. H. (1989). Hemispheric differences in global versus local processing of hierarchical visual stimuli by normal subjects: New data and a meta-analysis of previous studies. *Neuropsychologia, 27,* 1165–1178.

Vescio, T. K., Snyder, M., & Butz, D. A. (2003). Power in stereotypically masculine domains: A social influence strategy × stereotype match model. *Journal of Personality and Social Psychology, 85,* 1062–1078.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54,* 1063–1070.

Witkin, H. A., Oltman, P. K., Raskin, E., & Karp, S. A. (1971). *Group Embedded Figures Test Manual.* Palo Alto, CA: Consulting Psychologists Press.

Received December 31, 2004
Revision received July 26, 2005
Accepted July 26, 2005 ■