

Power and cognitive functioning

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Because powerful people's thinking is impactful, it is critical to understand how power affects cognition. We detail how recent empirical findings reveal that power often improves cognitive functioning. First, power increases controlled processing, in particular intentionality. Second, power improves executive functioning, leading individuals to exhibit better inhibition, working memory, and cognitive flexibility. Third, power increases abstract thinking. Synthesizing these last two points, we propose that high-power individuals' executive functions are enhanced due to their more abstract way of thinking. Both the greater social distance and reduced cognitive vigilance accompanying increased power could explain these effects. Finally, we note remaining questions, such as how much power's cognitive effects are driven by a subjective sense of power versus objective control.

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Introduction

Because powerful people can exert more control over their environment and other people, and others defer to them by default [1], their thinking carries great impact. Thus, it is critical to understand the relationship between power and cognitive functioning. Some researchers have proposed that having power increases automatic processing and reduces controlled processing, which is then claimed to cause faulty cognitive processes such as stereotyping [2,3]. In the present article, we apply a social-cognitive lens to the power literature and reveal that power often transforms cognitive processing for the better. Not only does having more power not increase automatic processing, but it may instead increase controlled processing. Having more power also improves individuals' executive functions: their ability to inhibit,

update information, and switch from one task to another. We propose that these latter effects may be understood as part of power's link to abstract information processing. Finally, we identify gaps in our understanding of power and cognitive functioning.

Power and automatic versus controlled processing

Cognition involves both automatic and controlled processes, and many decades of research have been devoted to disentangling whether and when processes fall into each category [4]. However, rather than an all-or-nothing dichotomy, processes are often automatic in some ways but not in others [5,6]. Classic characteristics of automatic processes include that they require few cognitive resources and thus are unlikely to be affected by competing tasks (i.e. are effortless or efficient), occur regardless of whether a person wants them to (i.e. are unintentional), occur outside awareness (i.e. are unconscious), and cannot be stopped once started (i.e. are uncontrollable).¹ Both processing styles can be functional in particular contexts, and both can lead to suboptimal decisions, contrary to the popular notion that errors are primarily driven by automatic processes [9].

Building on earlier conceptualizations of power [2], the approach-inhibition theory of power [3] proposed that because having power involves more resources and fewer constraints on one's behavior than lacking power, having more power should be associated with a greater reliance on automatic processing. Little research has examined the effect of power on automatic versus controlled processing directly, but rather it has been inferred from power's effects on processes that can be automatic, even though those same processes can also reflect control [e.g. Ref. 2]. However, when controlled and automatic processes were assessed via process dissociation, power actually enhanced controlled processing and had no effect on automatic processing [10**].

Other findings also suggest that power, if anything, increases controlled processing. First, rather than exerting less effort, high-power individuals process information as thoroughly as, and sometimes more thoroughly than, low-power individuals [11–14], though low-power individuals

¹ The use of heuristics, or simple rules, to make judgments has been assumed to reflect automatic processing. However, individuals can also consciously choose to use heuristics [7]. Research on power and heuristics has not investigated whether they are being applied automatically [e.g. Ref. 8], so we do not consider such research as clear evidence for whether power affects a person's reliance on automatic processing.

may feel they are exerting more effort because they perceive the same environment as more challenging [15]. Second, high-power individuals' thinking and behavior appear to be more intentional than that of low-power individuals, as high-power individuals are more likely to change their thinking or behavior to fit their goals or the situation at hand [16,17*,18].

Power, executive functions, and abstract thinking

The greater flexibility that accompanies having power reflects a general tendency of power to facilitate goal pursuit and self-regulation [19,20]. Indeed, more recent theories of power such as the social distance theory of power emphasize the goal-driven nature of power's effects [21]. We propose that underlying these effects is a basic cognitive phenomenon: having power improves a person's executive functions relative to lacking power. Executive functions are a set of general-purpose mental processes that control and regulate thought and behavior [22]. The three core executive functions are inhibition, working memory/updating, and cognitive flexibility/shifting [23,24]; these form the backbone for higher-order processes such as planning, problem solving, and decision making. As such, executive functions play a critical role in successfully navigating everyday life, from mental and physical health to occupational and marital success [22]. Having power appears to improve all three core executive functions.

First, inhibition involves overriding dominant or prepotent impulses and controlling one's attention, thoughts, and behaviors to do what one chooses [22,24]. Power enhances inhibitory control. High-power individuals have been shown to be better at selective attention, directing their attention to stimuli they choose and inhibiting attention to other stimuli, than low-power individuals [16,25,26**]. As a result, low-power individuals perform worse on tasks requiring inhibition, such as Stroop tasks, where they need to inhibit the prepotent tendency to read a word [27,28,29**], and Flanker tasks, where they must focus on a central stimulus while ignoring other stimuli surrounding it [10**]. Similarly, priming women with high power decreased neural response within regions associated with cognitive interference while improving their performance on approximate math calculations, relative to priming them with low power [30].

Second, power appears to improve working memory, which involves mentally working with information held in memory. High-power individuals performed better than low-power individuals on a two-back task, where old information needs to be maintained, then compared with new information, and finally replaced by the new information [29**]. Similarly, individuals primed with high power showed superior visual working memory performance in a change detection task [31], and women

primed with high power were better at mental rotation tasks [32].

Finally, power increases cognitive flexibility, which includes changing perspectives or ways of thinking. Creativity reflects cognitive flexibility, and being primed with power led individuals to generate more creative responses [33]. As previously mentioned, across a wide variety of studies, high-power individuals were more likely to adjust their attention, thoughts, and behaviors in accordance with situational demands [16,17*,18,25]. This flexibility is likely related to high-power individuals' greater ability to inhibit previous situational demands and update them with new demands in working memory.

We propose that the heightened executive functioning that accompanies having power is related to high-power individuals' tendency to think more abstractly and use higher-level construals [21,26**]. Abstract information processing involves moving beyond the specific details of stimuli to extract the gist, or the most essential and meaningful parts [34]. Thus, abstract processing involves focusing on the important, central aspects of an object, as well as detecting relationships. Notably, what is central versus peripheral will be determined in part by the situation and a person's goals. High-power individuals think more abstractly than low-power individuals, both perceptually and conceptually [26**,35–37]. For example, high-power individuals use more abstract language [38] and superordinate categories [26**,39] than low-power individuals. In fact, the link between power and abstract thinking is so deep that it is bidirectional. Compared to concrete thinking, abstract thinking made individuals feel more powerful and prefer high-power positions [40], and observers thought people who used more abstract language were more powerful [41–43].

High-power individuals' abstract thinking should enhance their executive functioning. Being able to distill what is primary from a sea of information allows individuals to identify not only what needs to be kept active in a given situation, but also what is peripheral and needs to be inhibited. Indeed, individuals primed with an abstract mindset more efficiently filtered distractors from entering visual working memory than those primed with a concrete mindset [44*]. Without abstract information processing, individuals would be buried in the details, distracted by peripheral stimuli and incapable of exerting the necessary cognitive control to do what they choose to do. Indeed, lacking power is associated with feeling more mentally depleted than having power [45,46**].

Better executive functioning, in turn, should also enhance high-power individuals' abstract information processing. Extracting gist from concrete details requires keeping the available details in working memory and manipulating them. The ability to inhibit irrelevant information

ensures that the maximum working memory capacity is available for relevant information. Without sufficient working memory capacity, individuals would struggle to extract relationships between different stimuli or detect underlying structures. Cognitive flexibility allows individuals to go not only from concrete details to abstract gist, but also from abstract gist to concrete details to ensure that extraction is successful.

Potential mechanisms and future research directions

In contrast to ideas that having power reduces controlled processing, which can lead to impaired cognitive functioning, a large body of research indicates that having power increases controlled processing and high-power individuals have better executive functions than low-power individuals, perhaps due to their greater tendency to engage in abstract processing. However, many questions remain regarding what the underlying mechanisms of these effects are, and how they translate into real-world consequences.

One potential mechanism is social distance. The social distance theory of power posits that because high-power individuals are less dependent on other people to achieve their goals than low-power individuals, they feel more socially distant [21]. Greater psychological distance would then lead to more abstract thinking [26[•],34], and more abstract thinking to better working memory [44[•]]. Indeed, having power has been shown to increase a person's sense of social distance [47].

Another potential mechanism is cognitive vigilance. The approach-inhibition theory of power posits that because low-power individuals are more dependent on their high-power counterparts than vice versa, they face more threats and thus need to monitor the environment more vigilantly [3]. It may be risky for low-power individuals to focus on central aspects of stimuli while ignoring everything else. For example, the person who has power over them may change what goals they need to pursue, making new aspects central, and previously central aspects now peripheral. This may explain why low-power individuals are more easily distracted by peripheral information and more focused on details. Note that this mechanism would predict power's effects on both abstract processing and executive functions.

Identifying which mechanisms are at play will shed light on ways to improve low-power individuals' executive functioning. If feeling less socially distant is what leads low-power individuals to focus on unimportant details and fail to see the big picture, then increasing their sense of social distance, such as by highlighting that members of a team have diverse backgrounds [48], should facilitate their abstract thinking and improve their executive functions. If heightened vigilance impairs low-power

individuals' ability to inhibit irrelevant information, then creating a psychologically safe environment should improve their executive functioning.

Future research should also examine to what extent abstract processing and executive functioning are related to individuals' subjective sense of power versus their objective level of control over others, also known as structural or positional power [46^{••},49]. Though subjective and structural power are often correlated, they appear to have unique effects on many outcomes [46^{••}]. Knowing which is the proximal or main driver of power's effects on cognitive functioning allows for the optimal design of interventions. Different things should be done to improve low-power individuals' executive functioning depending on whether their subjective sense of power or objective level of control needs to be increased. For example, both will increase if low-power individuals are allocated more resources and responsibilities. However, it is also possible to elevate low-power individuals' sense of power without giving them actual control over others. Recent research found that low-power individuals who had a chance to affirm the self, such as by writing about an important personal value, felt more efficacious, and thus no longer showed decrements in inhibitory control [50[•]]. Self-affirmation appears to have made low-power individuals feel they were less dependent on others to achieve their goals and thus have a higher sense of power. It is also possible that self-affirmation directly increased low-power individuals' abstract thinking [51], which then increased their inhibitory control. Another potential way to increase low-power individuals' sense of power is to give them more choices about what to do in their daily life. Choices, like power, fulfill people's need for control [52]. As such, giving low-power individuals control over things like how to decorate their workspace may elevate their sense of agency and power [53], and as a consequence improve their executive functioning.

Additionally, structural power in the real world involves further factors that may complicate these effects. In particular, when individuals possess structural power in the workplace, they may experience increased cognitive load due to their heightened responsibilities and the number of subordinates they must supervise [2]. In this case, the cognitive benefits that accompany having power may be balanced out by the increased load. Thus, high-power individuals in some real-life circumstances may exhibit the same cognitive performance as low-power individuals because their improved cognitive functioning is being consumed by heightened mental demands.

Finally, we want to emphasize what these effects of power on cognitive functioning do not imply. First, just because high-power individuals show improved cognitive functioning relative to low-power individuals, does not mean that a group of high-power individuals will perform

better on a task than a group of low-power individuals. In fact, such high-power teams use worse group processes, in part due to increased concerns about the distribution of power [54]. Hence, groups of high-power individuals tend to perform worse than groups of low-power individuals, unless the task involves working alone or little group coordination [55].

Second, we are not claiming that high-power individuals always process information in a more controlled fashion or more thoroughly than low-power individuals. Note that the processes we detailed distinguish between central or goal-relevant information, and peripheral or goal-irrelevant information. If a high-power person determines that a task or individual is not goal-relevant, that task or individual will receive less of their attention. Thus, these same mechanisms may explain some of the pernicious behavior sometimes observed to accompany having power, such as reduced interpersonal accuracy [56,57].

Conclusion

Contrary to dire portraits of power as making individuals mindless and lazy, a large body of research suggests that having power increases reliance on controlled processing and improves executive functions, relative to lacking power. We propose that these improved executive functions are best understood through the increase in abstract thinking that also accompanies power.

Conflict of interest statement

Nothing declared.

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