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Lack of Power Enhances Visual Perceptual Discrimination

Mario Weick[1], Ana Guinote[2] & David Wilkinson[1]

[1]School of Psychology, University of Kent

[2]Cognitive, Perceptual and Brain Sciences, University College London

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Abstract

Powerless individuals face much challenge and uncertainty. As a consequence, they are highly vigilant and closely scrutinize their social environments. The aim of the present research was to determine whether these qualities enhance performance in more basic cognitive tasks involving simple visual feature discrimination. To test this hypothesis, participants performed a series of perceptual matching and search tasks involving color, texture and size discrimination. As predicted, those primed with powerlessness generated shorter reaction times and made fewer eye movements than either powerful or control participants. The results indicate that the heightened vigilance shown by powerless individuals is associated with an advantage in performing simple types of psychophysical discrimination. These findings highlight, for the first time, an underlying competency in perceptual cognition that sets powerless individuals above their powerful counterparts, an advantage that may reflect functional adaptation to the environmental challenge and uncertainty that they face.

Lack of Power Enhances Visual Perceptual Discrimination

Lacking power has a profound impact on people's lives. Powerless individuals live under constraint and deprivation (see Keltner, Gruenfeld & Anderson, 2003), and show significant reductions in health and psychological well-being (e.g., Rivers & Josephs, 2010). These findings coincide with recent evidence that a sense of powerlessness impairs various facets of cognition. Compared to their powerful counterparts, powerless individuals underperform in complex tasks requiring the planning of multiple action sequences, updating goals, task switching, and response inhibition (Guinote, 2007c; Smith, Jostmann, Galinsky, & van Dijk, 2008). This underperformance is thought to arise from powerless individuals' heightened vigilance and closer monitoring of the environment (see Fiske, 2010), which in turn reduces their capacity for executive control (Guinote, 2007a, 2007b; Smith et al., 2008). The aim of the present research was to show that powerlessness is not singularly detrimental and that the increased vigilance shown in social contexts can enhance basic perceptual discrimination when demands on executive control functions are low. A demonstration of this nature would indicate that powerlessness impacts performance in ways that may be considered adaptive for powerless individuals, and also identify a novel determinant of visual processing efficiency.

Power refers to the ability to control one's own and others' resources (see Fiske & Berdahl, 2007). Powerful individuals live in reward-rich environments, while powerless individuals are faced with threats and exposed to more difficult circumstances. These differences in environmental control affect the ways powerful and powerless individuals approach and interact with the world. Powerless individuals are more restrained, less action-oriented, and tend to monitor their environments more carefully than powerful individuals, who readily impress themselves onto the environment (e.g., Fiske, 1993; Galinsky, Gruenfeld, & Magee, 2003; Keltner et al., 2003). These behavioral signatures map onto two distinct survival strategies, exploration and observation respectively, which can be observed within many species and are assumed to have adaptive functions (see Wilson, Coleman, Clark, & Biederman, 1993).

Past research supports the notion that powerlessness leads to greater vigilance. Low power people generally try to be more accurate and gather more information to help them regain control over their environment and predict the actions of others (see Fiske, 2010, for a review). In line with this, many studies indicate that powerless individuals attend more carefully to their social environment and as a consequence are often better social perceivers (e.g., Ebenbach & Keltner, 1998; Fiske & Dépret, 1996; Goodwin, Gubin, Fiske, & Yzerbyt, 2000; Guinote & Phillips, 2010; Keltner & Robinson, 1997), though clear exceptions to this rule do exist (e.g., Schmid Mast, Jonas, & Hall, 2009; Overbeck & Park, 2001, 2006; but see Kenny, Snook, Boucher, & Hancock, 2010). Consistent with work on control deprivation (e.g., Pittman & D'Agostino, 1985; see also Weary, Gleicher, & Marsh, 1993), powerlessness enhances the motivation to gain a sense of predictability and control, which in turn induces greater scrutiny of the environment (see also Keltner et al., 2003). This process may be facilitated by the release of release of cortisol, a substance found in greater concentration in those who feel relatively powerless (e.g., Carney, Cuddy, & Yap, 2010).

Perhaps unsurprisingly, greater vigilance and the allied tendency to more thoroughly process incoming visual information can make one more distracted by background stimuli which, especially if incongruent, can impair task performance (Guinote, 2007b). Yet, greater vigilance also facilitates visual discrimination (e.g., Rose, Schmid, Winzen, Sommer, & Büchel, 2005), presumably through the up-regulation of activity in primary sensory cortex (Corbetta, Miezin, Dobmeyer, Shulman, & Petersen, 1991; Shulman et al., 1997). In the present context, the implication is that a lack of power may be associated with an increased perceptual sensitivity. If true then there may be certain types of task in which powerless individuals outperform their powerful counterparts. Such a demonstration would indicate that a lack of power is not, as one might suspect based on the current state of knowledge (e.g., Smith et al., 2008), singularly detrimental to basic cognition, and also provide fresh insight to the long-standing, though recently under-investigated, idea that social factors influence visual perception (Segall, Campbell and Herskovits, 1966).

In the following sections, we report two experiments that assess the effects of social power on perceptual discrimination. If powerlessness really does confer greater sensitivity to visual detail then powerless participants should be more efficient at discriminating basic visual attributes such as color, texture and size than their powerful or non-power primed counterparts, provided the tasks place little demand on those executive components that are known to compromise their cognitive performance. To assess if any such behavioral advantage could be associated with how individuals deployed their attention, participants' eye movements were tracked during task performance.

Experiment 1: Color, Texture, and Size Matching

In Experiment 1, we administered a match-to-sample task in which participants were first primed with powerfulness or powerlessness, or assigned to a neutral control condition. They were then asked to indicate which of two rectangles at the bottom of a computer screen was identical in color, texture, or size to a rectangle at the top. Given the preliminary nature of our study, it was unclear whether any difference in perceptual discrimination would be restricted to particularly difficult judgments where increased vigilance would be especially beneficial, or whether the advantage manifested more widely. We therefore made some comparisons easy and others hard. To obtain an indication of whether power affects the distribution of attention during perceptual match-to-sample performance, we recorded participants' eye movements. If powerless individuals are relatively efficient at perceiving visual differences then they might produce fewer fixations prior to response, produce shorter dwell times, and/or make fewer saccades between the top and bottom rectangles (cf. Ballard, Hayhoe, & Pelz, 1995).

Method

Participants and Design

Sixty-six students (42 female; $M_{\text{Age}} = 21.55$; $SD_{\text{Age}} = 5.08$) from the University of Kent at Canterbury, UK, participated in exchange for a monetary incentive (£5 ≈ $8). Participants were randomly assigned to one of three experimental conditions (powerless vs. powerful vs. control).

Procedure and Materials

Participants first completed an episodic priming manipulation, in which they described either a past event in which someone else had control over them (powerless), a past event in which they had control over another individual (powerful), or their activities during the previous day (control) (see Galinsky et al., 2003)[1]. Participants then performed a two-alternative forced-choice match-to-sample task. The stimulus display consisted of two images at the bottom of the screen, and one image at the top (see Figure 1). One of the two bottom images (the match) was identical to the top image (the sample) and participants were instructed to identify the match by means of a 2AFC button press using the outer left and right buttons of a 5-button response pad (Cedrus SRB-200A). Participants performed three types of matching tasks, the order of which was counterbalanced. In the color-matching task, stimuli appeared in one of 12 chromatic and achromatic colors (green, red, blue, brown, purple, yellow, orange, pink, cyan, grey, dark pink, and black), with two variants for each color (e.g., two shades of green). In the texture-matching task, participants were presented with 24 textures of varying spatial frequency. In the size-matching task participants saw images of 24 different sizes. For the color and texture-matching, all images subtended 6.19° (height) x 5.15° (width) at a viewing distance of 60cm, while for the size-matching, images subtended 3.10° to 6.19° (height) x 2.59° to 5.15° (width). Each matching-task involved 24 easier discriminations (i.e., the incorrect match appeared in a distinct color, texture, or size) and 24 harder discriminations (i.e., the incorrect match appeared in a similar color shade, texture, or size). The location of the correct match (left vs. right) was counterbalanced, though appeared in random order. A Viewpoint™ infrared eye-tracking device recorded participants' eye-movements during the experiment. All stimuli were presented on a CRT monitor (iiyama Vision Master Pro454, 85Hz).

-- Figure 1 about here --

Results and Discussion

Manual Response Times and Errors. An analysis of the 2.5SD truncated correct response latencies yielded a marginally significant main effect of power ($F(2, 63) = 2.64$, $p = .079$, $\eta_p^2 = .08$), qualified by a significant interaction with difficulty level, $F(2, 63) = 3.90$, $p = .025$, $\eta_p^2 = .11$ (see Figure 2). Powerless participants were faster than powerful and control participants at matching rectangles based on their color, texture, and size, and this was more pronounced for harder (*M*s = 1342 vs. 1589 vs. 1589 ms; *SD*s = 374 vs. 325 vs. 417 ms) ($F(2, 63) = 3.26$, $p = .045$, $\eta_p^2 = .09$) than for easier discriminations (*M*s = 744 vs. 834 vs. 769 ms; *SD*s = 137 vs. 160 vs. 238 ms), $F(2, 63) = 1.44$, $p = ns$. Powerful participants did not differ from control participants, *F*s < 1. There were no differences in accuracy (Error rates: Ms_{hard} = 34% vs. 32% vs. 29%; SDs_{hard} 7% vs. 9% vs. 8%; Ms_{easy} = 1% vs. 1% vs. 1%; SDs_{easy} = 2% vs. 1% vs. 1%; *F*s < 2), indicating that the reaction time advantage was not the product of a speed/accuracy trade-off.

Eye-Movements. Powerless participants spent less time fixating, and made fewer fixations before responding than powerful and control participants ($Ms_{Duration}$ = 724 vs. 1013 vs. 976 ms; $SDs_{Duration}$ = 288 vs. 468 vs. 218 ms; $Ms_{NFixations}$ = 3.84 vs. 4.90 vs. 4.78; $SDs_{NFixations}$ = 1.27 vs. 2.00 vs. .99) ($Fs(2, 61) \geq 3.44$, $ps \leq .038$, $\eta_p s^2 \geq .10$), and this difference was again qualified by difficulty level, $Fs(2, 61) \geq 3.44$, $p \leq .039$, $\eta_p s^2 \geq .10$. Powerful and control participants did not differ from each other, $Fs < 1$.

To interrogate how the visual displays were inspected, we calculated the number of saccades from the bottom stimuli back to the top sample stimulus in proportion to the total number of fixations made within each trial (i.e., the proportion of re-entries). This proportion was lower for powerless than for powerful or control participants (*M*s = 7% vs. 9% vs. 10%; *SD*s = 4% vs. 4% vs. 4%) ($F(2, 61) = 3.31$, $p = .043$, $\eta_p^2 = .10$) and also qualified by difficulty level, $F(2, 61) = 3.70$, $p = .031$, $\eta_p^2 = .11$. A planned contrast comparing powerless against powerful and control participants revealed that the proportion of re-entries was causally linked to the observed differences in manual responses; when the proportion of re-entries was controlled, the difference in response latencies was no longer significant (βs = .28 vs. .08, *p*s = .024 vs. *ns*), and the proportion of re-entries mediated the differences in response latencies, $Z_{Sobel} = 2.35$, $p = .019$.

-- Figure 2 about here --

The results of Experiment 1 support the hypothesis that powerlessness increases the efficiency with which basic properties of color, texture, and size are discriminated. The gain in visual performance was more pronounced as discriminations became harder, indicating a greater sensitivity to fine-grained differences, as opposed to differences per se. Furthermore, the reaction time advantage was causally linked to the number of times powerless participants re-inspected the sample before initiating a response, pointing to a more efficient allocation of attention.

Experiment 2: Visual Search

In a second experiment, we sought to both replicate the discriminatory advantage of powerless individuals seen in Experiment 1, and show that the effect generalizes across task. We administered a visual search task in which participants were required to actively search for a pre-defined target amongst irrelevant, distractor items. This task appealed because it combines perceptual discrimination with a greater degree of spatial exploration, thus equating more closely to everyday behavior. It also provides an opportunity to measure the ability to distinguish multiple, as opposed to just two, coloured items. As before, we presented targets that were defined by a unique color. This time, however, all stimuli were pictures of real objects that had been given a colored outline. By using pictures of real objects, it was also possible to administer blocks of trials in which the targets were instead defined by their function. This is particularly relevant because the inclusion of a functional search condition allowed us to probe specificity of effect, whilst holding the stimulus displays and motor responses constant. Unlike color targets, functional targets could not be distinguished along a single psychophysical dimension, and instead required the integration of multiple perceptual and conceptual attributes (e.g., Humphreys & Forde, 2001). Given that, on one hand, powerless individuals often show performance losses in tasks that involve semantic association (e.g., Guinote, 2007b; Smith et al., 2008), while on the other hand, the identification of functional properties might invoke a greater sense of goal-directedness and approach-orientation in power*ful* individuals, we expected powerless participants to show an advantage for color, but not functional, search.

Method

Participants and Design

Forty-five students (35 female; $M_{\text{Age}} = 22.52$; $SD_{\text{Age}} = 4.06$) from the University of Kent at Canterbury, UK, participated in exchange for a monetary incentive (£3 ≈ \$5).

Participants were randomly assigned to one of two experimental conditions (powerless vs. powerful).

Procedure and Materials

Participants were first primed to feel powerful or powerless, and then performed the search task. Participants were instructed to point to a target that appeared amongst a series of 5 or 11 distractors on a touch-sensitive screen (iiyama ProLite T17305, 60Hz), using the index finger of their dominant hand. The target and the distractors consisted of black and white pictures (6.19° x 5.15° at 60cm viewing distance) of twelve everyday objects (e.g., hammer; scissors), with two variants for each object (e.g., two different hammers). The pictures appeared in an imaginary matrix of 6x4 cells and were surrounded by a fringe (~.15°) that appeared in one of the 24 color-shades employed in the previous experiments. Each trial began with a cue that defined the target based on either its function (e.g., *point to the object you can use to hit a nail*) or color (e.g., *point to the object that appears in green*). Each display consisted of distinct objects and distinct colors. The number of distractors (5 vs. 11) and the type of cue (color vs. function) were counterbalanced with the latter appearing in blocks of 24 trials. Distractor number and the location of individual stimuli were randomized within each block. There were 96 trials in all.

Results and Discussion

Manual Response Times and Errors. An examination of the 2.5SD truncated correct response latencies yielded the predicted interaction between power and target identity, $F(1,43) = 7.90$, $p = .007$, $\eta_p^2 = .16$. Irrespective of the number of distractors, powerless participants were quicker than powerful participants at identifying objects based on their colors (*M*s = 1124 vs. 1255 ms; *SD*s = 163 vs. 234 ms) ($F(1, 43) = 4.83$, $p = .033$, $\eta_p^2 = .10$), but not their functions (*M*s = 1287 vs. 1313 ms; *SD*s = 172 vs. 177 ms), $F < 1$ (see Figure 3).[2]

Error rates were low (*M* = 8%; *SD* = 5%) and did not differ between powerless and powerful participants, $F(1, 43) = 2.63$, p = ns.

-- Figure 3 about here --

As predicted, the results of Experiment 2 indicate that powerless participants were more efficient than their powerful counterparts at finding objects defined by their color. This performance increment vanished when participants searched for the very same objects that were instead defined by their function. This result corroborates the conclusion that a lack of power alters the capacity to carry out basic forms of visual discrimination, and further suggests that this effect manifests in tasks other than stimulus matching. Given that the advantage disappeared when the response demands remained the same but targets became defined by their function as opposed to physical appearance, we can have greater confidence that the effect is specific to the process of visual perceptual discrimination.

Past research shows that powerful individuals tend to perceive others as means to their own ends (Gruenfeld, Inesi, Magee, & Galinsky, 2008), and are better at seizing opportunities for goal-attainment (Guinote, 2007c). Consequently, one might have expected that powerful, compared to powerless, individuals would be faster at detecting objects defined by their functions. This was not, however, the case. One reason may be that participants did not have to act upon the objects that they saw, which in turn could have prevented the activation of goals and approach-related behaviors. If true, then it may be wise to administer a more physically interactive task next time.

General Discussion

Power is a ubiquitous phenomenon that triggers important behavioral changes. Powerful individuals are approach-oriented and readily act upon their environments, while individuals who are lacking power are withdrawn, observant, and usually more attentive to individuating properties of stimuli. Our contention was that the greater vigilance and attention to detail typically shown by powerless individuals during social encounters may benefit performance in simple, stimulus discrimination tasks.

In line with the above hypothesis, the data indicated that powerless individuals outperformed powerful individuals in the various tasks administered here. Powerless participants were faster at discriminating between different colors, textures and sizes, and required fewer eye movements and dwell times to make such judgments. Additional data showed that the advantage held in a visual search task, implying that the effect was not specific to stimulus matching and held in tasks requiring scanning and the discrimination of many differently-colored items. The observed difference in task performance could not be reconciled with a speed/accuracy tradeoff, grew stronger as the discrimination became harder, and disappeared when stimuli could not be distinguished along a single psychophysical dimension and instead drew on more elaborate perceptual and functional associations.

The present findings fit with our proposal that the greater vigilance and attention to detail typically seen in powerless individuals boosts efficiency in visual perceptual discrimination. One could argue, however, that the observed differences in performance instead derived from power*ful* participants' lack of interest in performing what they may have considered 'unworthy' tasks (cf. DeWall, Baumeister, Mead, & Vohs, 2010). However, if that was the case then one would have expected powerful and control participants to have differed in their performance. Also, in Study 2 powerless participants performed better in the perceptual, but not functional, search condition, a finding that is again inconsistent with an explanation based on disdain for the overall task. Another alternative explanation is based on the finding that powerless individuals attend more to concrete, low-level stimulus features compared to powerful individuals who construe stimuli at a more abstract, higher order level, and are more focused on information that is primary to task performance (Smith & Trope, 2006). We are, however, reluctant to implicate such an account because, unlike with vigilance, there is no empirical research to link abstraction with the discrimination of psychophysical attributes such as color, texture or size. On a related note, the color and size stimuli presented in our experiments are not hierarchically organized, and a focus on global or local attributes may not lead to differences in the perception of those stimuli. Also, if it were the case that powerful participants focused more than the powerless on those elements that were of primary importance to the task then it is they, not the powerless, who should have shown an advantage. That said, we are not in a position to dismiss this account empirically, so must remain open to such a possibility.

In terms of visual information processing theory, the present findings are important because they challenge the assumption held by some cognitive psychologists that the flow of visual information is primarily unidirectional, proceeding from sensory perception and movement control to processes more specifically geared towards driving the social aspects of behaviour. While all models of social behavior are constrained by basic cognitive capacity, there has been less need to constrain models of basic cognition with information about the social world. The current data fit with an emerging consensus that the transient, shifting states of mind induced by social interaction nevertheless modulate activity in seemingly low low-level visual processes (e.g., Balcetis & Lassiter, 2010). This may have very practical consequences for individuals, such as radiologists and baggage-screeners, whose job is to detect fine-grained differences in image media.

In conclusion, the present findings encourage one to move away from a good/poor dichotomy that has so far characterized the effects of power on cognitive performance, towards a more functional perspective whereby cognition is seen as flexibly attuned to the particular demands of the social situation. While powerless people tend to struggle in tasks that strongly engage the executive processes of task switching, action sequencing and response inhibition, they tend to excel in simpler discrimination tasks that minimize these elements. We suggest that this preference for environmental monitoring at the cost of executive control may reflect a compromise that stems from the greater need to predict and detect environmental change, and is therefore adaptive in nature.

References

Balcetis, E., & Lassiter, G. D. (Eds.). (2010). *The social psychology of visual perception*. New York: Psychology Press.

Ballard, D. H., Hayhoe, M., & Pelz, J. B. (1995). Memory representations in natural tasks. *Journal of Cognitive Neuroscience, 7*, 66-80.

Carney, R. D., Cuddy, A. J. C., & Yap, A. J. (2010). Power posing: Brief nonverbal displays affect neuroendocrine levels and risk tolerance. *Psychological Science, 21*, 1363-1368.

Corbetta, M., Miezin, F. M., Dobmeyer, S., Shulman, G. L., & Petersen, S. E. (1991). Selective and divided attention during visual discriminations of shape, color, and speed: functional anatomy by positron emission tomography. *Journal of Neuroscience, 11*, 2383-2402.

DeWall, C. N., Baumeister, R. F., Mead, N. L., & Vohs, K. D. (2010, October 4). How Leaders self-regulate their task performance: Evidence that power promotes diligence, depletion, and disdain. *Journal of Personality and Social Psychology.* Advance online publication.

Ebenbach, D. H., & Keltner, D. (1998). Power, emotion, and judgmental accuracy in social conflict: Motivating the cognitive miser. *Basic and Applied Social Psychology, 20*, 7-21.

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

Fiske, S. T (2010). Interpersonal stratification: Status, power, and subordination. In Fiske, S. T., Gilbert, D. T., & Linzey, G. (Eds.), *Handbook of social psychology* (5th ed., Vol.2, pp. 941-982). John Wiley: New Jersey, CA.

Fiske, S. T., & Berdahl, J. (2007). Social Power. In A. W. Kruglanski, & E. T. Higgins (Eds.), *Social Psychology: Handbook of basic principles* (2nd ed., pp. 678-692). New York: Guilford Press.

Fiske, S. T., & Dépret, E. (1996). Control, interdependence and power: Understanding social cognition in its social context. *European Review of Social Psychology, 7*, 31-61.

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

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.

Gruenfeld, D. H., Inesi, M. E., Magee, J. C., & Galinsky, A. D. (2008). Power and the objectification of social targets. *Journal of Personality and Social Psychology, 95*, 111-127.

Guinote, A. (2007a). Behaviour variability and the Situated Focus Theory of Power. *European Review of Social Psychology, 18*, 256–295.

Guinote, A. (2007b). Power affects basic cognition: Increased attentional inhibition and flexibility. *Journal of Experimental Social Psychology, 43*, 685–697.

Guinote, A. (2007c). Power and goal pursuit. *Personality and Social Psychology Bulletin, 33*, 1076-1087.

Guinote, A., & Phillips, A. (2010). Power can increase stereotyping: Evidence from managers and subordinates in the hotel industry. *Social Psychology, 41*, 3-9.

Humphreys, G. W., & Forde, E. M. (2001). Hierarchies, similarity, and interactivity in object recognition: category-specific neuropsychological deficits. *Behavioral and Brain Sciences, 24*, 453-476.

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

Keltner, D., & Robinson, R. J. (1997). Defending the status quo: Power and bias in social conflict. *Personality and Social Psychology Bulletin, 23*, 1066-1077.

Kenny, D. A., Snook, A., Boucher, E. M., & Hancock, J. T. (2010, Nov 9). Interpersonal sensitivity, status, and stereotype accuracy. *Psychological Science.* Advance online publication.

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.

Overbeck, J. R., & Park, B. (2006). Powerful perceivers, powerless objects: Flexibility of powerholders' social attention. *Organizational Behavior and Human Decision Processes, 99*, 227-243.

Pittman, T. S., & D'Agostino, P. R. (1989). Motivation and cognition: Control deprivation and the nature of subsequent information processing. *Journal of Experimental Social Psychology, 25,* 465-480.

Rivers, J. J., & Josephs, R. A. (2010). Dominance and health: The role of social rank in physiology and illness. In A. Guinote & T. K. Vescio (Eds.), *The Social Psychology of Power* (pp. 87-112). New York: Guilford.

Rose, M., Schmid, C., Winzen, A., Sommer, T., & Büchel, C. (2005). The functional and temporal characteristics of top-down modulation in visual selection. *Cerebral Cortex, 15*, 1290-1298.

Schmid Mast M., Jonas K., & Hall J.A. (2009). Give a person power and he or she will show interpersonal sensitivity: The phenomenon and its why and when. *Journal of Personality and Social Psychology, 97*, 835–850.

Segall, M. H., Campbell, D. T., & Herskovits, M. J. (1966). *The influence of culture on visual perception*. Indianapolis, US: Bobbs-Merrill Co.

Shulman, G. L., Corbetta, M., Buckner, R. L., Raichle, M. E., Fiez, J. A., Miezin, F. M., & Peterson, S. E. (1997). Top-down modulation of early sensory cortex. *Cerebral Cortex, 7*, 193-206.

Smith, P. K., Jostmann, N. B., Galinsky, A. D., & van Dijk, W. W. (2008). Lacking power impairs executive functions. *Psychological Science, 19*, 441–447.

Smith, P. K., & Trope, Y. (2006). You focus on the forest when you are in charge of the trees: Power priming and abstract information processing. *Journal of Personality and Social Psychology, 90,* 578-596.

Weary, G., Gleicher, F. & Marsh, K. L. (Eds.) (1993). Control motivation and social cognition. NY: Springer-Verlag.

Wilson, D. S., Coleman, K., Clark, A. B., & Biederman, L. (1993). The shy–bold continuum in pumpkinseed sunfish (Lepomis gibbosus). *Journal of Comparative Psychology, 107*, 250–260.

Authors' Notes

Mario Weick and David Wilkinson, School of Psychology, University of Kent, Canterbury, Kent, CT2 7NP, United Kingdom. Ana Guinote, Cognitive, Perceptual and Brain Sciences, University College London, 26 Bedford Way, London WC1H OAP, United Kingdom. The authors contributed equally to the manuscript.

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Please address correspondence to Ana Guinote (a.guinote@ucl.ac.uk), Cognitive, Perceptual and Brain Sciences, University College London, 26 Bedford Way, London WC1H OAP, UK.

Footnotes

1 In all experiments, manipulation checks confirmed the effectiveness of the power primes (all Fs > 2.0).

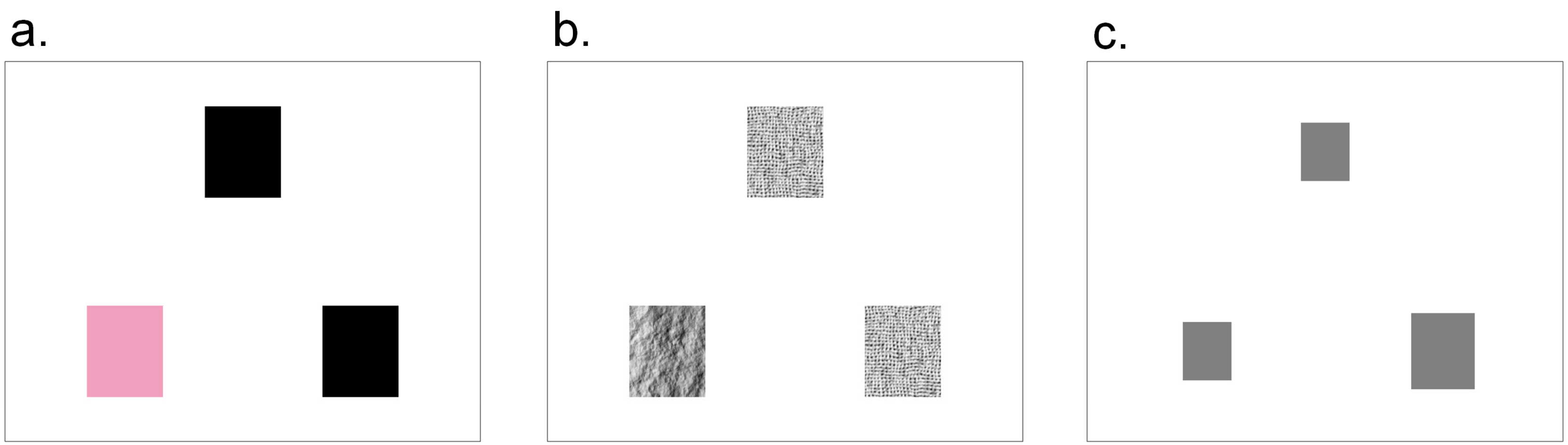
2 Study 1 found larger differences in response latencies for difficult as compared to easy discriminations. In Study 2, the effects of power did not differ reliably between the two distractor conditions (5 vs. 11). This is not necessarily unexpected. Manipulating the level of difficulty (Study 1) made the discriminations considerably harder ($M\text{s}_{\text{error}}$ = 1% vs. 32%; $SD\text{s}_{\text{error}}$ = 2% vs. 8%), but manipulating the set size (Study 2) had only a comparably small effect ($M\text{s}_{\text{error}}$ = 7% vs. 9%; $SD\text{s}_{\text{error}}$ = 5% vs. 6%). Thus, although the response latencies showed steep set size slopes, evidence for serial search, adding non-targets to the display had only a small effect on the difficulty of discriminating targets from non-targets.

Figure Captions

Figure 1. Example displays taken from the (a) color, (b) texture, and (c) size matching tasks in Experiment 1. These example displays formed part of the 'easy discrimination' condition. For harder discriminations, color luminance differed by no more than 50cd/m^2, textures differed by no more than 15% mean intensity, 164% intensity variance, and 115% angular second moment, and sizes differed by no more than 6% in overall dimension.

Figure 2. Mean correct reaction times (with standard error bars) and accuracy in the matching tasks of Experiment 1.

Figure 3. Mean correct reaction times (with standard error bars) and accuracy in the search task of Experiment 2.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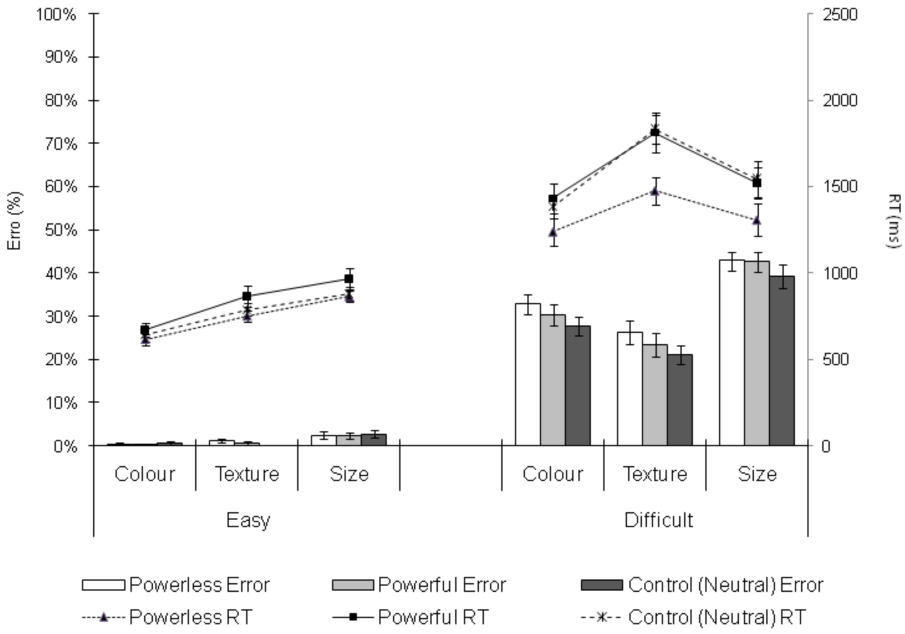

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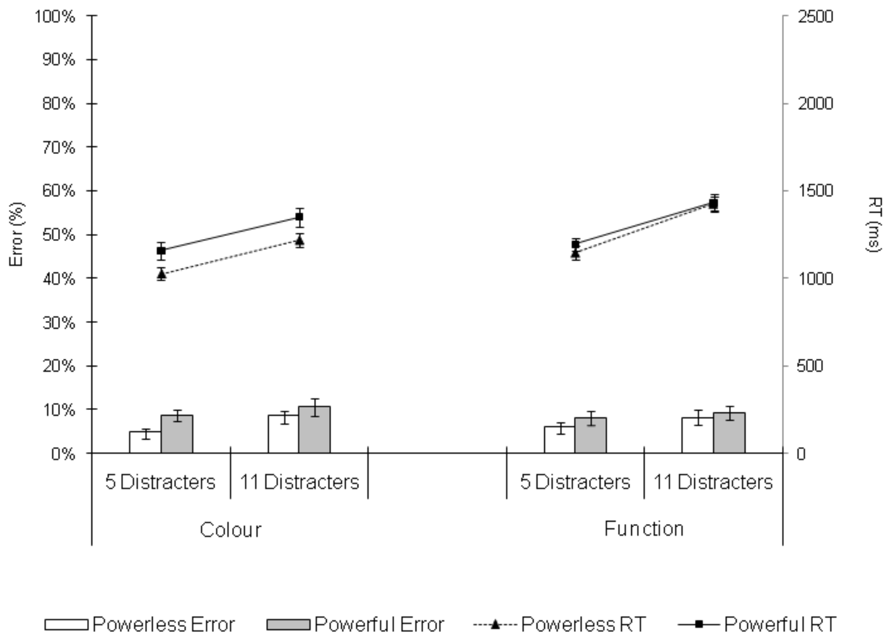
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