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FlashReport

Embodied perception with others' bodies in mind: Stereotype priming influence on the perception of spatial environment

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ABSTRACT

It has been shown that spatial perception is not only a function of optical variables but also a function of people's physiological potential. When this potential is reduced, either due to age or fatigue, individuals have been observed to report hills steeper and distances longer. Two studies have demonstrated that the experience of an actual reduction in capacities is not necessary. After being primed with the elderly category, young participants estimated the gradient of various pathways and that of a hill steeper (Study 1) and distances across a grassy field longer (Study 2) than their non-primed counterparts. The activation of a social category has often been found to result in stereotype-congruent behaviors. The present findings indicate that, in addition to this well-documented behavioral mimetism, this activation also leads to perceptual mimetism. I suggest that it helps facilitate social interactions by investing the partners with a shared vision of their environment.

In addition to optical and ocular-motor information, the visual perception of our environment is influenced by nonvisual factors such as our bodies' behavioral abilities and the energetic costs associated with anticipated actions in the perceived environment. Hills appear steeper to observers who are elderly and in declining health than to observers who are young and healthy; hills also appear steeper to observers when they are tired or carrying a heavy backpack; and the distance to a target appears greater to observers when they are carrying a heavy backpack or have to throw a heavy ball (Bhalla & Proffitt, 1999; Proffitt, Bhalla, Gossweiler, & Midgett, 1995; Proffitt, Creem, & Zosh, 2001; Proffitt, Stefanucci, Banton, & Epstein, 2003; Witt, Proffitt, & Epstein, 2004). Thus, a constant finding across all these studies is that gradients and distances appear greater as observers' physiological potential is reduced (Proffitt, 2006). As Proffitt has claimed (2006), such distortions of the apparent geometry of the environment may play a functional role: before climbing a hill, people do not need to estimate the energetic costs of their action, if these are directly apparent in the configuration of the environment. By making these energetic costs apparent, visual perception informs people's decisions (choice of a locomotor speed, for example) and consequently contributes to action planning. More generally, these distortions illustrate the notion, already evident throughout Gibson's (1979) ecological approach, that visual perception is embodied and action centered.

I conducted two studies to investigate the influence of stereotype priming on the perception of gradients and distances which might result from unconscious changes in observers' perceived physiological potential. Much research has already demonstrated that a stereotype (i.e., characteristics believed to be true for members of a given social category) can be activated spontaneously from memory through simple exposure to relevant stimulus cues in the environment and may subsequently influence individuals' behavior in a stereotype-congruent manner (see Dijksterhuis & Bargh, 2001; Wheeler & Petty, 2001, for reviews). For example, young individuals exposed to words strongly associated with elderly people (e.g., *wrinkle, bingo, retired*) walked more slowly when leaving the laboratory than young individuals exposed to control words (Bargh, Chen, & Burrows, 1996). More recently, the performances of sports students required to throw a heavy ball decreased after repeated exposure to the label "*elderly people*", whereas the performances of other sport students repeatedly exposed to the label "*basketball player*" improved (Follenfant, Légal, Marie Dit Dinard, & Meyer, 2005). In addition, and whatever the nature of the behavior (e.g., motor action, intellectual performance, social behavior), researchers have consistently noted that these effects occur automatically, i.e. they are outside of the individual's control and awareness of the activation of the stereotype and its subsequent influence.

In an attempt to account for this wide range of automatic behavioral effects, Wheeler, DeMaree, and Petty (2005, 2007) suggest that traits from the primed social category become integrated in the perceiver's working self-concept. Insofar as the working self-concept generally plays a role in guiding behavior, these momentary alterations in self-perceptions could then lead to the observed behavioral effects. In support of their Active-Self account, the authors report growing evidence that stereotype priming induces

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significant changes in self-perceptions, as well in many other self-relevant aspects such as attitudes, feelings, or self-esteem.

Given that young people's stereotype of the elderly includes poor health and declining capacities (e.g., Hummert, Garstka, Shaner, & Strahm, 1994), I hypothesized that young adults primed with the elderly category would estimate hills to be steeper and distances to be longer than non-primed young adults due to expected stereotype-congruent changes in perceptions of their current state of fatigue, wealth status, or physical fitness. The first study took place in a public park and the second in a grassy field on the campus. In both studies, the participants were primed with the elderly category using Bargh et al's. (1996) sentence-unscrambling procedure. The participants then had to estimate the gradient of various pathways and of a grassy hill in the park (Study 1), or the distance from themselves to a cone placed on the field (Study 2).

The objective of the present research is twofold. The first goal is to show that, because of its embodied nature, visual perception may be susceptible to the subtle influence of environmental cues responsible for non-voluntary and non-conscious alterations of self-perceptions. The second goal is to establish that stereotype priming not only influences people's behaviors, but also influences their perception of the natural environment in which these behaviors take place.

Study 1: Perception of slopes

Method

Participants

Forty students (20 men and 20 women; age range = 18–25 years) participated in the study. They were stopped individually on their way through a hilly park near the campus in Clermont–Ferrand and asked whether they would like to participate in two experiments.

Procedure

The study consisted of two parts presented as two unrelated experiments and run by two different experimenters in order to avoid providing an insight into the real purpose of the research. The first part was modeled on the paradigm developed by Bargh et al. (1996) to prime the elderly stereotype. The participants were asked to unscramble 25 six-word sentences by dropping an extraneous word from each to create a grammatical five-word sentence. In the elderly prime condition, 20 of the 25 sentences included a word identified in a pre-study as being strongly associated with the elderly category (e.g., *retired, solitude, moaning, wisdom*). Any direct reference to fatigue or reduction in physiological potential was excluded. In the no-prime condition, neutral sentences were used. The participants were randomly assigned to a condition.

In the second part, the participants accompanied the second experimenter to the foot of a straight, sloped section of four different pathways (4°, 5°, 6°, and 7° incline, respectively) and the bottom of a grassy hill (17° incline). All the sections and the hill had a fairly uniform and even surface and were located in a limited area. The participants were asked to state their estimate of the gradient of the pathway or hill as a number of degrees. The slopes were presented in random order. The experimenter was unaware of the condition to which the participants were assigned.

The experimenter questioned the participants about the tasks and their hypothetical relatedness using the funneled debriefing procedure described by Bargh and Chartrand (2000). None of the students identified the theme of elderly people among the words in the priming task. Only two of them identified a particular but irrelevant theme. None of them indicated any suspicion of a connection between the two parts of the study and of a possible influence of the first task on the second. Finally, the participants were debriefed and thanked.

Results and discussion

As in most research on slope perception, the participants overestimated the steepness of the hill (17° incline) ($M = 33.4°$), one-sample $t(39) = 6.87$, $p < .001$. More important, priming modulated this overestimation. As expected, priming with the elderly stereotype produced a significant increase in estimates (control, $M = 24.7°$; stereotype, $M = 42.1°$), $F(1,39) = 19.92$, $p = .001$.

The same pattern of results was found for the perception of the pathways. Overall, the participants overestimated ($M = 12.6°$) the steepness of the pathways ($M = 5.5°$ incline), one-sample $t(39) = 6.19$, $p < .001$. Again, this overestimation was modulated by priming (control, $M = 9.6°$; stereotype, $M = 15.65°$), $F(1,39) = 8.18$, $p < .01$. A 2 (priming) × 4 (pathway) repeated measures analysis of variance was performed, with priming as the between-subjects variable and pathway as the within-subjects variable. This analysis revealed a main effect of pathway, $F(3,114) = 40.19$, $p < .001$, and confirmed the main effect of priming, $F(1,38) = 8.18$, $p < .01$. However, these two effects were qualified by a significant priming × pathway interaction, $F(3,114) = 4.70$, $p < .01$. In order to further examine this interaction, polynomial contrasts were computed. They revealed a significant linear trend, $F(1,38) = 6.88$, $p < .02$, indicating that the effect of stereotype priming on perceived steepness increased in a linear manner as the gradient of the pathway increased (see Fig. 1).

These findings provide evidence that the implicit priming of the elderly stereotype produces dramatic changes in spatial perception: primed participants consistently judged pathways and a hill to be significantly steeper than non-primed participants did. Interestingly, the largest changes occurred when the participants estimated the steepest pathways.

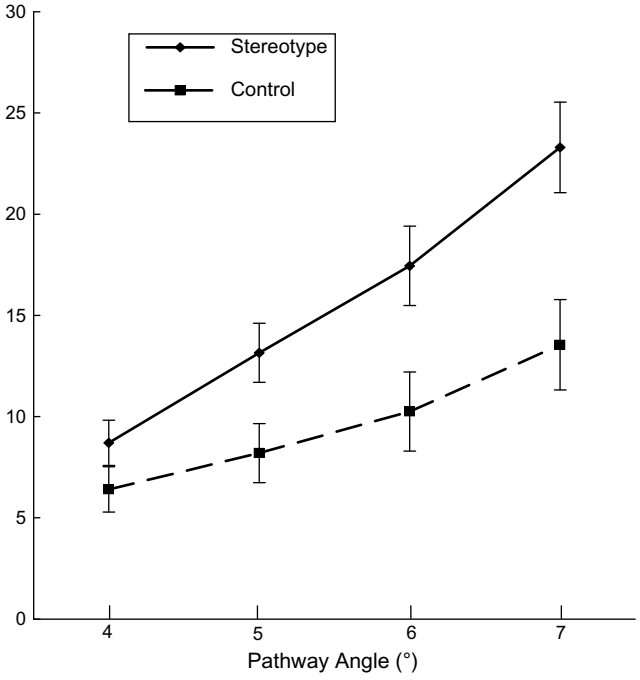

Fig. 1. Perceived gradient (±1 *SE*) as a function of true pathway gradient and priming condition.