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Case Report

Taking the point of view of the blind: Spontaneous level-2 perspective-taking in irrelevant conditions

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ABSTRACT

Efficient perspective taking abilities are critical for successful social interactions. The aim of this study was to investigate whether and to what extent we spontaneously adopt others' perspectives in interpreting a visual scene. Through four distinct studies, we tested whether another person's point of view is adopted when interpreting an ambiguous stimulus. In addition, we manipulated the relevance of another person's perspective to a stimulus by altering sensory and action capabilities. The vast majority of participants spontaneously endorsed the other perspective rather than their own when asked to identify the target stimulus. Strikingly, and contrary to our expectations, they also overwhelmingly took the other's perspective when it was not relevant visually (blindfolded person) or behaviourally (armless person). A smaller number of subjects also adopted an external perspective in the absence of a person. Additionally, two control experiments show that viewing an injured person induces more compassion but does not trigger more perspective taking than viewing a healthy person. Our results demonstrate an overwhelming human tendency to predominantly consider non-egocentric perspectives while interpreting the surrounding world.

1. Introduction

Do we spontaneously adopt the perspectives of others? The ability to access another's mental states such as a person's beliefs, feelings, or perceptions is classically referred to as having a "theory of mind" but is also referred to as "mindreading" or "mentalizing" (Emery, 2005; Frith & Frith, 2008; Gallese & Sinigaglia, 2011; Gallotti & Frith, 2013). This ability is considered to be crucial to justifying and predicting another person's behaviours (Apperly & Butterfill, 2009) and has benefited from broad attention from scientists. In spite of this interest, not much is known of the conditions that determine when humans spontaneously take the perspectives of others. Initially, mentalizing was considered to be a conscious, deliberate and costly phenomenon, a hypothesis that was further supported by its relatively late occurrence during childhood (Gopnik & Astington, 1988; Perner & Wimmer, 1985) and by the putative involvement of executive functions (Bull, Phillips, & Conway, 2008; Carlson, Moses, & Claxton, 2004; German & Hehman, 2006; Perner & Lang, 1999). By contrast, more recent findings have shown that mentalizing processes may occur at more elementary levels. Specifically, a growing body of experimental evidence supports the proposition that another person's actions (Sebanz, Knoblich, & Prinz, 2003), opportunities to engage in certain actions (Costantini,

Committeri, & Sinigaglia, 2011), visuo-spatial perspectives (Freundlieb, Kovács, & Sebanz, 2016), intentions (Quesque, Delevoeye-Turrell, & Coello, 2015), and beliefs (Buttelmann & Buttelmann, 2017) can be processed in a rapid and unconscious manner under appropriate circumstances. Therefore, empirical evidence suggests that mentalizing capacities can apply beyond the realms of explicit cognition.

Historically, three types of perspective-taking—namely, perceptual, cognitive and emotional perspective-taking—have been investigated within different scientific fields (e.g., Davis, 1994; Enright & Lapsley, 1980; Ford, 1979; Piaget & Inhelder, 1948). Over time, the boundaries between emotional and cognitive perspective-taking have disappeared. Indeed, classical tests derived for one of the two aforementioned kinds of perspective-taking include items referring to the other (e.g., Baron-Cohen & Wheelwright, 2004; Davis, 1980; Jolliffe & Farrington, 2006). Even if still debated, recent studies suggest that all forms of perspective-taking could rely on general ability irrespective of their content. For example, different correlational studies have identified relations between given forms of perspective-taking (see Hamilton, Brindley, & Frith, 2009 and Kanske, Böckler, Trautwein, Parianen Lesemann, & Singer, 2016 for links between spatial and cognitive perspective-taking abilities; see Erle & Topolinski, 2015 and Mattan, Rotshtein, & Quinn, 2016 for links between spatial and emotional perspective-taking

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abilities). Brain areas responsible for representing other perspectives in a domain-general fashion (Aichhorn, Perner, Kronbichler, Staffen, & Ladurner, 2006; Schurz, Aichhorn, Martin, & Perner, 2013) have been identified. Finally, a recent study (Erle & Topolinski, 2017) found a causal link between different levels of perspective-taking. In particular, these authors suggest that a mere shift in visuo-spatial perspectives could support more complex psychological perspective-taking judgements. Accordingly, the ability to take another's point of view (i.e., visuo-spatial perspective-taking) may then be considered as the simplest form of mentalizing.

Recently, the question of the existence of a spontaneous tendency to represent another's point of view even when not task-relevant has generated intense debate within the scientific community (Cole, Atkinson, Le, & Smith, 2016; Conway, Lee, Ojaghi, Catmur, & Bird, 2017; Furlanetto, Becchio, Samson, & Apperly, 2016; Heyes, 2014; Langton, 2018; Marshall, Gollwitzer, & Santos, 2018; Samson, Apperly, Braithwaite, Andrews, & Bodley Scott, 2010; Santiesteban, Catmur, Hopkins, Bird, & Heyes, 2014). However, to our knowledge, all studies conducted on this issue have focused on “level-1 visuo-spatial perspective taking”, i.e., representing what is visible or not to another person (Flavell, Everett, Croft, & Flavell, 1981), which appears to be a predominantly egocentric process (Kessler & Rutherford, 2010). As level-1 visuo-spatial perspective taking operates independent of another person's frame of reference, tasks implying this form of judgement constitute a suboptimal means of testing the conditions under which others' perspectives are adopted.

In contrast to level 1, “level-2 visuo-spatial perspective taking”, i.e., representing how another person sees the world from her point of view (Flavell et al., 1981), largely involves considering different frames of reference on the same state of affairs. This necessity, however, has a cost, and developmental research accordingly suggests that level-2 judgements are only mastered several years after level-1 visuo-spatial perspective judgements (Masangkay et al., 1974) and at the same age as cognitive perspective judgements (Wimmer & Perner, 1983). Numerous experiments (e.g., Gardner, Stent, Mohr, & Golding, 2017; Kessler & Rutherford, 2010; Kessler & Thomson, 2010; Michelon & Zacks, 2006; Surtees, Apperly, & Samson, 2013) suggest that level 2 visuo-spatial perspective-taking involves representing one's own body as in the physical location of the other person. As a consequence, level-2 visuo-spatial perspective taking tasks should constitute an elegantly simple means to determine the conditions under which others' perspectives are adopted. In a pioneering study, Tversky and Hard (2009) demonstrated that a significant proportion of humans use the point of view of another person when describing the spatial relations of objects located close to that person. In line with this study, our aim was to determine whether

the perspective of another agent is only processed on purpose or is systematically represented independent of its relevance.

In the current work, we provide evidence from four experiments showing that level-2 visuo-spatial perspective taking can be observed for persons for whom it is irrelevant. We adapted a well-validated implicit task to investigate spontaneous perspective-taking (Conson, Salzano, Frolli, & Mazzarella, 2017; Furlanetto, Cavallo, Manera, Tversky, & Becchio, 2013; Todd, Hanko, Galinsky, & Mussweiler, 2011; Tversky & Hard, 2009). Our participants were presented with a visual scene containing a person that could or could not see (Experiment 1) or act on (Experiment 2) an ambiguous target stimulus. The participants completed a perceptual (Experiment 1) or a spatial (Experiment 2) perspective task through which they were required to either identify (Experiment 1) or localize (Experiment 2) the target stimulus. Experiments 3a and 3b allowed us to rule out confounds related to the induction of compassion or personal distress. Given the target's ambiguity, the occurrence of identification or localization depended on whether subjects adopted their own or the person's visuo-spatial perspective. If humans automatically consider the perspectives of other agents, participants should take the perspective of the person in the scene similarly to when participants can or cannot see/act on the target. Conversely, if perceiving another person does not spontaneously lead one to consider his or her point of view, then perspective taking should only be observed in relevant conditions (i.e., when the person can see/act on the target).

2. Experiment 1

2.1. Participants

One hundred ninety-two adult participants (mean age = 23.8, SD = 4.8, 137 females) were recruited. The sample size was not a priori determined by a power analysis but was based on previously published studies using the same experimental paradigm (approximately 60 participants per condition; see Furlanetto et al., 2013; Tversky & Hard, 2009). In addition, a posteriori sensitivity power analysis ($1-\beta = 0.80$, $\alpha = 0.05$, one-tailed) computed for this sample of 192 participants allows us to identify a Cramer's V effect size of 0.249 with a probability of 0.80 (Faul, Erdfelder, Lang, & Buchner, 2007). Subjects were randomly assigned to the experimental conditions and had no prior knowledge of the scientific aims of the study. All measures, manipulations, and exclusions used are reported in the present report. Protocols used were set in accordance with principles of the Declaration of Helsinki (World Medical Organization, 1996).

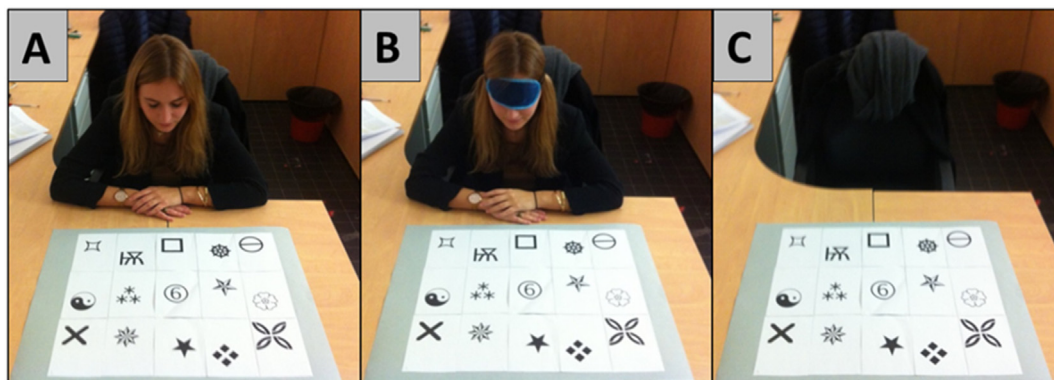


Fig. 1. Scenes used in Experiment 1 depicting (A) a female actor looking at symbols displayed on a table (condition Natural), (B) a blindfolded actor facing symbols displayed on a table (condition Blinded), (C) symbols displayed on a table in front of an empty chair (condition Empty chair).

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