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Short Communication

Taking someone else's spatial perspective: Natural stance or effortful decentring?

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ABSTRACT

When perceiving stimuli, self-centred and decentred perspectives can be adopted. In the present study, we investigate whether perceivers have a natural perspective that constrains their spatial perception, with some people perceiving better with self-centred than decentred perspectives and vice versa for other people. We used a recognition task of tactile ambiguous letters (b, d, p, and q) presented on the stomach, for which three perspectives can be adopted (trunk-centred, head-centred, and decentred). At first, the participants were free to adopt any perspective they wanted. Then, either the same or a different perspective was imposed on them. Without constraints, 80% of the participants adopted a self-centred perspective (50% trunk-centred, 30% head-centred) and 20% a decentred one. The perspective adopted freely appears to be natural as recognition performance decreases with a different perspective and returns to its previous high level with the same perspective. Thus, to perceive space, some perceivers adopt naturally a perspective centred on themselves whereas others take naturally others' perspective.

1. Introduction

Perceivers can adopt different spatial perspectives that are either centred on their own location (i.e., self-centred) or else on a different location (i.e., decentred). On the one hand, self-centred perspectives underlie self-consciousness by binding together the multisensory experiences and the physical body (Ferrè, Lopez, & Haggard, 2014; Vogeley & Fink, 2003). Consequently, self-centred perspectives are often seen as having some sort of primacy in terms of spatial cognition (e.g., Epley, Morewedge, & Keysar, 2004). On the other hand, the ability to adopt the perspective of others is crucial when it comes to communicating and interacting with them (Schober, 1993). Decentred perspectives can be spontaneously adopted in collaborative situations (Duran, Dale, & Kreuz, 2011) and even in situations where communication is not required (Thirioux, Jorland, Bret, Tramus, & Berthoz, 2009; Tversky & Hard, 2009). In addition, as a consequence of certain personality traits – for instance, being dominated or dominant (see Galinsky, Magee, Inesi, & Gruenfeld, 2006) – some people adopt the perspective of others whereas other people adopt their own perspective. One important question is whether people have a natural stance to adopt either self-centred or decentred perspectives. In the present study, we target this question using the tactile ambiguous symbol recognition task.

Tactile perception is interesting for the investigation of spatial perspectives because self-centred (e.g., perception from our body) and decentred perspectives (e.g., perception from outside the body) conflict with each other. Moreover, more than one self-centred perspective exists: the perspective can be centred either on the stimulated surface or on a central body part (e.g., the head; Harrar & Harris, 2010; Ho & Spence, 2007). In this sense, the recognition of ambiguous tactile symbols displayed on the body surface such as the letters b, d, p, and q (Ferrè et al., 2014; Natsoulas & Dubanovski, 1964; Parsons & Shimojo, 1987; Sekiyama, 1991; for a review, see Arnold, Spence, & Auvray, submitted for publication) provides an excellent paradigm with which to investigate the perspectives that are naturally adopted by perceivers. The same perceived stimulation can be interpreted as corresponding to different symbols, as a function of the perspective that is taken when interpreting the stimulation. For example, when the letter b is drawn on a participant's stomach (from the viewpoint of the experimenter located in front of them), three different perspectives can be adopted (see Fig. 1): a decentred perspective oriented toward the participant's stomach (response b); a trunk-centred perspective oriented forward the participant (response d); a

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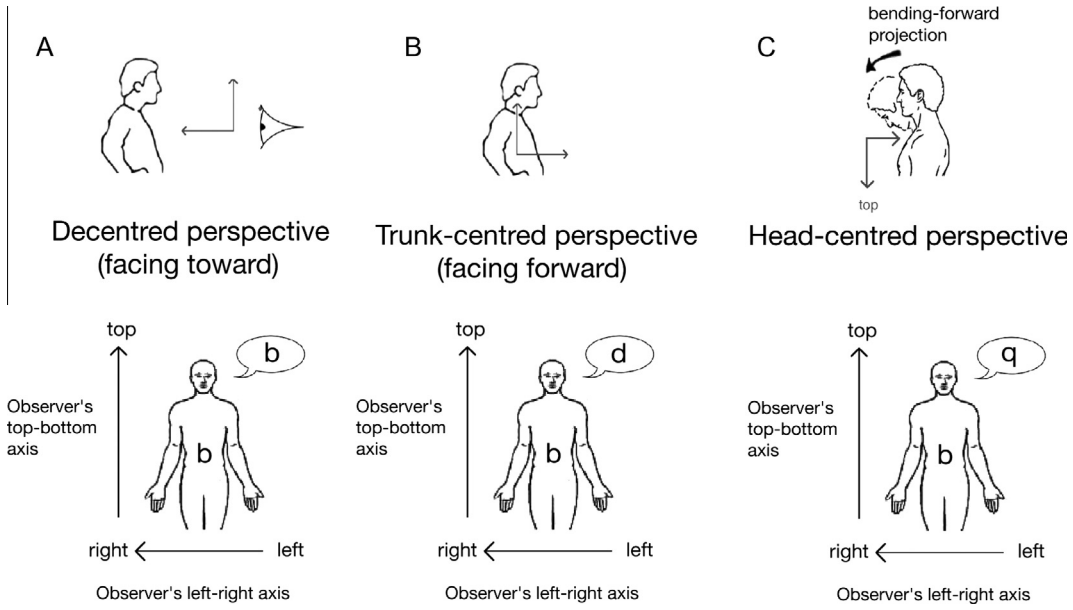

Fig. 1. Illustration of the three possible perspectives that participants can adopt when interpreting ambiguous symbols displayed on the body surface. In this figure, the lowercase letter "b" is drawn on the participant's stomach from the experimenter's perspective. Top row: the spatial perspective that can be inferred from the participant's responses. Bottom row: the different responses reported by participants. (A) Perception of the letter "b", resulting from the adoption of a decentred perspective whose origin is located in front of the participant. (B) Perception of the mirror-reversed letter "d", resulting from a trunk-centred perspective. The horizontal and vertical axes of the letter are assigned congruently to the participant's trunk. (C) Perception of the 180°-rotated letter "q", resulting from a bending-forward head-centred perspective.

head-centred perspective, as if the head was bending forward to "see" the tactile stimulation (response q).

Important inter-individual differences have been observed in the recognition of ambiguous tactile symbols with preferences to adopt one of the three possible perspectives (Sekiyama, 1991). However, one important question that has not been directly addressed is whether perceivers have a natural perspective that constrains their spatial perception. Do some perceivers perceive better from a self-centred perspective whereas other perceivers perceive better from a decentred perspective? The aim of the present study was therefore to investigate whether individual preferences for self-centred vs. decentred perspectives reflect the natural perspectives that people adopt. Tactile symbols were presented on the stomach, for which three different perspectives can be adopted (see Fig. 1). In order not to risk biasing the participants toward the experimenter's perspective, symbols were not drawn manually by the experimenter (which was the case in all previous studies) but by means of a matrix of vibrators.

To test the *natural perspective* hypothesis, the instructions given to the participants were varied in terms of the perspective that was to be adopted. First, the participants were free to adopt any perspective that they wanted, thus allowing us to evaluate their baseline preferences. Second, different perspectives were imposed on the participants. These corresponded either to the same or to a different perspective than the one that they had adopted freely. These imposed perspectives allowed for the evaluation of any cost associated with adopting an unnatural perspective. If the perspective that is adopted freely is natural, then imposing a different perspective should produce a cost in terms of recognition performance. Some perceivers should perform better with self-centred than decentred perspectives and vice versa for other perceivers. On the other hand, if participants are not constrained by a natural perspective, one possibility is that imposing a different perspective should not induce a cost. However, as decentred perspectives are more demanding than self-centred perspectives (Epley et al., 2004; Natsoulas, 1966), another possibility is that all of the perceivers would perform better with a self-centred than with a decentred perspective, independently of the perspective adopted freely. Finally, in order to evaluate whether the cost of adopting an unnatural perspective is simply explained by changes in perspectival instructions or by the difficulty that is associated with disengaging from a perspectival choice, we evaluated whether performance would improve when the participants returned to the natural perspective after adopting an unnatural one. If the cost of adopting a different perspective is explained simply by changes in instruction or the difficulty that is associated with disengaging from a perspectival choice, returning to the natural perspective adopted freely should not increase performance.

In addition, we evaluated whether the ability to adopt an unnatural perspective would be influenced by visuo-spatial abilities and by the natural perspective. We thus compared the cost of adopting an unnatural perspective in those participants who adopted the trunk-centred, head-centred, and decentred perspective. However, only the two perspectives for which the vertical axis is not reversed (i.e., the trunk-centred and decentred) were imposed. The decentred perspective was imposed on participants who freely adopted the trunk-centred perspective and vice versa for the decentred participants. For the head-centred participants, the trunk-centred perspective was imposed for one half and the decentred for the other half. The head-centred perspective was not imposed because the top–bottom axis is less prone to confusion than the left–right axis. Left–right confusion occurs when a self-centred or a decentred perspective is imposed on participants (Natsoulas, 1966). However, vertical confusion is less frequent because the vertical assignment is influenced, on the one hand, by both the external environment (i.e., gravity) and the orientation of the egocentric top–bottom axis (i.e., the head–foot axis; Oldfield & Phillips, 1983), and, on the other, by the orientation of the head with a head-centred perspective (Sekiyama, 1991). Moreover, when the vertical axis is reversed, consequently to the adoption of a head-centred perspective, there is only one possible left–right assignment.