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Observed actions affect body-specific associations between space and valence

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ABSTRACT

Right-handers tend to associate "good" with the right side of space and "bad" with the left. This implicit association appears to arise from the way people perform actions, more or less fluently, with their right and left hands. Here we tested whether observing manual actions performed with greater or lesser fluency can affect observers' space–valence associations. In two experiments, we assigned one participant (the actor) to perform a bimanual fine motor task while another participant (the observer) watched. Actors were assigned to wear a ski glove on either the right or left hand, which made performing the actions on this side of space disfluent. In Experiment 1, observers stood behind the actors, sharing their spatial perspective. After motor training, both actors and observers tended to associate "good" with the side of the actors' free hand and "bad" with the side of the gloved hand. To determine whether observers' space–valence associations were computed from their own perspectives or the actors', in Experiment 2 we asked the observer to stand face-to-face with the actor, reversing their spatial perspectives. After motor training, both actors and observers associated "good" with the side of space where disfluent actions had occurred from their own egocentric spatial perspectives; if "good" was associated with the actor's right-hand side it was likely to be associated with the observer's left-hand side. Results show that vicarious experiences of motor fluency can shape valence judgments, and that observers spontaneously encode the locations of fluent and disfluent actions in egocentric spatial coordinates.

1. Introduction

Across many languages and cultures, the right is associated with positive and the left with negative (Hertz, 1973). In Spanish, the word "diestro" meaning "right-handed" also means "able," whereas the word "zurdo" meaning "left-handed" derives from the word "zocato," meaning "ugly" and "klutz." English speakers use positive and negative idioms like "my right hand man" and "two left feet," and similar expressions have been reported in English, Italian, Arabic, and Chinese (McManus, 2002).

Yet, despite widespread linguistic and cultural conventions linking "good" with "right," left-handers implicitly associate "good" with "left" (Casasanto, 2009, 2011). Casasanto (2009) proposed that this implicit association arises from patterns of manual motor fluency: People tend to associate "good" with the side of space on which they can perform actions more fluently, typically with their dominant hand. To test this proposal, Casasanto and Chrysikou (2011) tested whether changing someone's patterns of manual motor fluency could change their associations between space and emotional valence (i.e., positivity and negativity), accordingly. They assigned right-handers to perform a bimanual fine motor task while wearing a cumbersome ski glove on one of their hands. After this motor training task, participants who had worn the glove on their left hand, preserving their natural right-handedness, associated "good" with "right." By contrast, participants who had worn the glove on their right hand associated "good" with "left," like natural left-handers. This study validated the proposal that space–valence associations depend on asymmetries in manual motor fluency, and also showed that these associations can be rapidly changed by new patterns of motor experience.

Is motor experience the only way to influence people's space–valence associations? Since the advent of Social Learning Theory (Bandura, 1977), it has been clear that people learn not only directly through acting on the environment themselves, but also vicariously by watching others act (i.e., observational learning). The goal of the present study was to determine whether associations between space and valence depend exclusively on one's own physical experience, or whether they can also be influenced by seeing someone else acting more or less fluently with their right and left hands. In Experiment 1 we tested whether space–valence associations could be changed through vicarious motor experience. In Experiment 2 we changed the viewer's position relative to the actor to determine the perspective

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from which observational learning of space–valence associations occurred, in order to better understand the neurocognitive processes that led the observers' judgments to be influenced by the actors' actions.

2. Experiment 1: observational learning of space–valence associations

2.1. Method

2.1.1. Participants

Students from the Arts Department of the University of Granada ($N = 96$; 48 female; mean age: 24.2 years; range 18–39 years) volunteered to participate and provided informed written consent. All participants were right-handed. Their mean score on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971) was 74.5. Actors and observers (described below) did not differ in gender (24 female in each group), age ($p = .35$) or degree of laterality as measured by the EHI ($p = .64$).

2.1.2. Materials and procedure

Participants were tested in pairs and performed a two-part motor training experiment. Each participant was randomly assigned to either the role of "actor" or "observer." Actors and observers received verbal instructions individually in separate rooms. Observers were told that the aim of the experiment was to test if the presence of a close observer affected negatively the actor's performance on a psychomotor task. Actors were told that their progress would be closely monitored and evaluated by the person observing them.

2.1.2.1. Training phase. Actors performed the task developed by Casasanto and Chrysikou (2011, Experiment 2). In what was ostensibly a test of psychomotor speed, participants arranged dominos upright on a 120 × 60 cm surface, on 80 equally spaced spots, as quickly as possible for 12 min. The 80 spots were separated by 12 cm. To induce an asymmetry in manual motor fluency, we assigned participants to wear a bulky ski glove on one hand, with the other glove dangling from the same wrist. The actors were instructed to take one domino with each hand from a centrally located box and to place them on the board simultaneously. The dominoes were to be placed upright facing the participant in symmetrical rows on the board, each domino on one spot. Participants were not allowed to use one hand to help the other hand to place the domino correctly. If a domino fell, the participant could not carry on with new dominoes, but rather he had to fix it using only its corresponding hand. Participants could only begin a new row after the previous row had been completed. Participants were monitored to ensure that they followed the instructions. Manipulating the dominoes was thus much more difficult with the gloved hand than with the free hand. As in the original experiment by Casasanto and Chrysikou (2011), accuracy and duration in this task were not recorded.

While the actor completed the task sitting at a table, the observer stood behind the actor, facing the same direction (see Fig. 1, left). Between them there was a distance of 20 cm. The observer was instructed to take mental note of the errors that the actor committed. The participants were also told that the experimenter would be taking written notes of the process in which the actor placed the dominoes and they were told that the observer's should coincide with the experimenter's notes. Debriefing questions confirmed that no observer suspected that

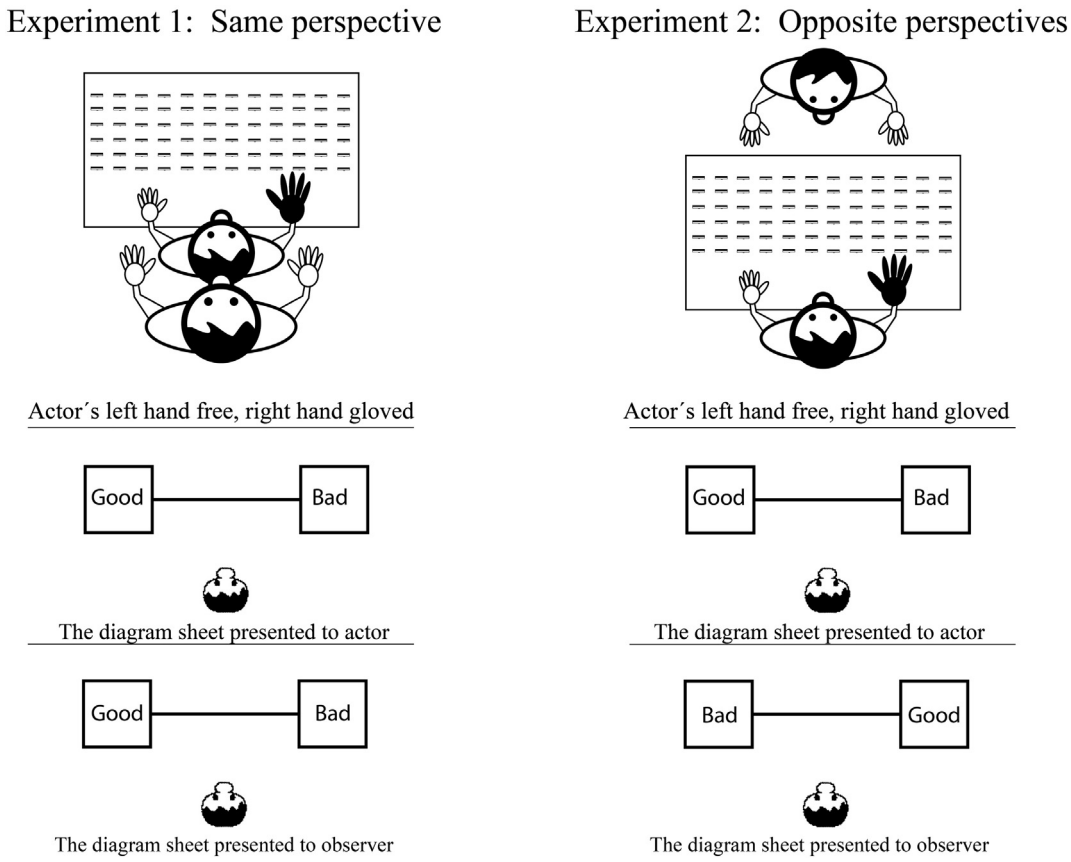

Fig. 1. Experimental set up and summary of main results from Experiments 1 and 2. The boxes in the diagrams were blank when presented to the participants. The words "good" and "bad" above indicate the modal responses given by actors (top row of boxes) and observers (bottom row of boxes) in Experiment 1 (left) and Experiment 2 (right).