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Abstract

The influence of vitality forms on action perception and motor response

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During social interactions, by observing how actions are performed or by listening to the tone of voice, people can understand the affective state of others. Indeed, actions can be executed kindly or energetically, delicately or hesitantly, and also words can be pronounced gently or rudely, reflecting positive or negative attitudes of the agent. These subtle aspects of social communication have been named "*vitality forms*" by Daniel Stern. Despite their pervasiveness in human interactions, to date it is not clear whether and how vitality forms expressed by an agent may affect the action perception and the motor response of a receiver. To clarify these points, we conducted both kinematic and psychophysics experiments. Specifically, our kinematic studies showed that a request expressed with different vitality forms (gentle/rude) by an agent influenced the kinematic parameters of the participants' actions. For example, when the request was gentle, participants move the object accordingly in a gentle way (low velocity and high distance covered). Interestingly, this effect was present regardless the request modality (visual, auditory, physical) and the type of agent (human, humanoid robot iCub, robotic manipulandum). Since fMRI studies conducted by our research group showed that the perception and expression of vitality forms based on the same neural circuit, we hypothesized that the vitality form of a request may additionally influence the internal representation of a subsequent action, modifying some features such as its time duration estimation. In this view, in our psychophysics study, participants listened to an actor voice pronouncing "give me" in a rude or gentle way, and then they were asked to observe in a monitor the initial part of a rude or gentle passing action, continue it mentally and estimate the time of its completion. Results showed that, a gentle request, independently of its modality, increased the estimated duration of the subsequent action observed by participants. In contrast, a rude request affected the perception of the action subsequently presented, decreasing its perceived duration. Taken together, our results indicate that, when interacting with a confederate (human, robot), vitality forms expressed by the agent influence both the perception and motor behaviour of the receiver. Our studies represent the first attempt to assess the ability in encoding and expressing the action vitality form (how) and may have important implications for social and communicative disorders and other research fields such as robotics.

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