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Perspective Taking in Communicative Pointing: An Optimal Feedback Control Modeling Approach

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Abstract: Pointing movements can serve instrumental goals ('pointing to press a button') or communicative goals ('pointing to indicate to someone which button to press'). Previous work has shown that communicative pointing follows different trajectories, and has different end points than instrumental pointing movements, depending on the addressee's spatial location. This suggests that motor control processes are affected by communicative intentions, but the nature of this interface remains unknown. Using optimal feedback control theory, we construct a model of instrumental pointing, and explore how this model can be adjusted to reproduce the dependency between communicative trajectories and addressees' locations. Our results show that the variations in end points cannot account for those trajectories. Instead, the kinematic data are best explained by 'perspective taking' on the part of the communicator, i.e., communicative pointing movements seem to be planned in a frame of reference that is adjusted to the addressee's point of view.