

The relative effect of different gesture representations in remote collaboration

Anja Wessels, Cara Stitzlein, Jane Li, and Leila Alem
CSIRO ICT Centre, Sydney, Australia
anja.wessels@csiro.au

Abstract. This poster presents results of an experimental investigation of remote collaboration (or guiding) on a physical task, focusing on the comparative effectiveness, user satisfaction, and user preference of two gesture representations (using hands or pointer as a gesture device). Results indicate that both gesture representations were similarly effective and satisfying. However, preferences would depend on both user role and gesture intent. Therefore, technical solutions should naturally reflect gestures by those who are guiding, and be straight forward for those who are guided.

Introduction and relevance of work

Remote collaboration on physical tasks refers to shared tasks involving tangible artifacts and coordinated operations of two (or more) people separated by physical distance, e.g. when one individual guides another over distance (e.g. Fussell, Setlock, Yang, Ou, Mauer, & Kramer, 2004; Ou, Oh, Fussell, Blum, & Yang, 2005). Hereby, mediation of gesture is achieved via pointer, hands or sketching. Kirk, Fraser, and Rodden (2005) demonstrated that gesturing with an unmediated representation of the hands lead to improved performance over an artificial representation of remote gestures (sketch). A cursor pointer is according to Fussell and colleagues (2003) the simplest way to point out objects.

However, investigating the relative effectiveness of the two most popular gesture devices, overlaying hands and cursor pointer, within one media condition has not been done so far. We compare these two devices within a video-conferencing setting and consider both sides of the distributed interaction.

The Study

The gesture representations, overlaying hands vs. cursor pointer, were systematically varied in a within-subject design to test their effect on task performance, overall satisfaction, and user preference for one condition. Assembly was completed on a Lego toy, and in each condition participants were asked to build collaboratively two different body parts of the toy via

videoconference. Hereby, the helper used an online manual to guide the worker through the steps. There were 16 trials, each with two participants.

Results

Overlaying hands and cursor pointer conditions were similarly effective and user satisfaction was high for the collaborators without significant differences between conditions. Regarding their preferences, the majority of the helpers (64%) stated that it was easiest for them to explain when they used their hands. Workers expressed a preference for the cursor pointer indicating task objects (53%). When given the choice, both parties slightly preferred cursor pointer functionality.

Discussion and design recommendations

There is no main effect for one gesture representation over another, contrary to previous works which each compared across conditions. However, we report evidence that the role (helper or worker) in videoconferencing matters, indicated by preference results. The inclination of the helper to use their embodied hands is not altogether surprising, as hands are both rich and natural for gesturing. The preference for hands is not reciprocated within the worker group. There may be an inability of the technical setup to display gestures in an appropriate vantage for the worker to benefit. Instead, workers show a preference for the cursor pointer which gives a clearer indication of pieces to select and direction of orientation. For this reason, technical solutions should reflect the role-specific functions by naturally representing gestures for those who are guiding, and straightforward receipt for those who are guided.

References

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