

Computational Analysis of Motionese: What can infants learn from parental actions?

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Motionese is parental modifications in their actions directed to infants versus adults. Parents enhance relevant features in actions so as to maintain the infants' attention and aid the infants' processing of the actions. Brand et al. [1, 2] revealed higher interactiveness, more enthusiasm, broader movements, simplification, and so on in infant-directed action (IDA). Computationally analyzing the task relevant actions, Rohlfing et al. [3] found longer and more pauses between actions and decomposition of actions in IDA.

The aim of this study is to evaluate IDA from an infant-like viewpoint. Although the characteristics of motionese have been uncovered, we do not know yet how it can help infants to perceive and process the actions. Infants are supposed to have little semantic knowledge about the actions in comparison to adults. Their understanding of the environmental, social, and psychological constraints on the actions is limited. In order to simulate such primal abilities of infants, we adopted a model of saliency-based visual attention [4] for the analysis of motionese. Saliency is defined as outstandingness from the surroundings in terms of color, intensity, orientation, flicker, and motion. That is, the model can simulate the bottom-up visual attention comparable to the early infant's.

We analyzed videotapes of 15 parents (5 fathers and 10 mothers) demonstrating a stacking-cups task first to their 8- to 11-month-old infants ($M = 10.56$, $SD = 0.89$) and then an adult. The videos were fed into the saliency model, and the locations attended to by the model in the IDA condition were compared with in the adult-directed action. Our analysis revealed that, in IDA:

- (a) the cups attracted more attention before the task started and after it ended,
- (b) the static features more contributed to the saliency of the cups, and
- (c) the parents' face was attended to more often during the task.

The first two results indicate that motionese has the effect of highlighting the initial and final state of the task and the means of it. Our closer analysis on the third result showed that the parents gave social signals indicating the significant state changes in the actions, i.e., putting a cup into another. We suggest from these results that motionese may also enable infants to detect these information.

References

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