Perception and Prediction of Social Intentions from Human Body Motion

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Effort shape factor	Descriptions of movements (scale 1-5)	
	1	5
Torso	Contracted, bowed, shrinking	Expanded, stretched, growing
Limb	Moves close to body, contracted	Moves away from body, expanded
Energy	Light, delicate, buoyant	Strong, forceful, powerful
Space	Indirect, wandering, diffuse	Direct, focused, channeled
Time	Sustained, leisurely, slow	Sudden, hurried, fast
Flow	Free, relaxed, uncontrolled	Bound, tense, controlled

Figure 1. *Left: Examples of 'hero' and 'villain' character body motions. Right: Effort-Shape rating scale.*

1. Introduction

Better understanding of how social traits and intentions are conveyed through human body motion is central in creating believable, life-like virtual characters. Body motion conveys socially relevant information on which people make judgments, such as other people's personality or gender. [e.g. Koppensteiner and Grammer 2011, Thoresen et al. 2012]. However, it is unclear how the body motion features are related to the perceived social traits and intentions of others. The main goal of this study is to examine how visual information from human body motion is related to social traits and intention perception. Furthermore, we also investigated if body motion features can be used as predictors of social intentions.

2. Methods

Forty-one acting students were asked to act as a 'hero' or a 'villain' based on their own knowledge. Although their performance was recorded during a motion capture session, only reference videos were used for this experiment. Based on a pilot study, we selected 26 actors (13F-13M) so that both hero and villain videos of each actor included sufficient amount of variability between the two character-type body motions. This resulted in 52 videos (26 actors × 2 character-type). Each video was 10s long, with the starting point matching the start of the performance. In order to prevent facial expressions influencing participants' ratings, all the videos were edited to include a black disc masking the actors' face (Figure 1 Left).

Ten participants (9F-1M, mean age 24.1, age range 17-57) viewed the videos projected onto a large screen. Each video was rated on all 6 Effort Shape scales (5-point Likert scales from [Thoresen et al. 2012] presented in Figure 1), resulting in 312 ratings in total. The experiment was then divided into 24 counterbalanced blocks: 2 Character-type (Hero, Villain) × 2 Gender (Female, male) × 6 Effort Shape scales. In each block, participants viewed videos of the 13 female or male actors in random order, while the same actor was not presented more than once in each block. Each block started with a screen displaying the Effort Shape rating condition in question, and a 3s break followed each video.

3. Results

We found consistent differences in the type of body motion associated with heroes versus villains. The body motion of hero characters was in general more expanded, powerful, hurried and included more movements away from the body, while the body motion of villain characters was more controlled and tense. We performed a 2-way ANOVA for each effort shape factor (w. subject factors: character-type and gender). Results showed a *Character-type* × *Gender* interaction effect ($p<0.05$), with female actors having more expanded body motion when portraying a hero. The body motion of male actors was also rated to be more strong and forceful. Furthermore, we performed logistic regressions analyses which revealed that Effort Shape factor ratings can predict correctly the portrayed character-type. The model classified correctly 84.6% of the body motion videos. We also found that torso factor ratings are a statistically significant predictor of intention.

4. Conclusions

The findings suggest that specific visual body motion features are important for the perception of high-level social information such as social traits and intentions. These findings are consistent with previous studies reporting that body motion information can affect the perception of social traits such as personality [e.g. Koppensteiner et al. 2011]. Furthermore, body motion features can be utilised to accurately predict certain social traits and intentions. This implies intriguing potential opportunities to enhance the believability of virtual characters by controlling and modifying the body motion and shape to make the character convey the desired social traits and intentions.

References

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