Hearer Engagement as a Variable in the Perceived Weight of a Face-Threatening Act

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Abstract

We have performed a perceptive study in human-human interaction to verify if Brown & Levinson's formula to estimate the perceived weight of a Face-Threatening Act should be augmented with the perceived engagement level of the addressee. The outcome of this analysis will be applied to human-machine interaction, giving indications as to whether human-like virtual characters that interact with a less engaged human user should employ stronger politeness strategies than when they interact with a more engaged human user.

1 Introduction

We consider engagement as "the value that a participant in an interaction attributes to the goal of being together with the other participant(s) and of continuing the interaction" (Poggi, 2007 in: Peters et al., 2005). Numerous recent studies describe how a virtual character can influence user engagement by coordinating and synchronizing its behaviour with that of its user. One of the verbal aspects that can be coordinated with the user is the degree of expressed politeness (De Jong et al., 2008). En & Lan (2012) indeed state that a successful implementation of politeness maxims is likely to improve human-agent engagement. To gain more insight into the optimal coordination of politeness, we have conducted a perceptive study to verify the existence of a link between the speaker's perceived engagement level of the hearer, and the speaker's politeness strategies.

2 Hypothesis

According to Brown & Levinson's (1987) (B&L) Politeness Theory, Wx, the numerical value that measures the weightiness, i.e. danger, of a Face-Threatening Act (FTA) x is calculated by: $W_x = D(S,H) + P(H,S) + R_x$ where $D(S,H)$ is the social distance between the speaker and the hearer, $P(H,S)$ is the power that the hearer has over the speaker, and R_x is the degree to which the FTA x is rated an imposition in that culture. The distance and power variables are intended as very general pan-cultural social dimensions. In our view, besides a very general pan-cultural distance between participants in an interaction, the level of engagement can be seen as a measure for distance as well. Considering our definition of engagement, a low level of engagement implies a temporal small value to *continue the interaction and be together with the other interaction participant(s)*. This distance may be comparable with B&L's distance variable, only this time it has a more temporal and dynamic nature. We thus formulate our hypothesis as: $W_x = D(S,H) + P(H,S) + R_x - Eng(H)$ where $Eng(H)$ is the speaker's perceived engagement level of the hearer. Related research includes André et al. (2004) who modelled an agent that takes into account the perceived emotions of the user in adapting its politeness strategy; De Jong et al. (2008) who described a model for the alignment of formality and politeness in a virtual guide; and Mayer et al. (2006) who evaluated the perception of politeness in computer based tutors.

3 Method

From B&L's theory it is apparent that a straightforward way to infer the perceived threat of an FTA is by looking at the politeness strategy that is employed to formulate it. We thus performed a perceptive study by means of a questionnaire to compare the use of politeness strategies over different conditions. Concretely, for three different FTAs (disagreement, request and suggestion), we created two conditions (written, scripted interactions) of the same scenario where two people converse, with different hearer engagement levels. We

then presented third party observers (participants of the questionnaire) with one condition of each FTA and asked them to advice the speaker (Person A) the utterance with the most appropriate politeness strategy to place the FTA, under the condition that the speaker absolutely wants to continue the conversation with the hearer (Person B). We also asked the observers to judge Person B on her level of engagement and related concepts involvement, rapport and interest.

For the context in which Person B's utterances were designed to express a minimum level of engagement we kept her utterances as brief (few and short utterances) and uninterested (emotionless) as possible. In the interactions where Person B 's utterances were designed to demonstrate a high level of engagement we added cues that have been linked to engagement in former studies and which can be expressed in written text: We made Person's B reactions longer as to extend the interaction time (Bickmore et al., 2013); we added more feedback (Gratch et al., 2006); added expressions of emotion (Peters et al., 2005.) and of liking their interaction partner (Bickmore et al., 2013); and showed interest in Person A (Peters et al., 2005).

The politeness strategies among which observers could choose were constructed according to B&L's tactics to formulate such strategies, inspired by example sentences from De Jong et al. (2008), and validated by an earlier perceptive study we performed. The validation was necessary since theoretically politeness strategies can be ranked according to their potential of minimizing the FTA's risk in the way B&L proposed, but in practice B&L's hierarchy is not always entirely respected (De Jong et al., 2008; André et al., 2004).

4   Results

200 subjects participated to our questionnaire: 68.5% female, 100% native French speakers, aged 16-75. Every participant was exposed to one version (engaged or less engaged) of each scenario (FTA). For every FTA, observers perceived the hearer's engagement, involvement, rapport and interest levels significantly higher in the engaged condition than in the less engaged condition (t-tests $p < 0.01$). Between the two conditions Mann-Whitney U tests have not shown significant differences in the distributions of recommended politeness strategies. Kendall Tau tests on the complete data set have shown significant negative

correlations ($p < 0.05$), for the FTA 'request', between the rank of the chosen politeness strategy and the level of engagement ($\tau = -0.127$, Q2; $\tau = -0.111$, Q3), involvement ($\tau = -0.110$) and interest ($\tau = -0.107$). The FTA 'suggestion' holds a significant negative correlation regarding the perceived level of involvement ($\tau = -0.109$).

5   Conclusion and Discussion

In the creation of the two conditions (engaged and less engaged) we have demonstrated a successful verbal behaviour model to convey a participant's engagement level. The results do not show that the recommendation of politeness strategies differs between both conditions. The lack of such a clear overall difference confirms that politeness is a highly subjective phenomenon (Danescu-Niculescu-Mizil et al., 2013). We also compared the ranking of an observer's chosen politeness strategy for Person A with the level of engagement and related concepts he perceived in Person B. Significant negative correlations were revealed in the contexts of the negative FTAs 'request' and 'suggestion'. 'Disagreement', a threat to the addressee's positive face, does not show such correlations. A possible explanation for this is that here such a tendency interferes with a preference for alignment. Namely, a low level of engagement is expressed by features that overlap with features that indicate positive impoliteness. Some people prefer strong alignment settings and may thus be inclined to answer positive impoliteness with less caution for the addressees positive face as well (De Jong et al., 2008). The fact that the FTA 'suggestion' shows only one negative correlation may be due to the fact that the FTA can be interpreted as not really face-threatening. We conclude that in the context of a certain negative FTA, observers who choose weightier politeness strategies, tend to perceive a lower level of the addressee's engagement level, and vice versa. In these contexts, our hypothesis $W_x = D(S,H) + P(H,S) + R_x - Eng(H)$ seems confirmed, giving indications that a virtual character that wants to continue the interaction with its human user needs to speak more politely to someone who is less engaged than to someone who is very engaged in the ongoing interaction. For the future we plan to extend our study with other modalities and other aspects of engagement such as paying attention (Sidner et al., 2005) and showing empathy (Castellano et al., 2013).

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References

Elisabeth André, Matthias Rehm, Wolfgang Minker and Dirk Bühler. 2004. *Endowing spoken language dialogue systems with emotional intelligence.* Affective Dialogue Systems.178–187. Springer.

Timothy W. Bickmore, Laura M. Vardoulakis Pfeifer and Daniel Schulman. 2013. *Tinker: a relational agent museum guide.* Autonomous agents and multi-agent systems.27(2):254–276. Springer.

Penelope Brown and Stephen C. Levinson. 1987. *Politeness: Some universals in language usage.* Cambridge University Press.

Ginevra Castellano, Ana Paiva, Arvid Kappas, Ruth Aylett, Helen Hastie, Wolmet Barendregt, Fernando Nabais Susan Bull. 2013. *Towards empathic virtual and robotic tutors.* Artificial Intelligence in Education.733–736 Springer.

Cristian Danescu-Niculescu-Mizil, Moritz Sudhof, Dan Jurafsky, Jure Leskovec and Christopher Potts. 2013. *A computational approach to politeness with application to social factors.* arXiv preprint arXiv:1306.6078.

Markus De Jong, Mariët Theune and Dennis Hofs. 2008. *Politeness and alignment in dialogues with a virtual guide.* Proceedings of the 7th international joint conference on Autonomous agents and multiagent systems-Volume 1.,207–214.

Looi Qin En and See Swee Lan. 2012. *Applying politeness maxims in social robotics polite dialogue.* Human-Robot Interaction (HRI), 2012 7th ACM/IEEE International Conference on,189–190. IEEE.

Jonathan Gratch, Anna Okhmatovskaia, Francois Lamothe, Stacy Marsella, Mathieu Morales, Rick J. Van der Werf, and Louis-Philippe Morency. 2006. *Virtual rapport.* Intelligent Virtual Agents,14–27. Springer.

Richard E. Mayer, and W. Lewis Johnson, Erin Shaw and Sahiba Sandhu. 2006. *Constructing computer-based tutors that are socially sensitive: Politeness in educational software.* International Journal of Human-Computer Studies.64(1):36–42. Elsevier.

Christopher Peters, Catherine Pelachaud, Elisabetta Bevacqua, Maurizio Mancini and Isabella Poggi. 2005. *Engagement capabilities for ecas.* AAMAS05 workshop Creating Bonds with ECAs.

Isabella Poggi. 2007. *Mind, hands, face and body: a goal and belief view of multimodal communication.* Weidler.

Candace L. Sidner, Christopher Sidner, Cory D. Kidd, Neal Lesh, and Charles Rich. 2005. *Explorations in engagement for humans and robots.* Artificial Intelligence,166(1):140–164. Elsevier.