An Embodied Conversational Agent for Social Support

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1. PROBLEM STATEMENT

Today, children and adolescents spend a lot of time on the Internet. One of the risks they run online is to become a victim of cyberbullying. Cyberbullying is bullying through electronic communication devices. It is a complex problem that has a high impact on victims [4]. About 40% of the victims is emotionally affected by incidents of cyberbullying [4]. These victims may need help to deal with their negative emotions. To this end, specialized helplines exist, that allow cyberbullying victims to talk to online counselors and/or peers trained to give social support (see for example Cybermentors[1] or Pestweb[2]). Social support or comforting refers to communicative attempts, both verbal and nonverbal, to alleviate the emotional distress of another person [2].

To some extent, everybody is capable of comforting another person. Since one on one online counseling is very labor intensive, automating this kind of support could help to reach more victims. Early work in the field of affective computing demonstrated that virtual agents are able to reduce negative emotions in users by addressing them [3]. More recent developments show that empathic agents are increasingly capable of complex social and emotional dialogues. However, these dialogues are predominantly task-oriented, i.e. to help users perform concrete tasks, such as finding information and learning, whereas giving social support is unrelated to this type of tasks.

Our research concerns the design and implementation of an Embodied Conversational Agent (ECA) that provides social support to victims of cyberbullying. The ECA 'lives' on the computer screen of potential victims of cyberbullying. When a child feels uncomfortable because of a cyberbullying incident, it turns to the ECA for emotional support and practical advice on how to deal with the situation, just as it would do with a human online counselor.

2. RESEARCH OBJECTIVE AND SCOPE

The objective of this thesis is to present a working prototype of an Embodied Conversational Agent that provides social support to victims of cyberbullying. The domain of cyberbullying was selected, because it is a socially relevant, real world problem. However, this means the development and evaluation of the prototype is slightly more complex than usual.

First, we would like to remark that the focus of the research is on providing social support. The goal of the ECA is to increase the user's well-being and decrease the perceived burden of his/her problem. We assume the user's problem is connected to cyberbullying, but we do not claim the ECA is a solution for the problem of cyberbullying. If we can establish the ECA is successful in providing support, a next step could be to investigate the effectiveness of the ECA against cyberbullying. However, currently, this is beyond the scope of the project.

To be able to give social support to victims of cyberbullying, the ECA needs domain knowledge about cyberbullying, for example about what types of cyberbullying exist and what advice to give in which situation. Although this knowledge in itself is interesting, our focus is on the technology for providing social support. It is our aim to make the technology as domain independent as possible, in a way that changing the domain knowledge leads to different conversations between the ECA and the user. To keep the amount of specific domain knowledge to a minimum, we will use a limited set of scenarios to evaluate the ECA.

Finally, we would like to point out that there is a big difference between successful laboratory experiments and a real world software application. Many additional criteria play a part in the feasibility and acceptability of software applications, such as the protection of privacy and other ethical and legal issues. At the very least the ECA should be able to detect and deal with cases it can not handle, either by referring the user to a specialized helpline, or call in a human counselor that takes over the conversation.

3. RESEARCH QUESTIONS

In this thesis, we address ways to make an ECA display supportive behavior. The main research question is:

> *How can Embodied Conversational Agents (ECAs) provide social support to victims of cyberbullying?*

This question can be split up into multiple sub questions:

1. How do humans give social support?
2. How can human strategies for social support be implemented in an ECA?

[1] www.cybermentors.org.uk
[2] www.pestweb.nl

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3. How do users respond to the comforting ECA?

As mentioned before, all humans are, to some extent, capable of comforting others. Therefore, the ECA's behavior is inspired by how humans give support. Based on a literature study and interviews with online counselors, promising strategies for social support have been selected. These strategies are implemented in a working prototype of the ECA. Since we are interested in the extent to which users actually feel supported by the system (i.e., perceived social support), we will evaluate the prototype in a user study.

4. APPROACH

To determine how humans give social support, we consulted human counselors and conducted a literature study. The counselors structure their conversations according to the 5-phase model, a methodology developed for counseling via telephone and chat [1]. In each conversation phase, one or more topics are addressed. Conversation topics were identified by Burleson and Goldsmith based on cognitive appraisal theories of emotions [2].

These results have been implemented in a baseline prototype of the comforting ECA. The main components of the prototype are: input and output modalities, knowledge bases, emotional module, and the reasoning engine. The agent's reasoning engine is modeled according to the Belief-Desire-Intention (BDI) paradigm. This means the agent has beliefs (e.g., about what advice to give in which situations), goals (e.g., to know about the upsetting event), and plans (e.g., to give advice after it knows about the upsetting event).

The study on how humans give social support also yielded the insight that other techniques for social support can be divided in verbal and nonverbal strategies. An example of a verbal social support strategy is giving compliments; for instance, the agent may say *Good of you to have told your parents about the bullying!* Nonverbal social support consists of facial expressions that match the content of the speech act uttered by the ECA. For example, if the agent expresses sympathy with the user because he is being bullied, a sad facial expression might be appropriate.

In the next phase of our research, the baseline prototype will be extended with both verbal and nonverbal support strategies. Combining these two ways of comforting the user results in four configurations to evaluate: without verbal support and without embodiment (the baseline system), without verbal support and with embodiment, with verbal support and with embodiment, and with verbal support and with embodiment.

Currently, we have implemented the following verbal support strategies: sympathy, compliment, encouragement, advice and teaching [5]. These strategies are linked to the phases in the 5-phase conversation model.

The next step will be to implement nonverbal support. Nonverbal support is executed by the embodiment of the agent, which is an animated character with an appearance that appeals to the target audience (i.e., children and adolescents in certain age groups). At the moment, we are evaluating different possible embodiments for the ECA.

Finally, the prototype has to be evaluated. Since we are dealing with a sensitive topic (cyberbullying) and a vulnerable target audience (children), we need to know how good the system is before we can involve children in the evaluation process. Therefore, we will first perform an expert evaluation with online counselors as test subjects.

5. CONTRIBUTIONS

The main contribution of this research is a better understanding of how ECAs can provide social support. By comparing the performance of the four different configurations of the social support agent, we can substantiate to what extent adding verbal support and the embodiment contribute to the perceived social support. Overall, we expect that perceived social support of the ECA increases by adding verbal social support and the embodiment. Because the verbal channel is the main communication channel, we expect that adding verbal social support has a stronger impact on perceived social support than adding non verbal support.

6. ACKNOWLEDGEMENTS

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7. REFERENCES

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