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1 Research Interests

My research interests lie generally in the area of **human computer interaction** and the ways in which language can create **multimodal grounding** between human participants and virtual agents. Grounding is defined generally as "the augmentation of common ground as the production of contributions" (Traum, 1999) between any or all participants involved. Learning what causes this development of common ground is essential in spoken dialogue systems because by studying the human ability to communicate, we can better understand the ways in which we interact with machines across variety of different scenarios. Furthermore, we can study what builds trust and connections between humans and apply these same techniques to automated systems to produce more helpful and efficient machines. I have previously studied human interaction and language, particularly **word choice,** between people in the field of psychology and linguistics, but I have also studied human dialogue between an embodied virtual agent, a disembodied virtual agent, and an embodied robot. Much of my work includes **analyzing data** from these recordings to annotate and code for signs of mutual grounding or cases of non-understanding, both **verbal and non-verbal**. By studying human language in as many varied scenarios as possible, I hope that I can eventually work with spoken dialogue systems in the future and develop trust and mutual understanding between humans and their technology.

1.1 Past Research

As part of the USC Family Studies Project Lab last year, I worked extensively with the Home Data team and used the Audacity software to help transcribe and analyze hundreds of recordings of couples throughout their daily lives. The purpose of this study was to find a correlation between couple's overall relationship satisfaction and their everyday dialogue. In particular, we focused on word choice, and the phenomenon that I helped study was the use of first-person pronouns in everyday conversation, (e.g. "I" "I'm", and "I'll"). Our prediction was that high first person pronoun use would lead to less satisfaction between partners. For women, this was true overall, but in times of conflict, higher first person pronoun use actually led to more relationship satisfaction (Power et al., 2016). These were important findings because they showed a possible correlation between language and satisfaction, implying trust and overall happiness. When dealing with spoken dialogue systems, these findings could also be used as a guide to avoid first person pronoun use in most conversational language, but to use first person pronouns more during times of conflict, to take the blame for mistakes or to show support and understanding (Ex: "I know, I was wrong").

1.2 Present Research

Currently, I am working at the Institute for Creative Technologies, studying human interactions with various different virtual characters, both embodied and disembodied. As part of the New Dimensions in Testimony project, we are working with pre-recorded clips of a Holocaust survivor, where participants can ask questions and receive real time responses through voice recognition and an automated system that chooses an appropriate answer (Traum et al., 2015). By having this form of active, spoken dialogue between the participant and the survivor, we hope to instill passion and interest in their stories in a way that could not be accomplished with regular video. The way that these participants have interacted with the survivor sheds light onto a new form of interactive education that can promote interest and withstand the test of time, and I see many potential applications in the future with this technology. Additionally, I am also working on a Robot Grounding project that analyzes signs of grounding in a participant as he or she interacts with a disembodied virtual human and an embodied robot as they navigate through two different ranking tasks. We also study the effects of having the participant talk about favorite activities and personal information to see if this would develop a stronger bond between the agent and the participant. Data collection is still currently ongoing, and I am helping with annotations of different signs of grounding.

1.3 Future Research

In the future, I hope to continue in the field of spoken dialogue systems and natural language processing to improve the current systems and develop context dependent responses as well as more robust voice recognition systems. I am curious to see if spoken dialogue can be used in more varied environments, like inside a classroom with young students as a form of education, or inside nursing homes with the elderly as a form of companionship. With the way technology is advancing, I see applications beyond just entertainment, and I hope that my research in the future can help me discover these new ways to use technology to provide aid.

2 Future of Spoken Dialog Research

In my opinion, I believe that spoken dialogue research will be used in the future to benefit people across a wider range of fields. Currently, we have systems available on personal laptops and mobile devices, but I anticipate that in the next five to ten years, this will grow to reach classrooms and larger institutions, providing aid in the form of education or therapy. I believe this generation of young researchers has no limit to the kinds of discoveries they will make, and I hope that we will be able to discover the technology needed to develop spoken dialog systems on a much larger scale. The kinds of questions to investigate would be ones regarding error checking and scalability, as well as understanding how to enhance overall user experience rather than detract from it. Questions like "How can we build a more robust natural language processing system built without context dependency so that we can facilitate more natural conversation?" and "How can we create a system that can be understood and appreciated by the youth or the elderly?" come to mind when thinking of research in the future.

3 Suggestions for Discussion

I would be interested in any discussion regarding spoken dialogue systems, but in particular these few topics:

- Ethical and cultural standards when dealing with research in human computer interaction and societal stereotypes of artificial intelligence
- Context dependency in dialogue and potential ideas to deal with context dependent questions and answers
- More frequent connectivity between researchers whether it be through conferences or a technological interface
- Examining user needs and working with marketing specialists who can understand the benefits of spoken dialogue research and advise where it can best be applied

References

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Biographical Sketch

Eugenia (Anya) Hee is an undergraduate student at the University of Southern California studying computer science and cognitive science. She hopes to pursue higher level education in computer science with an emphasis in artifical intelligence. She has experience as a research assistant both at the University of Southern California as well as the Institute for Creative Technologies affiliated with the university. In her free time, she enjoys listening to music, traveling, and baking desserts.