

# Cassidy Rae Henry

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## 1 Research Interests

My developing research interests are primarily in **linguistics**. I especially enjoy **computational linguistics**, and in addition to using computational analysis within linguistics, I am very interested in **artificial intelligence, machine learning, and neural networking**. My favorite subfields of linguistics are **morphology, phonology, phonetics**, and social/behavioral **affect in language**, especially in the context of **human-robot interaction**.

### 1.1 Present work

Currently, I am doing work on a robot-based dialog system at ARL. I am researching to investigate how various perceptions of a robot teammate may affect one's language or paralinguistic speech towards a robot. This is my first dialog system project, but I am very excited to continue research in this area, as it ties in very closely with my strong research interests in artificial intelligence and computational linguistics. I have also participated in several data collection experiments for USC ICT's New Dimensions in Testimony project, and attend their weekly Natural Language Group meetings, which is furthering my interest in dialog systems research. It is inspiring to be able to work with top people in the field on projects such as these.

Outside of dialog research, I am currently working on a illustratory phonology project of a Turkic language spoken in Eastern Europe/Russia with another student in my department under the supervision of a faculty member. This project is an extension of a final paper I completed for a phonetics class. We are hoping to submit it for publication in the JIPA.

In terms of the future, I also have many personal research projects that I hope to have more time to develop, such as large-scale analysis of Internet linguistic phenomenon, amongst other linguistic topics. My home department also highly encourages research projects within their classes, so I will also be doing lots of linguistics research there too.

### 1.2 Past work

In the past, I have done corpus-based linguistics projects, such as analysis of loanwords in the Russian language in terms of when they entered the language and how frequently they are used. In that project, I found that words relating to technology and other modern phenomena tended to enter in the post-Soviet era, and words otherwise experienced a vast increase in usage relative to other words at the time in the post-Soviet era.

## 2 Future of Spoken Dialog Research

Dialog research in the next few years will most likely be focusing on automation. Instead of humans building corpuses or question-answer systems for dialog systems, dialog systems in the future will be based off of intelligent natural language systems that are trained to handle specific information, similar to how IBM Watson has shown it can be used, using Wikipedia as its "knowledge base." In the time between then and now, young researchers will be the ones working on the solutions to the problems standing in the way between now and then. I believe with the huge strides of progress being made within computational linguistics currently, that dialog systems research will as a result have great progress.

The current problems that need to be addressed are wide in scope. One of them is of particular interest to me – how affect and paralinguistic elements can be integrated into dialog systems, particularly in the forms of detection and understanding. Another big consideration is including paralinguistic information such as gestures, which will allow for future accessibility (laying a pathway for interpreting gesture could allow dialog systems that use sign languages, leading to greater accessibility of the dialog system. These are pertinent issues that should be considered while other big issues are being evaluated and rectified in dialog systems research.

Other issues include addressing linguistic variation, allowing for wider sets of behavior, state tracking, and more. David DeVault of ICT and Nigel Ward

describes these issues in great detail in *Ten Challenges in Highly-Interactive Dialog Systems*.

### 3 Suggestions for discussion

In terms of potential discussions at YRRSDS 2016, I would be interested in a variety of topics. One such topic I think of often is how to incorporate facial expressions and gesture-based communication into dialog systems. This is not only important because of our very gesture-rich and expressive movements in communication, but also for accessibility – people who are hard of hearing should be able to use sign language as an input. ASL speakers don't just sign blank-faced, however. The prosodic elements of speech for ASL are strong – from their facial expressions, to rate of movement and even flow in movement, there's lots going on. While things like this could be identified in vocal speech ASR through analysis of soundwaves (and is currently underdeveloped in research), it is much harder to recognize prosodic elements of sign-based speech for an AI system.

This also broaches the broader topic of accessible dialog systems. It is important for researchers to address the issues of accessibility now while dialog systems are in development, before they are implemented on a wide-scale basis and then cannot be used by an entire population group due to some issue of accessibility. Dialog systems also have great potential for expanding access of information or making certain tasks easier for people with certain kinds of disabilities, so it is important to be accessible in that regard as well.

Another area of interest I find worth discussing is automation of grounding techniques in dialog systems. Grounding is the strongest way that one can show that they are both following a conversation and understanding what the other conversational party is talking about. Therefore, a dialog system that automatically uses grounding techniques could be viewed as more efficient or trustworthy based upon how good it is at doing so. In certain context, the user's perception of the dialog system can matter a lot in how successful they are at completing a task. This falls under the umbrella of natural dialog systems.

With the explosion of neural networking and machine learning within computational linguistics, I think it would be fun to consider expansive techniques and current research problems for natural dialog systems. I believe that while efficient for simple tasks, dialog systems with limited vocabulary are not engaging. Natural dialog systems allow the user to actually *engage* the conversational agent instead of just being required to adapt to a question-answer system. Many

exciting research problems currently exist within the field of natural dialog systems and this would be great conversation at YRRSDS, as young researchers are the ones who will be working on these issues.

### References

- Dialog. (n.d.). Retrieved July 15, 2016, from <http://www.ibm.com/watson/developercloud/dialog.html>
- Nigel G. Ward and David DeVault. 2015. *Ten Challenges in Highly-Interactive Dialog Systems*. Institute for Creative Technologies, University of Southern California.

### Biographical Sketch



Cassidy Henry is a 21-year-old, current senior undergraduate student at the University of California, Los Angeles (UCLA) studying Linguistics with a specialization in Computer Science, and a minor in Russian language. Prior to that, she was enrolled at College of the Canyons to prepare for transfer to UCLA. In the past, she has also studied Russian at Kazan National Technological University in Kazan, Tatarstan, Russia on the U.S. Department of State's National Security Language Initiative for Youth (NSLI-Y) program. She plans to pursue a PhD in Linguistics following her undergraduate career, while maintaining the focus on computational linguistics. Cassidy aspires to work as an academic researcher upon completion of her PhD, as she finds research invigorating and exciting.

Cassidy is also currently a visiting research assistant at the U.S. Army Research Lab, West (ARL West) campus, where she works on a bot language project under the supervision of a team in the Human Research and Engineering and Computational and Information Sciences Directorates.