GRFP Personal Statement **Julia Mendelsohn**

Introduction. I didn't realize how strangely I talked until I switched coasts for college. Suddenly, I was the only one who pronounced *Mary, merry,* and *marry* differently, *kvetched* about problem sets, and waited *on line* for my morning coffee. I became fascinated by how language conveys social information beyond the semantic content alone. How do our cultures, and social networks impact how we talk, and how do we communicate our values through language? I began to answer these questions by completing a BA in Linguistics at Stanford University. Attending college in Silicon Valley sparked my interest in the intersection of language and computation, which led me to simultaneously complete an MS in Computer Science.

I discovered that computationally modeling social aspects of language is one of the most exciting challenges in natural language processing (NLP). Advancing this area would improve machines' overall language capabilities, provide unique insights into humans' language and behavior, and have deep implications for societal impact. As a first-year PhD student at the University of Michigan School of Information, I aim to create NLP models to understand complex social relations on a large scale, improve current systems by integrating sociolinguistic awareness, and advocate for social equity through my work.

Relevant Experience. My desire to address pressing societal issues through computation has motivated several prior research experiences. For the past few years, I have become increasingly disturbed by the prevalence of dehumanizing language aimed at marginalized groups and its tragic consequences worldwide, including hate crimes and even genocide. I addressed this issue in my Honors Thesis, where I introduced a set of computational linguistic techniques to analyze and quantify dehumanization. For example, I used log-odds statistics and vector space models to identify lexical associations and connotations of group labels. I also developed embedding-based techniques to quantify subtle, indirect invocations of dehumanizing metaphors, such as likening a target group to vermin. As a case study, I investigated changing representations of LGBTQ communities in the *New York Times* over three decades. While LGBTQ groups have been increasingly humanized overall, some labels (e.g. *homosexual*) began to occur in more dehumanizing contexts than other labels (e.g. *gay*), demonstrating how different social meanings can emerge from words with seemingly similar definitions.

I am grateful to have presented this work at a sociolinguistics conference (NWAV 47), and I am preparing a journal article for submission to the Frontiers Research Topic in Computational Sociolinguistics. Influenced by psychology, computer science, linguistics, and political science, this project made me appreciate the benefits of highly interdisciplinary research. Because dehumanization emerges through subtle manipulations of linguistic variables, my sociolinguistics background uniquely prepared me to undertake this work. My computational methods enabled large-scale study of this complex phenomenon, and even revealed linguistic changes not easily identifiable through qualitative analysis alone. While I mostly worked independently, I benefited from actively seeking out resources and advice. I am grateful for my discussions with Prof. Dan Jurafsky and Prof. Yulia Tsvetkov, whose insights into creating NLP techniques to address social questions have deeply impacted my own perspectives. Finally, this experience has demonstrated how I could pursue my passions for social change through academic research.

I have further explored using NLP to address urgent sociopolitical issues through an independent course project. I created diachronic word embeddings and developed a recurrent neural network autoencoder to model how polarizing issues and people, such as abortion and Hillary Clinton, are discussed in online communities. I analyzed how representations of these issues and people have changed over time and vary across ideologies. Though short-term, this

experience has greatly influenced my current plan to study how controversial issues are framed in U.S. social media, and the impact of these frames on public opinion and policy decisions.

My personal experiences have inspired other work at the intersection of computation, language, and society. Language associated with women tends to be denigrated in professional and academic contexts, especially in male-dominated fields. As a woman, I learned long ago to avoid talking too "feminine" in order to be taken seriously in STEM. However, that same "feminine" language is positively evaluated in other contexts, such as with my sisters or female friends. This naturally led to my interest in how people linguistically construct a wide variety of gendered identities in different social contexts, which I studied across Reddit communities ("subreddits"). Working with another undergraduate, I used graph-based induction algorithms to create community-specific sentiment lexicons for subreddits with explicitly gendered orientations (e.g. "r/FemaleFashionAdvice"). We systematically identified differences between these lexicons; for example, while the words *omg* and *obsessed* were uniformly more positive in women-oriented communities than in men-oriented ones, *weakness* was more variable within genders. We connected our findings with differences in gender ideologies and cultural norms across communities. This large-scale analysis enabled us to make novel contributions to sociolinguistic research, which we shared in the 2019 proceedings of the Society for Computation in Linguistics.

Beyond NLP, I have a breadth of experience in other areas of computer science and linguistics. In 2015, I interned with the cognitive computing team at Hewlett Packard Labs, where I implemented and evaluated convolutional neural networks for a variety of computer vision tasks. While this experience inspired me to pursue computer science research, I sought to create connections with my coursework in linguistics. This led me to work with Prof. Michael Bernstein in Stanford's Human-Computer Interaction group to create *Iris*, a conversational agent that can execute open-ended data science tasks. Drawing upon ideas from conversation analysis theory, I helped ensure that *Iris* could communicate fluidly with its users. By creating a domain-specific language that transformed Python functions into composable commands, we enabled *Iris* to handle complex cases of anaphora and sequences of dependent questions. I co-authored a paper about *Iris* at the ACM CHI Conference on Human Factors in Computing Systems in 2018.

I have also conducted several data-driven phonetics projects. I analyzed variation in the pronunciation of /l/ between Latinx speakers from the California cities of Salinas and Bakersfield and connected this variable to differing ideologies about the value of Spanish (and its speakers) in the two cities. During an internship at the Leibniz Zentrum in Berlin, I compared phonetic features of the Berlin dialect with Kiezdeutsch, an understudied variety spoken by youth in multiethnic urban areas. These projects have shown me that studying linguistic phenomena, even as small as individual sounds, can reveal deep insights into people's social identities and communities.

These experiences have profoundly shaped my current and future endeavors. As a new PhD student, I am grateful to be advised by Prof. Ceren Budak and Prof. David Jurgens, and learn from their expertise in NLP and computational social science. I continue to build interpretable NLP models to study human interaction within sociopolitical contexts. Inspired by my prior research on framing and dehumanization, I synthesize NLP, network analysis, and communication theory to understand the language of online political discourse and its societal implications.

Intellectual Merit. Through a combination of coursework, research, and industry work, I have significant experience and skills in machine learning, NLP, and sociolinguistics. My interdisciplinary background has uniquely prepared me to apply modern computational methods to answer important social science questions and conversely to incorporate social theory into computational models. My experience in both leading self-directed projects and working as part

of a larger team enables me to flexibly adapt to the dynamic research environment that PhD students often encounter. Furthermore, I have promoted the progress of research in my field by sharing my findings with the wider academic community through publications and conference presentations in both Computer Science and Linguistics. Finally, I have cultivated collaborations and connections with scholars across disciplines, universities, and even countries.

Broader Impact. I work to support communities that are underrepresented in research and marginalized in society. My dehumanization project draws attention to issues of LGBTQ representation in the media and the harmful impact of dehumanizing language. Its implications for the automated detection of hate speech and abusive language, which disproportionately affect marginalized populations, can save lives. My sociophonetics projects brought attention to the rich linguistic diversity of several understudied communities. I believe that it is essential for social science and NLP research to represent diversity in people, ethnicities, and cultures.

I have been fortunate to have substantial support throughout my academic career. Even with the institutional privileges of being a White person from a financially-stable background, seeing few other women in STEM classes and labs made me question my qualifications and sense of belongingness. Both my advantages and challenges that I have faced have inspired me to advocate for diversity in education. In high school, I served as president of Reading Reflections, an organization that donates gently-used children's books to under-resourced schools and afterschool programs. At Stanford, I tutored underprivileged youth through the East Palo Alto Stanford Academy (EPASA) for three years. I encouraged my middle-school mentees to follow their academic passions while being sensitive to the institutional and societal challenges that many of them face as youth of color in a primarily low-income community. I also tutored a custodian named José two evenings a week for four years through Habla, an organization dedicated to teaching English as a foreign language to Stanford staff. I found teaching English intellectually rewarding because it challenged me to disentangle language instruction from harmful ideologies about "correct" or "proper" language. Moreover, I am grateful to have had the opportunity to recognize José's contributions to Stanford and give back in whatever ways possible. Reading Reflections, Habla, and EPASA have convinced me of the importance of educational outreach, and I am committed to leading such initiatives during my PhD and beyond.

These tutoring experiences helped me discover my love for teaching. Last year, I served as a teaching assistant for Prof. Dan Jurafsky's NLP course and Prof. John Rickford's African American Vernacular English (AAVE) course. In both courses, I encouraged students to explore how to apply course concepts to create positive social impact. For Prof. Jurafsky's course, I created a new assignment in which students built classifiers to determine if messages from regions struck by natural disasters were victims' requests for urgent aid. In Prof. Rickford's course, I encouraged students to think about how to apply their knowledge about AAVE to address issues such as linguistic prejudice in the courtroom. I was acutely aware of how my role as a TA put me in a position of relative power. I actively counterbalanced this power differential by learning from and respecting the knowledge and experiences that my students brought into the classroom.

Future Goals. I aspire to become an expert in interdisciplinary research that combines modern computational techniques with social science theory to better understand our world. Along with my passion for learning and research, my commitment to social justice has inspired me to pursue an academic career. I aim to promote inclusion and equity through research, teaching, and outreach. I hope that my PhD studies will lead me to a future career as a professor, where I can work both as a researcher and teacher. I especially look forward to sharing my knowledge in an area that I care so deeply about, and I hope to inspire similar passions in my future students.