REDUNDANCY AND SYNTACTIC REDUCTION IN SPONTANEOUS SPEECH

A DISSERTATION SUBMITTED TO THE DEPARTMENT OF LINGUISTICS AND THE COMMITTEE ON GRADUATE STUDIES OF STANFORD UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Tim Florian Jaeger September 2006 In deep respect, appreciation, and love to my first friends and advisors,

Rolf and Christiane

Acknowledgments

High above the clouds of California, I feel an acute sense of loss. Yesterday I walked through golden hills. The last five years have been full of experiences that I wouldn't have dared to anticipate. I could not have imagined a fraction of the opportunities that have opened up. Coming from a German academic environment to Stanford, I have been most impressed by the truly scholarly atmosphere, where colleagues are not afraid to share ideas, where advisors have time for their students, and where academic curiosity is more important than academic hierarchies. It has been an extraordinary privilege to work and hang out with so many amazing people.

My walk through the graduate program may at times have appeared more like an erratic chicken dance than anything with a clear goal. That I found a topic that caught my imagination and made me look forward to a life of research, is mostly due to my advisors Tom Wasow, Dan Jurafsky, and Ted Gibson. One of Tom's classes inspired me to use corpora for psycholinguistic investigation. Ironically, I started working with Tom while I was visiting MIT. I had just joined Ted's lab and I was amazed by the productivity and scientific attitude of the peeps there. It was a time of intense learning for me (thanks, foremost, to Ted and Ev'). As should be obvious from the topic of this thesis, the idea was also inspired by Dan's work on probabilistic phonetic reduction. I am grateful to Tom, Dan, Ted, and Elizabeth Traugott for so many mind-opening conversations, their support and encouragement, as well as for giving me enough space to make my own discoveries (or letting me feel they were my own). I also thank them as well as David Beaver and Michael Ramscar for a truly enjoyable thesis defense that gave me plenty of food for thought. Elizabeth and Tom in particular read countless drafts of my thesis and always shared valuable feedback. Later in the process, Joan joined my reading committee. The methodological approach taken in this thesis is strongly influenced by Joan's work and I benefitted immensely from the first ever *Laboratory Syntax* class she taught.

This thesis grew out of collaborations with Tom and Dave Orr (foremost, Wasow, Jaeger, and Orr, 2006, where we first developed the idea that relativizer omission is influenced by the predictability of a relative clause). Parts of this thesis (Study 4 – 6) are based on collaboration with Roger Levy (Jaeger and Levy, 2006; Levy and Jaeger, to appear). I learned so much from Roger without whom those Studies would not have been possible. Thanks also go to the wonderful collaborators on other projects that have influenced this thesis: Dan Jurafsky, Neal Snider, Laura Staum, Mary Ann Walter, Rafe Kinsey, and Harry Tily. These collaborations have pushed me beyond where I could have gone by myself, so that I truly hope that we will continue them.

I also wish to thank the following colleagues for invaluable help and advice: Tom, Herb Clark, Vic Ferreira, and Rebecca Scarborough for discussion about production pressures and audience design; Ted, Dan, Herb, Vic, Ev', Shravan Vasishth, and Mike Tanenhaus for providing me with a wider perspective on issues regarding the psychology of language; Joan, Dan, Roger, and Shravan for help with statistics and the jungle of R; Sasha Calhoun, Shipra Dingare, Doug Rohde, and, most of all, Neal Snider for help with the data extraction; John Beavers and Judith Tonhauser for help with formatting; Harry Tily and Rafe Kinsey, as well as the participants in the 15-hour-2-bucks-per-unique-typo-fund-drive (a party fundraiser) for feedback on earlier drafts; and Coco, Melanie, Allen, Gretchen and the rest of the administrative staff in the department for un-bureaucratic help with administrative obstacles and for always brightening our days.

In addition to those mentioned above, I wish to express my appreciation of the following people for help, stimulating discussions, or critical feedback, all of which in some way or ther other influenced this thesis: Arto Anttila, Inbal Arnon, Ellen Bard, Lev Blumenfeld, Edward Flemming, Michael Frank, Matt Goldrick, John/Jack Hawkins, Irene Heim, Rafe Kinsey, Paul Kiparsky, Lars Konieczny, Maryellen MacDonald, Alec Marantz, Andrew Nevins, Lissa Newport, Hannele Nicholson, John Paolillo, David Pesetsky, Janet Pierrehumbert, Alex Pouget, Philip Resnik, Doug Roland, Ivan Sag, Rich Shiffrin, Neal Snider, Laura Staum, Harry Tily, Michael Wagner, Laura Whitton, and an unidentified symbolic systems undergraduate student. It goes without saying that none of these colleagues necessarily agrees with the views expressed here.

My time at Stanford has also been a time of traveling. You, who accompanied me on those trips (in one or the other way), I thank you for your stories, the laughter, and moments burned into my mind for ever. Rolf and Christiane, without you I would not

have crossed the ocean to explore the states — I thank you for having been a source of support and well-meant criticism that kept me alert when necessary; Sandra, you made me fall in love with California; Andy, Chris-X, Christian S., Katrin, Mareen, and Michi, thanks for listening and sharing; Lis, thanks for all the laughs (in Apaaaaaaaache-land and elsewhere), for worlds far away, and for making this thesis possible; Lorina, I would walk those miles in Trento barefoot again anytime — I appreciate your resourcefulness in defying conventionality. Valarie, Zach, Karlita, Marisa, Irene, Lev, Inbal, Hal, and Satoko, you made Boston and Palo Alto places I wanted to be at. Mariah, I thank you for your patience when I was absent-minded, for the walks, for your curiosity, your subtle ways, and, well, some other really enjoyable things;-). All of you, my friends, have been my guides, encouragement, and inspiration, and I would not have come to this point without you.