



/ **Princeton University Doctoral Dissertations, 2011-2017** (/jspui/handle/88435/dsp01td96k251d)
 / **Neuroscience** (/jspui/handle/88435/dsp016h440s48r)

Please use this identifier to cite or link to this item: <http://arks.princeton.edu/ark:/88435/dsp01jw827b806>

Title:	The Neural Correlates of Real-World Communication
Authors:	Silbert, Lauren (/jspui/browse?type=author&value=Silbert%2C+Lauren)
Advisors:	Hasson, Uri (/jspui/browse?type=advisor&value=Hasson%2C+Uri)
Contributors:	Neuroscience Department
Keywords:	communication (/jspui/browse?type=subject&value=communication) comprehension (/jspui/browse?type=subject&value=comprehension) coupling (/jspui/browse?type=subject&value=coupling) interaction (/jspui/browse?type=subject&value=interaction) production (/jspui/browse?type=subject&value=production) time-warp (/jspui/browse?type=subject&value=time-warp)
Subjects:	Neurosciences (/jspui/browse?type=subject&value=Neurosciences) Cognitive psychology (/jspui/browse?type=subject&value=Cognitive+psychology)
Issue Date:	2014
Publisher:	Princeton, NJ : Princeton University
Abstract:	Successful verbal communication requires the finely orchestrated interaction between production-based processes in the speaker's brain and comprehension-based processes in the listener's brain. The degree of overlap between the production and comprehension systems remains controversial, and the ways in which they interact is largely unknown. This dissertation pursues four aims: 1) to map all areas (sensory, motoric, linguistic and extra-linguistic) that are reliably activated during the production of complex, real-world narrative; 2) to map the overlap between areas that respond reliably during production and comprehension of real-world narrative; 3) to assess the coupling between activity in the speaker's brain during production and activity in the listener's brain during comprehension; and 4) to explore the temporal relationship between production and comprehension and the role of prediction in neural coupling. Natural speech production is difficult to study due to methodological challenges inherent to complex speech production. To achieve the first aim, we built a novel time-warping technique that allowed for the measurement of multiple complex speech productions in fMRI, and used intersubject correlation to map the entire production network reliably activated during speech production. Given this result, we then mapped the comprehension system during comprehension of the same speech and measured the extent of spatial overlap between the two processes (Aim 2). We then directly compared the response profiles during speech production and comprehension by building a model of the listener's brain responses based on the speaker's (Aim 3). Further, we added a temporal relationship into the model and found that the speaker's brain activity is spatially and temporally coupled with the listeners' brain activity: while on average the listeners' brain activity mirrored the speaker's activity with a delay, we also found areas that exhibit predictive anticipatory responses. Lastly, we explored the role of prediction in neural coupling by connecting the extent of neural coupling to a quantitative measure of story comprehension and found that the greater the anticipatory speaker-listener coupling, the greater the understanding (Aim 4). Overall, the results of this dissertation argue that a shared neural mechanism supporting both production and comprehension facilitates communication, and underline the importance of studying comprehension and production within a unified framework.
URI:	http://arks.princeton.edu/ark:/88435/dsp01jw827b806 (http://arks.princeton.edu/ark:/88435/dsp01jw827b806)
Alternate format:	The Mudd Manuscript Library retains one bound copy of each dissertation. Search for these copies in the library's main catalog (http://catalog.princeton.edu)
Type of Material:	Academic dissertations (Ph.D.)
Language:	en

Appears in

Neuroscience (/jspui/handle/88435/dsp016h440s48r)

Collections:


Files in This Item:

File	Description	Size	Format	
Silbert_princeton_0181D_10854.pdf		7.77 MB	Adobe PDF	View/Download (/jspui/bitstream/88435/dsp01jw827b806/1/Silbert_princ

Show full item record (/jspui/handle/88435/dsp01jw827b806?mode=full)

Items in Dataspace are protected by copyright, with all rights reserved, unless otherwise indicated.

Search



This Collection

[Advanced Search \(/jspui/simple-search?location=88435/dsp016h440s48r\)](#)

Browse

Issue Date

Author

Academic Advisor

Subject