

# Dave F. Kleinschmidt

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## Education

- 2016 **Ph.D. Brain and Cognitive Sciences**, *University of Rochester*, Rochester, NY.  
*Perception in a Variable but Structured World: The Case of Speech Perception*. Committee: T. Florian Jaeger (advisor), Richard Aslin, Lori Holt, Jeffrey Runner (chair)
- 2009 **B.A. Mathematics, concentration Cognitive Science**, *Williams College*, Williamstown, MA,  
*Summa cum laude*, highest honors in Cognitive Science.  
Senior thesis advisor: Safa Zaki

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## Appointments

- 2018 **Assistant Professor of Psychology and Center for Cognitive Science**, *Rutgers University*, New Brunswick.
- 2016–2018 **C.V. Starr Fellow**, *Princeton Neuroscience Institute*.
- 2009–2010 **Baggett Fellow**, *University of Maryland, Linguistics Department*.  
Post-baccalaureate research fellowship. Advised by Bill Idsardi.
- 2006–2009 **Research Assistant**, *Williams College, Department of Psychology*.  
Supervised by Safa Zaki.

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## Publications

### Papers

- in press Wu\*, M.-H., Kleinschmidt\*, D. F., Emberson, L. L., Doko, D., Edelman, S., Jacobs, R., & Raizada, R. D. S. Cortical transformation of stimulus-space in order to linearize a linearly inseparable task. *Journal of Cognitive Neuroscience*. <https://psyarxiv.com/ctgy6>
- 2019 Kleinschmidt, D. F. Structure in talker variability: How much is there and how much can it help? *Language, Cognition and Neuroscience*, 34(1), 43–68. <https://doi.org/10.1080/23273798.2018.1500698>
- 2018 Kleinschmidt, D. F., Weatherholtz, K., & Jaeger, T. F. Sociolinguistic perception as inference under uncertainty. *Topics in Cognitive Science*, 10(4), 818–834. <https://doi.org/10.1111/tops.12331>
- 2016 Kleinschmidt, D. F., & Jaeger, T. F. Re-examining selective adaptation: Fatiguing feature detectors, or distributional learning? *Psychonomic Bulletin & Review*, 23(3), 678–691. <https://doi.org/10.3758/s13423-015-0943-z>
- Pajak, B., Fine, A. B., Kleinschmidt, D. F., & Jaeger, T. F. Learning additional languages as hierarchical probabilistic inference: Insights from first language processing. *Language Learning*, 66(4), 900–944. <https://doi.org/10.1111/lang.12168>
- 2015 Kleinschmidt, D. F., & Jaeger, T. F. Robust speech perception: Recognize the familiar, generalize to the similar, and adapt to the novel. *Psychological Review*, 122(2). <https://doi.org/10.1037/a0038695>
- 2014 Salverda, A. P., Kleinschmidt, D. F., & Tanenhaus, M. K. Immediate effects of anticipatory coarticulation in spoken-word recognition. *Journal of Memory and Language*, 71(1), 145–163. <https://doi.org/10.1016/j.jml.2013.11.002>
- Zaki, S. R., & Kleinschmidt, D. F. Procedural memory effects in categorization: Evidence for multiple systems or task complexity? *Memory & cognition*, 42(3), 508–24. <https://doi.org/10.3758/s13421-013-0375-9>

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\* Indicates equal contributions.

- 2011 Croft, W., Bhattacharya, T., **Kleinschmidt, D. F.**, Smith, D. E., & Jaeger, T. F. Greenbergian universals, diachrony, and statistical analyses. *Linguistic Typology*, 15(2), 433–453. <https://doi.org/10.1515/LITY.2011.029>  
 From Duplicate 2 ( Greenbergian universals, diachrony and statistical analyses William Croft, - Croft, William; Bhattacharya, Tanmoy; Kleinschmidt, Dave; Smith, D Eric; Jaeger, T Florian )

### Submitted and in preparation

- in preparation **Kleinschmidt, D. F.** *Constraints on phonetic distributional learning in adults: The role of prior experience.* <https://osf.io/tv8wm/>  
**Kleinschmidt, D. F.**, Raizada, R., & Jaeger, T. F. *Neural mechanisms of rapid adaptation to unfamiliar talkers via distributional learning.*  
 submitted Luthra, S., Correia, J. M., **Kleinschmidt, D. F.**, Mesite, L., & Myers, E. B. *Lexical information guides retuning of neural patterns in perceptual learning for speech.*

### Refereed Proceedings Papers

- 2019 **Kleinschmidt, D. F.**, & Hemmer, P. A Bayesian model of memory in a multi-context environment (A. Goel, C. Seifert, & C. Freksa, Eds.). In A. Goel, C. Seifert, & C. Freksa (Eds.), *Proceedings of the 41st Annual Conference of the Cognitive Science Society*, Austin, TX, Cognitive Science Society. [osf.io/vuksn/](https://osf.io/vuksn/)  
 2018 **Kleinschmidt, D. F.** Learning distributions as they come: Particle filter models for online distributional learning of phonetic categories (T. T. Rogers, X. Rau, X. Zhu, & C. Kalish, Eds.). In T. T. Rogers, X. Rau, X. Zhu, & C. Kalish (Eds.), *Proceedings of the 40th Annual Conference of the Cognitive Science Society*, Austin, TX, Cognitive Science Society. <https://doi.org/10.31234/osf.io/dymc8>  
 2016 **Kleinschmidt, D. F.**, & Jaeger, T. F. What do you expect from an unfamiliar talker? (J. Trueswell, A. Papafragou, D. Grodner, & D. Mirman, Eds.). In J. Trueswell, A. Papafragou, D. Grodner, & D. Mirman (Eds.), *Proceedings of the 38th annual meeting of the cognitive science society*, Austin, TX, Cognitive Science Society.  
 2015 **Kleinschmidt, D. F.**, Raizada, R., & Jaeger, T. F. Supervised and unsupervised learning in phonetic adaptation (R. Dale, C. Jennings, P. Maglio, T. Matlock, D. Noelle, A. Warlaumont, & J. Yoshimi, Eds.). In R. Dale, C. Jennings, P. Maglio, T. Matlock, D. Noelle, A. Warlaumont, & J. Yoshimi (Eds.), *Proceedings of the 37th annual conference of the cognitive science society*, Austin, TX, Cognitive Science Society.  
 2012 **Kleinschmidt, D. F.**, Fine, A. B., & Jaeger, T. F. A belief-updating model of adaptation and cue combination in syntactic comprehension (N. Miyake, D. Peebles, & R. P. Cooper, Eds.). In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th annual conference of the cognitive science society*, Austin, TX, Cognitive Science Society.  
**Kleinschmidt, D. F.**, & Jaeger, T. F. A continuum of phonetic adaptation: Evaluating an incremental belief-updating model of recalibration and selective adaptation (N. Miyake, D. Peebles, & R. P. Cooper, Eds.). In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th annual conference of the cognitive science society*, Austin, TX, Cognitive Science Society.  
 2011 **Kleinschmidt, D. F.**, & Jaeger, T. F. A Bayesian belief updating model of phonetic recalibration and selective adaptation, In *Proceedings of the 2nd ACL workshop on cognitive modeling and computational linguistics*, Stroudsburg, PA, Association for Computational Linguistics.

### Presentations

- 2020 Knutsen, S., Stromswold, K., & **Kleinschmidt, D. F.** *Compensation, classification and inferring sentence structure from acoustic duration* [Poster presented at LabPhon 17]. Vancouver, Canada (virtual). Poster presented at LabPhon 17.  
 2019 **Kleinschmidt, D. F.** *Who's talking and what are they saying?* [Talk presented at the 177th Meeting of the Acoustical Society of America]. Louisville, KY. Talk presented at the 177th Meeting of the Acoustical Society of America. [osf.io/jt5wm/](https://osf.io/jt5wm/)  
 Knutsen, S., Stromswold, K., & **Kleinschmidt, D. F.** *Segmental duration as a cue to sentence structure* [Poster presented at the 32nd CUNY Sentence Processing Conference]. Boulder, CO. Poster presented at the 32nd CUNY Sentence Processing Conference. [osf.io/pmzes/](https://osf.io/pmzes/)

- Knutsen, S., Stromswold, K., & **Kleinschmidt, D. F.** *Segmental duration as a cue to sentence structure* [Poster presented at the 177th Meeting of the Acoustical Society of America]. Louisville, KY. Poster presented at the 177th Meeting of the Acoustical Society of America. [osf.io/na84g/](https://osf.io/na84g/)
- Luthra, S., Correia, J. M., **Kleinschmidt, D. F.**, Mesite, L., & Myers, E. B. *Lexical information guides retuning of neural patterns in perceptual learning for speech* [Poster presented at the Society for the Neurobiology of Language]. Helsinki, Finland. Poster presented at the Society for the Neurobiology of Language.
- 2018 **Kleinschmidt, D. F.** *A formula for bridging the table-matrix divide* [Talk presented at JuliaCon2018]. London, UK. Talk presented at JuliaCon2018. [www.davekleinschmidt.com/juliacon2018/slides.html](http://www.davekleinschmidt.com/juliacon2018/slides.html)
- Kleinschmidt, D. F.**, & Hemmer, P. *A sequential Bayesian model for learning and memory in multi-context environments* [Talk presented at the 51st annual meeting of the Society for Mathematical Psychology]. Madison, WI. Talk presented at the 51st annual meeting of the Society for Mathematical Psychology. [www.davekleinschmidt.com/dots-contexts-recall-prediction/mathpsych-2018-slides.slides.html](http://www.davekleinschmidt.com/dots-contexts-recall-prediction/mathpsych-2018-slides.slides.html)
- 2017 **Kleinschmidt, D. F.** *The ideal adapter: Life-long, hierarchical distributional learning* [Talk presented at ICON symposium "Models of category formation and adaptation: distributional learning of speech and language"]. Amsterdam, NL. Talk presented at ICON symposium "Models of category formation and adaptation: distributional learning of speech and language".
- 2016 **Kleinschmidt, D. F.**, & Jaeger, T. F. *What do you expect from an unfamiliar talker?* [Talk presented at the conference on Sociolinguistic Variation and Language Processing]. Blacksburg, VA. Talk presented at the conference on Sociolinguistic Variation and Language Processing.
- Kleinschmidt, D. F.**, & Jaeger, T. F. *What do you expect from an unfamiliar talker?* [Talk presented at LabPhon15]. Ithaca, NY. Talk presented at LabPhon15.
- Kleinschmidt, D. F.**, Raizada, R., & Jaeger, T. F. *Neural mechanisms for coping with talker variability by rapid distributional learning* [Talk presented at the Society for the Neurobiology of Language meeting]. London, UK. Talk presented at the Society for the Neurobiology of Language meeting.
- Kleinschmidt, D. F.**, Weatherholtz, K., & Jaeger, T. F. *How informative is dialect about vowel distributions?* [Poster presented at the LabPhon15 workshop on higher-order structure in speech variability]. Ithaca, NY. Poster presented at the LabPhon15 workshop on higher-order structure in speech variability.
- 2015 **Kleinschmidt, D. F.**, Jaeger, T. F., & Raizada, R. *Informativity in adaptation: Supervised and unsupervised learning of linguistic cue distributions* [Poster presented at the 28th Annual CUNY Sentence Processing Conference]. Los Angeles, CA. Poster presented at the 28th Annual CUNY Sentence Processing Conference.
- 2014 Jaeger, T. F., & **Kleinschmidt, D. F.** *Efficient language understanding in a variable world: Prediction and adaptation* [Talk jointly presented at the 21st Annual Meeting of the Cognitive Neuroscience Society]. Boston, MA. Talk jointly presented at the 21st Annual Meeting of the Cognitive Neuroscience Society.
- Jaeger, T. F., & **Kleinschmidt, D. F.** *Speech perception and adaptation as inference under uncertainty* [Plenary talk jointly presented at the 15th Australasian International Speech Science and Technology Conference]. Christchurch, NZ. Plenary talk jointly presented at the 15th Australasian International Speech Science and Technology Conference.
- 2013 **Kleinschmidt, D. F.**, & Jaeger, T. F. *Speech perception, the lack of invariance, and adaptation: A computational level analysis* [Poster presented at the Workshop on Current Issues and Methods in Speaker Adaptation]. Columbus, OH. Poster presented at the Workshop on Current Issues and Methods in Speaker Adaptation.

- Kleinschmidt, D. F., & Jaeger, T. F.** *Speech perception, the lack of invariance, and adaptation: A computational level analysis* [Poster presented at the LSA Institute 2013 Workshop: How the brain accommodates variability in linguistic representations]. Columbus, OH. Poster presented at the LSA Institute 2013 Workshop: How the brain accommodates variability in linguistic representations.
- Salverda, A. P., **Kleinschmidt, D. F.**, & Tanenhaus, M. K. *Immediate effects of anticipatory coarticulation in spoken-word recognition* [Talk presented at the 54th Annual Meeting of the Psychonomic Society]. Toronto, ON, Canada. Talk presented at the 54th Annual Meeting of the Psychonomic Society.
- 2012 **Kleinschmidt, D. F., Fine, A. B., & Jaeger, T. F.** *A Bayesian belief-updating model of syntactic expectation adaptation* [Poster presented at the 25th CUNY Sentence Processing Conference]. New York, NY. Poster presented at the 25th CUNY Sentence Processing Conference.
- Kleinschmidt, D. F., & Jaeger, T. F.** *Evaluation of a Bayesian belief-updating model for the time course of linguistic adaptation* [Poster presented at the 25th CUNY Sentence Processing Conference]. New York, NY. Poster presented at the 25th CUNY Sentence Processing Conference.
- 2011 Zaki, S. R., & **Kleinschmidt, D. F.** *Response location effects in categorization: Evidence for multiple systems or task complexity?* [Poster presented at the 52nd Annual Meeting of the Psychonomic Society]. Seattle, WA. Poster presented at the 52nd Annual Meeting of the Psychonomic Society.
- 2010 **Kleinschmidt, D. F.** *Efficient coding of speech in the auditory cortex* [Poster presented at the 2nd Annual Neurobiology of Language Conference]. San Diego, CA. Poster presented at the 2nd Annual Neurobiology of Language Conference.

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## Invited Talks

### Colloquia

- 2019 **Integrated Language Science and Technology Seminar**, *University of Pennsylvania*, October 25, 2019.
- Cognition and Language Workshop**, *Stanford University*, May 9, 2019.
- Cognitive Science Center Colloquium**, *Williams College*, April 11, 2019.
- 2018 **Cognitive Brown Bag series**, *Villanova University*, February 8, 2018.
- 2017 **Psychology Dept. Perception/Action/Cognition seminar**, *University of Connecticut*, October 30, 2017.
- 2014 **New Zealand Institute of Language, Brain, and Behavior Seminar**, *University of Canterbury*, December 9, 2014.
- Cognition and Language Workshop**, *Stanford University*, October 2, 2014.
- Psychology Department Seminar**, *Carnegie Mellon University*, July 22, 2014.
- Language Processing Brown Bag Seminar**, *Beckman Institute, University of Illinois*, March 6, 2014.
- Cognitive Science Colloquium**, *Tufts University*, February 13, 2014.

### Conferences

- 2019 **Exploring the interface between linguistic processing and talker recognition**, *Special session of the Annual Meeting of the Acoustical Society of America*, May 13, 2019.

### Internal

- 2019 **Rutgers Center for Cognitive Science Colloquium**, *Rutgers, New Brunswick*, April 23, 2019.

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## Teaching

### Rutgers University

- 2020-S **Sensation and Perception**, *Rutgers New Brunswick, Psychology*.
- 2019-F **Language and Cognition**, *Rutgers New Brunswick, Rutgers Center for Cognitive Science*.

2019-S **Sensation and Perception**, *Rutgers New Brunswick*, Psychology.

2018-F **Advanced Topics II "Perception in a variable world"**, *Rutgers New Brunswick*, Rutgers Center for Cognitive Science.

### University of Rochester

2013 **Teaching assistant: Foundations of Cognitive Science**, *University of Rochester*.

2011–2012 **Teaching assistant: Cognition**, *University of Rochester*.

### Williams College

2009 **Teaching assistant: Ergodic Theory**, *Williams College*.

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## Mentoring

### PhD supervision

2018-present Sten Knutsen, Psychology (primary advisor).

2018 Gwendolyn Rehrig, Psychology (committee member).

### PhD (external)

2020-present Sahil Luthra, University of Connecticut, Department of Psychological Sciences

### Masters supervision

*in progress* Sten Knutsen, Psychology (primary advisor).

2019 Yarkin Ergin, Rutgers Psychology (committee member).

2019 Joseph Sommer, Rutgers Psychology (committee member).

### Undergraduate supervision

2012 Supervised three University of Rochester undergraduate independent study students (jointly with one other graduate student).

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## Grants

- NIH F31 Ruth L. Kirschstein National Research Service Award (NRSA) Individual Pre-doctoral Fellowship, 2015–2016.

- National Science Foundation, Graduate Research Fellowship, 2010–2014.

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## Honors and Awards

- Outstanding Dissertation Award (Natural Sciences), University of Rochester, 2017

- Glushko Prize for Outstanding Doctoral Dissertations/theses in Cognitive Science, Cognitive Science Society, 2017

- Highest rated student abstract, 2016 Meeting of the Society for the Neurobiology of Language

- Best student presentation, 2013 LSA Summer Institute Workshop: "How the brain accommodates variability in linguistic representations".

- Best student talk, 2011 Architectures and Mechanisms of Language Processing (AMLaP) Conference.

- Sproull Fellowship, University of Rochester, 2010–2015.

- Baggett Fellowship, University of Maryland Linguistics Department post-bac. research fellowship, 2009–2010.

- Member, Phi Beta Kappa honors society, inducted 2008.

- Dean's List, Williams College, 2005–2009.

- Tyng Scholarship, Williams College, 2005–2009.

- National Merit Scholar, 2005.

- Maine Educational Association Clyde Russel Scholarship, 2005.

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## Service

### Department service

- 2020-present Psychology department website committee
- 2018-present Psychology department undergraduate honors committee
- 2018-present Psychology department statistics committee

### Statistics outreach

I work to advance statistical literacy among cognitive scientists, psychologists, and linguists, via presentations at workshops and tutorials on statistical methods.

- 2020 *Mixed Models in the Julia Programming Language*, workshop at the Zentrum für interdisziplinäre Forschung (Center for Interdisciplinary Research), Universität Bielefeld, Germany, co-organized with Reinhold Kliegl, Doug Bates, and Philip Alday
- 2016–2018 Weekly statistics workshops for Princeton Neuroscience Institute graduate students and postdocs (jointly with Mike Shvartsman)
- 2014 Tutorial on simulation-based methods for understanding mixed models. *SST 2014 Tutorial: Regression and mixed effects models*
- 2013 Co-organized UR BCS Department statistics and data analysis working group with Steve Piantadosi.
- 2011 *Preparing data for analysis using R*, presentation with Alex B. Fine at University of Rochester BCS workshop on mixed-effects regression analysis for cognitive scientists.
- 2010 *ANOVA and Mixed-Effects Models in R for Language Scientists*, presentation at University of Maryland Linguistics Dept. Winter Storm language sciences workshop.

### Open source software

I've contributed to a number of open source software projects. I've made substantial contributions to:

- **StatsModels.jl**: Primary maintainer and developer of StatsModels.jl, the statistical modeling package for the *Julia* language, which provides a familiar “formula language” for specifying regression models, contrast coding for categorical variables, etc.
- **MixedModels.jl**: Mixed-effects regression in Julia.
- **Gadfly.jl**: Data visualization in Julia, based on the grammar of graphics.

And contributed minor bug fixes and improvements to **Weave.jl** (knitr-like functionality for Julia), **latexdiff**, **lolcommits**, a node.js **mturk** API, and **FAAV/FAVE**.

### Reviewing

Ad hoc reviewer for *Acta Psychologica*; *Annual Meeting of the Cognitive Science Society*; *Attention, Perception, & Psychophysics*; *Cognition*; *Journal of the Acoustical Society of America*; *Journal of Experimental Psychology*; *Journal of Laboratory Phonology*; *Journal of Memory & Language*; *Journal of Speech, Language, and Hearing Research*; *Language*; *Language and Cognitive Processes*; *Language Learning*; *MIT Press*; *NSF SBE*; *PLoS One*; *Psychonomic Bulletin and Review*; and *Topics in Cognitive Science*