Dave F. Kleinschmidt

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I'm a cognitive and data scientist with more than 10 years of experience creating insights from large, complex datasets using computational tools, and communicating those insights to diverse stakeholders. I have a passion for making computational tools broadly useful through open source software and straightforward and intuitive presentation of difficult computational ideas through written publications and oral presentations.

Experience

2018–present **Assistant Professor of Psychology**, *Rutgers University*, New Brunswick, NJ.
Direct computational cognitive science lab; Supervise graduate research assistants and staff.
Design, implement (custom node.js+MongoDB backend), and analyze data (using R and Julia) from **online behavioral experiments**
Design and implement machine learning models of human cognition.

2013–present **Open source maintainer**, *JuliaStats organization*, Distributed/remote.
Maintain and develop open source software for statistical modeling in Julia language. Write code and documentation, review contributions, manage releases and automated testing/CI.
Primary developer of **StatsModels.jl**, used in 100+ packages to transform tabular data to numerical arrays.

2016–2018 **CV Starr Postdoctoral Fellow**, *Princeton Neuroscience Institute*, Princeton, NJ.
Implemented **custom Bayesian nonparametric models** of human perception and categorization.
Co-designed and ran **weekly open workshop on statistical methods and philosophy** for PhD students and other post-docs (regression, hierarchical models, Bayesian methods)

2010–2016 **PhD research**, *Brain and Cognitive Sciences, University of Rochester*, Rochester, NY.
Created **novel Bayesian theory of perceptual learning for speech**, implemented with MCMC sampler in custom R code and Stan.
Developed javascript platform for web-based auditory psychophysics experiments.
Lead machine learning analysis of multimodal data from brain imaging (fMRI) experiments of human perceptual learning (with Matlab).

2009–2010 **Baggett Fellow**, *Linguistics, University of Maryland*, College Park, MD.
Designed and taught one-day **workshop on mixed-effects models and ANOVA**
Research on penalized matrix factorization (sparse coding) models of statistical learning (presented at Neurobiology of Language meeting, 2010).

Education

2010–2016 **Ph.D. Brain and Cognitive Sciences**, *University of Rochester*, Rochester, NY.

2005–2009 **B.A. Mathematics, concentration Cognitive Science**, *Williams College*, Williamstown, MA, *Summa cum laude*, highest honors in Cognitive Science.

Skills

Statistics	Linear/logistic regression, mixed-effects models, nonparametric tests
Workflow	Jupyter notebooks, Rmarkdown, pandoc, make, git, github, TravisCI, docker, AWS
Bayesian inference	MCMC, sequential MC, nonparametrics, variational inference
Machine Learning	Predictive models, classification, clustering, NLP

Programming Languages

Julia	DataFrames.jl, GLM.jl, MixedModels.jl, Plots.jl/Gadfly.jl
Python	numpy, pandas, scikit-learn
Linux	bash, zsh, git, server/desktop
R	tidyverse (dplyr/purrr/tidyr), ggplot2, lme4/brms, rstan
Javascript	Node.js/express, frontend/JQuery
misc.	(Postre)SQL, MongoDB, Matlab, Java, Lisp, Perl, LaTeX

Grants and awards

2017 **Glushko Dissertation Prize**, *Cognitive Science Society*.

2015 **F31 National Research Service Award**, *NIH NICHD*.

2010 **National Graduate Research Fellowship**, *NSF*.

Selected Publications

2020 Wu*, M.-H.**, Kleinschmidt*, D. F.**, Emberson, L., Doko, D., Edelman, S., Jacobs, R., & Raizada, R. Cortical transformation of stimulus-space in order to linearize a linearly inseparable task. *Journal of Cognitive Neuroscience*, *Early Access*, 1–13. https://doi.org/10.1162/jocn_a_01533

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

Kleinschmidt, D. F., & Hemmer, P. A Bayesian model of memory in a multi-context environment. In A. Goel, C. Seifert, & C. Freksa (Eds.), *Proceedings of the 41st Annual Conference of the Cognitive Science Society*. Cognitive Science Society. osf.io/vuksn/

2018 **Kleinschmidt, D. F.** Learning distributions as they come: Particle filter models for online distributional learning of phonetic categories. In T. T. Rogers, X. Rau, X. Zhu, & C. Kalish (Eds.), *Proceedings of the 40th Annual Conference of the Cognitive Science Society* (pp. 1933–1938). Cognitive Science Society. https://doi.org/10.31234/osf.io/dymc8

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

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

* Indicates equal contributions.