

# Roeland Hancock, PhD

Brain Imaging Research Center  
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## Summary

I am a cognitive neuroscientist with a primary interest in using neuroimaging to investigate the biological bases of language processing, particularly the etiology of language dysfunction in neurodevelopmental disorders. My interdisciplinary training has been in computational methods, psycholinguistics and neuroimaging. I have expertise in software development, project management, magneto/electroencephalography and functional, structural and spectroscopic magnetic resonance imaging. My recent work has focused on the effects of neurochemistry on the neural dynamics of speech and auditory processing.

## Education

- 2013 **PhD, Psychology**, *University of Arizona*, Tucson, AZ.  
*Advisor:* Thomas G. Bever, PhD  
*Dissertation:* Dynamic properties of dopamine asymmetry as a basis for functional lateralization  
*Committee:* Thomas G. Bever, PhD (chair), Jean-Marc Fellous, PhD, Kevin Lin, PhD & Massimo Piattelli-Palmarini, PhD
- 2009 **MA, Psychology**, *University of Arizona*, Tucson, AZ.  
*Advisor:* Thomas G. Bever, PhD  
*Thesis:* Second-order distributional learning
- 2006 **BS, Mathematics**, *University of Arizona*, Tucson, AZ.  
*Advisor:* Dorin Dumitrascu, PhD  
*Thesis:* The asymptotic dimension of the discrete Heisenberg group

## Research Positions

- 2017– **Assistant Research Professor, Psychological Sciences**, *University of Connecticut*.
- 2017– **Associate Director, Brain Imaging Research Center**, *University of Connecticut*.
- 2017– **Director of Computation and Biostatistics Core**, *University of California Science-based Innovation in Learning Center*.  
Responsible for providing computational and statistical support to researchers in education, psychology and neuroscience as part of a multi-campus center for research on learning disabilities in English Language Learners.

- 2013–2017 **Postdoctoral Fellow**, *University of California, San Francisco*, San Francisco, CA.  
 Supervisor: Dr. Fumiko Hoeft  
 Neuroimaging, behavioral and genetic research on language processing, brain development and reading disorders.
- Developed behavioral, fMRI and M/EEG paradigms for assessing language and sensory processing in adults and children.
  - Provided mentoring and methodological consultations to students and visiting scholars.
  - Managed laboratory IT infrastructure.
  - Managed IRB approvals.
- Major Projects**
- *Neurochemistry of auditory processing* (Lead investigator)  
 Designed, partially funded and executed a multimodal (fMRI, MEG, MRS) imaging, behavioral and tDCS study on the role of GABA in speech and auditory processing and reading. Collaborated with MR physicists on the development of new sequences for J-edited spectroscopy.
  - *Early mobile screening for reading disorder risk* (PI)  
 Development of a tablet-based app to assess early literacy predictors.
  - *Neurochemistry as a moderator of brain networks for reading* (NIH R01HD086168I PIs: Kenneth Pugh & Fumiko Hoeft)  
 Grant writing and fMRI/EEG experimental design.
  - *Intergenerational neuroimaging* (PI: Fumiko Hoeft) Project management and management of MRI data collection.
  - *Understanding literacy acquisition through immersion in foreign languages* (NIH R01HD078351; PI: Fumiko Hoeft)  
 Data analysis and management of MRI data collection.
  - *The nature and acquisition of the speech code and reading* (NIH P01HD001994; PI: Jay Rueckl)  
 fMRI data analysis.
- 2012 **Visiting Scholar**, *Language and Genetics Group, Max Planck Institute for Psycholinguistics*, Nijmegen.  
 Supervisor: Dr. Clyde Francks
- 2011 **Visiting Scholar**, *Department of Neuropsychology, Max Planck Institute for Human Cognitive and Brain Sciences*, Leipzig.  
 Supervisor: Dr. Daniela Sammler
- 2006–2012 **Laboratory Manager and Graduate Research Assistant**, *Language and Cognition Laboratory*, University of Arizona, Tucson, AZ.  
 Supervisor: Dr. Thomas G. Bever
- Developed and ran behavioral and EEG psycho/neurolinguistic studies.
  - Supervised undergraduate and graduate researchers.
  - Managed IRB approvals.

## Grants

- submitted **Co-I**, *Intergenerational neuroimaging of the human corticolimbic circuitry using a natural cross-fostering design*, NIMH R01MH115089, PI: Fumiko Hoeft.
- submitted **Co-I**, *Reading Disabilities Research Network (Neurobiological Bases Core)*, NICHD P50, PI: Robin Morris.
- 2017–2019 **Co-I**, *Science-based Innovation in Learning Center (SILC)*, UCOP MRP-17-454925, PI: Fumiko Hoeft.

- 2016–2020 **Neuroimaging Investigator**, *Neurochemical correlates of auditory processing and reading ability*, NICHD R01HD086168, PIs: Kenneth Pugh & Fumiko Hoeft.  
Overall project design, fMRI and EEG task design, grant writing.
- 2014–2015 **PI**, *UCSF Digital Health Pilot Grant, Early mobile screening for reading disorder risk*, UL1 RR024131.
- 2014–2015 **PI**, *UCSF Catalyst Award, Early mobile screening for reading disorder risk*, UL1 RR024131.
- 2014–2015 **Co-I**, *Neurochemical correlates of auditory processing and reading ability*, Stanford Center for Cognitive and Neurobiological Imaging Pilot Grant, PI: David Hong.  
Wrote and executed on behalf of PI.
- 2014–2015 **Co-I**, *Individual neurometabolite variability and auditory frequency tuning*, UCSF Department of Radiology Seed Grant, PI: Srikantan Nagajaran.  
Wrote and executed on behalf of PI.

## █ Awards and Fellowships

- 2013 Robert Glushko & Pamela Samuelson Travel Award, Cognitive Science Society
- 2012 Fellow, Arizona Center for the Biology of Complex Diseases
- 2012 International Behavioral and Neural Genetics Society Young Investigator Travel Award

## █ Peer-reviewed Papers

- Xia, Z.\*, **Hancock, R.\***, & Hoeft, F. (in press). Neurobiological bases of reading disability part i: etiological investigations. *Language and Linguistics Compass*.
- Gu, M., Hurd, R., Noeske, R., Baltusis, L., Hancock, R., Sacchet, M. D., Gotlib, I. H., Chin, F. T., & Spielman, D. M. (2017). Gaba editing with macromolecule suppression using an improved mega-special sequence. *Magnetic Resonance in Medicine*.
- Hancock, R.**, Pugh, K. R., & Hoeft, F. (2017). Neural noise hypothesis of developmental dyslexia. *Trends in Cognitive Sciences*.
- Hancock, R.**, Richlan, F., & Hoeft, F. (2017). Possible roles for fronto-striatal circuits in reading disorder. *Neuroscience and Biobehavioral Reviews*, 72, 243–260.
- Hancock, R.**, Gabrieli, J., & Hoeft, F. (2016). Shared temporoparietal dysfunction in dyslexia and typical readers with discrepantly high IQ. *Trends in Neuroscience and Education*, 5(4), 173–177.
- Xiaoxia, S., **Hancock, R.**, Bever, T. G., Xiaoguang, C., Schmidt, L., & Seifert, U. (2016). Processing Relative Clauses in Chinese: Evidence from Event-Related Potentials. *Chinese Journal of Applied Linguistics*, 39(1), 92–114.
- Yamagata, B., Murayama, K., Black, J. M., **Hancock, R.**, Mimura, M., Yang, T. T., Reiss, A. L., & Hoeft, F. (2016). Female-specific intergenerational transmission patterns of the human corticolimbic circuitry. *The Journal of neuroscience*, 36(4), 1254–1260.
- Rueckl, J. G., Paz-Alonso, P. M., Molfese, P. J., Kuo, W.-J., Bick, A., Frost, S. J., **Hancock, R.**, Wu, D. H., Mencl, W. E., Duñabeitia, J. A., Lee, J.-R., Oliver, M., Zevin, J. D., Hoeft, F., Carreiras, M., Tzeng, O. J. L., Pugh, K. R., & Frost, R. (2015, December). Universal brain signature of proficient reading: Evidence from four contrasting languages. *Proceedings of the National Academy of Sciences of the United States of America*, 112(50), 15510–15515.

- Gimenez, P., Bugescu, N., Black, J., **Hancock, R.**, Pugh, K., Nagamine, M., Kutner, E., Mazaika, P., Hendren, R., McCandliss, B., & Hoeft, F. (2014). Neuroimaging correlations of handwriting quality as children learn to read and write. *Frontiers in Human Neuroscience*, 5, 155.
- Myers, C. A., Vandermosten, M., Farris, E. A., **Hancock, R.**, Gimenez, P., Black, J. M., Casto, B., Drahos, M., Tumber, M., Hendren, R. L., Hulme, C., & Hoeft, F. (2014, October). White matter morphometric changes uniquely predict children's reading acquisition. *Psychological Science*, 25(10), 1870–1883.
- Hancock, R.** & Bever, T. G. (2013). Genetic factors and normal variation in the organization of language. *Biolinguistics*, 7, 75–95.
- Piattelli-Palmarini, M., **Hancock, R.**, & Bever, T. G. (2008). Language as ergonomic perfection. *Behavioral and Brain Sciences*, 31(05), 530–531.

#### Under Revision

- Patael, S. Z., Farris, E. A., Black, J. M., **Hancock, R.**, Gabrieli, J. D. E., Cutting, L. E., Hoeft, F. *Prefrontal cortex buffers against poor reading comprehension in children with dyslexia*. Under revision at PLoS One.

#### Manuscripts in Preparation

- Hancock, R.**, Nagarajan, S. and Hoeft, F. *GABA is associated with temporal auditory processing and neural synchronization*.
- Hancock, R.**, Nagarajan, S. and Hoeft, F. *Neurochemistry of multiplexed speech processing*.
- Kumar, S., Hoeft, F., **Hancock, R.** *Asymmetric associations between GABA and intrinsic auditory network activity*.
- Hashimoto, N., **Hancock, R.** and Hoeft, F. *Maternal cerebellar grey matter volume is associated with daughters' psychotic experience*.
- Hashimoto, N., **Hancock, R.** and Hoeft, F. *Intergenerational transmission of resting state reading networks*.

#### Reviewed Chapters

- Hoeft, F. & **Hancock, R.** (2017). Intergenerational transmission of reading and reading brain networks. In A. Galaburda, N. Gaab, F. Hoeft, & P. McCardle (Eds.), *Dyslexia and neuroscience: the geschwind-galaburda hypothesis, 30 years later* (Chap. 14).
- Hancock, R.** & Bever, T. G. (2009). The study of syntactic cycles as an experimental science. In E. van Gelderen (Ed.), *Cyclical change*. (pp. 303–322). Amsterdam: John Benjamins Publishing Company.

#### Talks

- 2017 25th Annual Meeting of the Society for the Scientific Study of Reading, Halifax, Nova Scotia, Canada
- 2017 UC Center for Research on Special Education, Disabilities, and Developmental Risk, Santa Barbara, CA, US
- 2016 Hebrew University of Jerusalem, Jerusalem
- 2016 The 15th Extraordinary Brain Symposium, St. Croix, US Virgin Islands
- 2016 The National Research University Higher School of Economics, Moscow, Russia
- 2015 Basque Center on Cognition, Brain and Language, San Sebastian, Spain

- 2014 Haskins Laboratories, New Haven, CT
- 2013 35th Annual Meeting of the Cognitive Science Society, Berlin, Germany
- 2011 Max Planck Institute for Psycholinguistics, Nijmegen, Netherlands
- 2010 Max Planck Institute for Cognitive and Brain Sciences, Leipzig, Germany
- 2009 31st Annual Meeting of the German Linguistic Society, Osnabrück, Germany

## ■ Posters

- Kumar, S., Hoeft, F., **Hancock, R.** Asymmetric associations between GABA and intrinsic auditory network activity. Accepted for presentation at the 24th Annual Meeting of the Cognitive Neuroscience Society, March 25-28, San Francisco, CA.
- Hancock, R.**, Nagarajan, S. and Hoeft, F. GABA is associated with temporal auditory processing and neural synchronization. Accepted for presentation at the 24th Annual Meeting of the Cognitive Neuroscience Society, March 25-28, San Francisco, CA.
- Tanaka, H., **Hancock, R.**, Behroozi, P., Duong, P. and Hoeft, F. Slow reading: A new neurobiological phenotype. Presented at the 45th Annual Meeting of the International Neuropsychological Society, February 2-4, New Orleans, LA.
- Hancock, R.**, Nagarajan, S. S. and Hoeft, F. (2015). Resting GABA+ concentration predicts induced auditory gamma power and FM discrimination thresholds. Presented at the 7th annual meeting of the Society for the Neurobiology of Language.
- Bever, T.G and **Hancock, R.**(2015). The effects of familial handedness on cognitive processes in right handers. Presented at the 7th annual meeting of the Society for the Neurobiology of Language.
- Fisher, J., **Hancock, R** and Bever, T.G. (2012). Auditory masked priming and lexical processing in people with differing familial handedness. Presented at the Neurobiology of Language Conference, October 25-27, San Sebastian, Spain.
- Sammler, D., **Hancock, R**, Bianco, R., Friederici, A.D. and Bever, T.G. (2012). Genetic factors in the cerebral asymmetries for language and music. Presented at the Neurobiology of Language Conference, October 25-27, San Sebastian, Spain.
- Hancock, R.** (2012). Bayesian estimates of genetic handedness predict oscillatory brain activity. Presented at the 14th Annual Meeting of the International Behavioural and Neural Genetics Society, May 15-19, Boulder, Colorado.
- Hancock, R.**, Chan, S., Ryan, L. and Bever, T.G. (2011). Low-frequency networks for conceptual and syntactic sequencing. To be presented at the Neurobiology of Language Conference, November 11-12, Annapolis, MD.
- Hancock, R.** and Bever, T.G. (2011). Familial left handedness in right-handers changes neurological organization for language and cognition. Presented at The 17th Meeting of the European Society for Cognitive Psychology, September 29-October 2, San Sebastian, Spain.
- Hancock, R.** and Bever, T.G. (2010). The impact of familial left handedness on cortical organization for information integration in language and vision. Presented at the Neurobiology of Language Conference, November 11-12, San Diego, CA.
- Hancock, R.** (2010). Bounds on computational capacity in language acquisition. University of Arizona Graduate Interdisciplinary Programs Showcase, November 18, 2009.
- Spearing, S.A., and **Hancock, R.** (2004). A software project management tool to support sane SQM (U). Presented at *Nuclear Explosive Code Design Conference*, Livermore, CA: Lawrence Livermore National Laboratory. LA-UR-04-6893 (U).

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## Technical Work Experience

- 2007–2009 **Software Engineer**, *Language Technologies, Inc.*, Tucson, AZ.  
○ Applied psycholinguistic research to develop typesetting algorithms for improving print readability.
- 2006–2010 **Technical Staff Member**, *Scientific Software Engineering Group, Los Alamos National Laboratory*, Los Alamos, NM.
- 2004–2006 **Research Assistant**, *Scientific Software Engineering Group, Los Alamos National Laboratory*, Los Alamos, NM.  
Worked as a software engineer/developer embedded in multiple interdisciplinary science teams  
○ Led development of a web-based project management system that integrated with desktop project management software, enterprise business and SCM platforms to support high-level reporting for the Advanced Simulation and Computing program, one of the largest laboratory missions.  
○ Led development of usage reporting and performance monitoring systems for high performance computing systems.  
○ Developed advanced natural language and topic models.  
○ Developed advanced image processing and analysis algorithms.
- 2003–2004 **Research Assistant**, *Network Security Group, Los Alamos National Laboratory*, Los Alamos, NM.

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## Teaching Experience

- 2014 **Guest lecturer, Biomedical Sciences Course (BMS270)**, *University of California, San Francisco*, San Francisco, CA.  
Joint lecture on fMRI resting state functional connectivity methods.
- 2013 **Instructor**, *Department of Experimental Psychology, University of Oxford*, Oxford, UK.  
Developed and taught courses on methods in cognitive neuroscience, including EEG analysis, R, and statistics.
- 2010–11 **R instructor and co-organizer**, *University of Arizona*, Tucson, AZ.  
Co-developed and taught multiple weekend workshops on R for graduate students.
- 2009 **Instructor, Research Methods (PSYC290)**, *University of Arizona*, Tucson, AZ.  
Developed and taught an undergraduate summer session course on research methods in psychology.
- 2009–11 **Instructor, Laboratory in Research Methods (PSYC297)**, *University of Arizona*, Tucson, AZ.  
Developed and taught an undergraduate hands-on course in experimental design and analysis.
- 2008 **Guest lecturer, Behavioral Statistics (PSYC230)**, *University of Arizona*, Tucson, AZ.

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## Service Activities

- 2017 Co-organizer, *Biological & Environmental Factors that Impact Multilingualism Symposium*

2011-2012 **President**, *Graduate & Professional Student Council, University of Arizona, Tucson, AZ.*

Elected representative of over 8000 graduate and professional students.

- Supervised three administrative staff members.
- Used surveys and focus groups to identify unmet healthcare needs and negotiated improved healthcare benefits for graduate assistants.
- Conveyed student concerns to University committees and leadership, the AZ Board of Regents and state legislature.
- Increased organizational funding by 50%, providing increased support for student travel funding, career development workshops and outreach.

2008-2009 Representative, Graduate & Professional Student Council

2008-2009 Treasurer, Student Services Fee Advisory Board, University of Arizona

2008-2009 Departmental Convention Committee, Department of Psychology, University of Arizona

## Professional Memberships

- Cognitive Neuroscience Society
- Society for the Neurobiology of Language
- Linguistic Society of America
- Cognitive Science Society
- International Behavioral and Neural Genetics Society
- American Psychological Association

## Ad-hoc Reviewing

- Neuroimage Clinical
- Organization for Human Brain Mapping
- Neuroscience
- Current Opinion in Behavioral Sciences
- Frontiers in Human Neuroscience
- eNeuro

## Technical Skills

Programming languages MATLAB, R, Python, C, C++, Perl, Java, Bash, PHP, SQL

Scientific software FSL, AFNI, FreeSurfer, SPM, FieldTrip, EEGLAB, E-Prime, Presentation, Psychopy, Nipype

Methods functional and structural MRI, MR spectroscopy, M/EEG, tDCS, TMS, eye-tracking, psycholinguistics

Equipment Siemens and GE MR scanners, EGI and BrainVision EEGs, CTF MEG, Nexstim TMS, Chattanooga tDCS

## Patents

Bever, T. G., Nicholas, C. D., **Hancock, R.**, & Alcock, K. W. (2014). *System, plug-in, and method for improving text composition by modifying character prominence according to assigned character information measures.*

Bever, T. G., Nicholas, C. D., **Hancock, R.**, & Alcock, K. W. (2012). *System, plug-in, and method for improving text composition by modifying character prominence according to assigned character information measures.*

————— **Certifications**

2007 Construx Software Project Management

2006 Construx Software Quality Assurance