

**BIOGRAPHICAL SKETCH**NAME: **Fumiko Hoeft (aka MAEDA), M.D., Ph.D.**

eRA COMMONS USER NAME (credential, e.g., agency login): MAEDA.FUMIKO

POSITION TITLE: Professor, Dept of Psychiatry &amp; Weill Institute for Neurosciences, UCSF

**EDUCATION/TRAINING**

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Keio Univ Sch of Med, Tokyo, Japan	BSc/MD	03/1995	Medicine
Keio Univ Sch of Med, Dept Neuropsychiatry	Residency	04/1998	Psychiatry Clinical Neurophysiology
Harvard Med Sch, BIDMC, Dept Neurology, MA (Advisor: Alvaro Pascual-Leone MD PhD)	(Predoc)	03/2000	Neurophysiology
California Inst of Tech, Div Biology, Computation & Neural Systems, CA (Adv: Shinsuke Shimojo PhD)	(Predoc)	03/2003	Systems Neuroscience
Keio Univ Sch of Med, Dept Psychiatry	PhD	10/2003	Neurophysiology & Clinical Neuroscience
Stanford University, Dept Psychology, CA (Adv: John Gabrieli PhD)	Postdoc	03/2005	Developmental Cognitive Neuroscience

**A. Personal Statement**

I am a physician scientist and cognitive and systems neuroscientist with theoretical interest in the neurobiological mechanism underlying individual differences in brain maturational processes as well as acquisition of skills such as literacy and its disorders. In our research, we employ multimodal neuroimaging techniques, analytical approaches (e.g. machine learning, graph theory), and designs (e.g. intergenerational neuroimaging, imaging genetics, human natural cross-fostering design). We develop research tools (Multivariate Pattern Analysis [MVPA] toolbox, Graph Analytical Toolbox [GAT]) as well as translational tools (School Readiness and Personalized Learning [SCRAPL] App, Socio-Emotional Learning [SEL] Toolkit). Prior to joining UCSF, I was Associate Director of Center for Interdisciplinary Brain Sciences Research (CIBSR) at Stanford (Director: Allan Reiss MD) where I managed a number of NIH-funded *large-scale multisite collaborative neuroimaging projects* (2008-2011). Further, I am a recent recipient of a University of CA Office of the President's Multicampus Research Programs & Initiatives (UCOP MRPI) Award to build a center that integrates 6 UC campuses bridging cognitive sciences, education, medicine and policy focused on neurodevelopment in underserved populations (1/1/2017). Additionally, I serve as PI on 2 NICHD and 1 private foundation funded projects, and 1 NSF grant as Co-PI. In grants where I am a co-investigator (subcontract PI), I provide consultation on study design and analytical approaches. In addition to the many collaborations, I have mentored over 9 junior faculty, 20 postdoctoral, and 33 predoctoral students.

Collectively, I have: (1) held leadership roles in national and international multi-site collaborations as well as experience in mentorship; (2) interdisciplinary background in neurophysiology, clinical and developmental cognitive neurosciences, pediatric neuroimaging from toddler and up; and (3) expertise building toolboxes and app for research and practical purposes.

**OTHER PUBLICATIONS**

- a. **Maeda(Hoeft) F**, Kanai R, Shimojo S. Changing pitch induced visual motion illusion. *Curr Biol* 2004; 14(23):R990-R991.
- b. deCharms RC, **Maeda(Hoeft) F**, Glover GH, Ludlow D, Pauly JM, Soneji, D.J., Gabrieli, J.D.E., and Mackey, S.C. Control over brain activation and pain learned by using real-time functional MRI. *PNAS* 2005; 102(51): 18626-18631. Evaluated: F1000 Biology. Coverage: Nature, Nat Rev Neurosci

- c. **Hoef F**, Gabrieli JD, Whitfield-Gabrieli S, Haas BW, Bammer R, Menon V, Spiegel D. Functional brain basis of hypnotizability. *Arch Gen Psychiatry* 2012 Oct;69(10):1064-72. Press release: NICHD, Stanford; Author ITV in: Arch Gen Psychiatry
- d. Kesler SR, Wefel JS, Hosseini SM, Cheung M, Watson CL, **Hoef F**. Default mode network connectivity distinguishes chemotherapy-treated breast cancer survivors from controls. *PNAS* 2013;110(28):11600-5. PMID: 23798392; PMC3710809.

## B. Positions and Honors

### POSITIONS AND EMPLOYMENT

- 2003 - 2007 Visiting Scientist, Division of Biology, California Institute of Technology, CA USA
- 2005 - 2011 Research Associate ('05-'06), Senior Research Scientist ('06-'08), Instructor ('08-'11), CIBSR, Stanford Univ Sch of Med (SOM), CA USA
- 2008 - 2011 Associate Director of Neuroimaging Applications, CIBSR, Stanford Univ SOM, CA USA
- 2012 - 2013 Visiting Associate Professor, Stanford Univ SOM, CA USA
- 2012 - Associate Professor ('12-'17), Professor ('17-) of Psychiatry & Weill Institute for Neurosciences, UCSF, CA USA
- 2012 - Director, brainLENS Laboratory, UCSF, CA USA
- 2012 - Deputy Director, Dyslexia Center, UCSF, CA USA
- 2012 - Senior Research Scientist, Haskins Laboratories, CT USA
- 2012 - Adjunct Faculty, Keio University School of Medicine, Dept of Neuropsychiatry, Tokyo Japan
- 2017 - Executive Director, Precision Learning Center (PreCL), Univ of CA, CA USA

### OTHER RELEVANT EXPERIENCE

- 2013 - UCSF Dept of Psychiatry, Child and Adolescent Psychiatry (CAP) Grant Rounds Committee Member
- 2016 - UCSF Research Evaluation and Allocation Committee (REAC) Member
- 2012 - Center for Childhood Creativity, Member of the Board of Advisors
- 2015 - International Dyslexia Association (IDA) Executive Board Member
- 2016 - National Center for Learning Disabilities (NCLD), Professional Advisory Board Member
- 2016 - CA Dept of Ed, Dyslexia State Guideline Work Group Member
- 2014 - New Directions in Child and Adolescent Development (NDCAD) [journal] Associate Editor
- 2014 - American Education Research Association (AERA) Open [journal] Editor
- 2015 - Mind Brain and Education [journal] Associate Editor
- 2016 - Psychological Science [journal] Editor

### SELECTED HONORS

- 2005 Tom Slick Research Award in Consciousness, Mind Science Foundation
- 2007 Spectrum Child Health & Clinical & Translational Science Award, Lucile Packard Foundation for Children's Health
- 2008 Stanford Postdoctoral Mentor Award (Honorary Mention)  
Young Investigator Award, Brain & Behavior Research Foundation  
NICHD Career Development Award (K23)  
Spectrum Child Health & Clinical & Translational Science Award, Lucile Packard Foundation for Children's Health
- 2012 NIH Director's New Innovator Award (DP2; finalist)
- 2014 UCSF Academic Senate Award for Junior Investigators  
Norman Geschwind Memorial Lecturer, IDA Annual Meeting
- 2015 Remarks at the White House OSTP meeting on Neuroscience of Learning  
Participation in the UNESCO UNITWIN Network "Inclusive literacy for all"  
Transforming Education through Neuroscience Award, Learning & the Brain Foundation
- 2016 University of CA Office of the President (UCOP) Multicampus Research Programs & Initiatives (MRPI) Award

## C. Contribution to Science

Total of 130 publications with 102 being peer-reviewed publications (28 first, 31 corresponding author). Complete list of peer-reviewed work since 2006 (except those in Japanese) can be found in MyBibliography:

## 1. TMS NEUROPHYSIOLOGY

My early publications that led to my PhD thesis examined cortical excitability and neurophysiological mechanisms underlying transcranial magnetic stimulation (TMS) and its application. We provided the first and direct evidence of individual variability in cortical excitability using TMS. I served as the primary investigator mentored by Dr. Alvaro Pascual-Leone at Harvard in all studies. I also created a double-blind sham TMS coil and performed validation using computational modeling, psychophysics, and neurophysiological properties. The work was funded by NSF, and I served as the primary investigator on the grant and project from grant preparation to execution of the study.

- a. **Maeda(Hoeft) F**, Keenan J, Pascual-Leone A. Interhemispheric asymmetry of motor cortical excitability as measured by transcranial magnetic stimulation in major depression. ***Br J Psychiatry*** 2000;177:169-173. Comment in: *Br J Psychiatry* 2000;177:468
- b. **Maeda(Hoeft) F**, Keenan J, Tormos JM, Topka H, Pascual-Leone A. Interindividual variability of the modulatory effect of repetitive transcranial magnetic stimulation on cortico-spinal excitability. ***Exp Brain Res*** 2000; 133:425-30
- c. **Maeda(Hoeft) F**, Kleiner-Fisman G, Pascual-Leone A. Motor facilitation while observing hand actions: Specificity of the effect and role of observer's orientation. ***J Neurophysiol*** 2002;87:1329-1335
- d. **Hoeft F**, Wu DA, Hernandez A, Glover GH, Shimojo S. Electronically switchable sham transcranial magnetic stimulation (TMS) system. ***PLoS One*** 2008 Apr 9;3(4):e1923. PMID: 18398456; PMC2271126.

## 2. NEURAL MECHANISMS OF NEUROGENETIC DISORDERS

While I was at Stanford University School of Medicine, with a team of investigators such as Dr. Allan Reiss (Stanford) and a team of investigators such as Dr. Joe Piven (UNC), Dr. Ursula Bellugi (Salk Inst), Dr. Julie Korenberg (U Utah), and Dr. Judith Ross (Thomas Jefferson U), we performed a series of neuroimaging studies in neurogenetic conditions such as fragile X syndrome, autism spectrum disorders (ASD), Williams, and 22q11.2 (Velo-Cardio Facial) syndromes to understand the impact of genetics on macrocircuits and behavior. I served as the primary investigator supervised by Dr. Allan Reiss in all studies where I am first author and also served as a mentor on all studies where I am second or second to last author.

- a. **Hoeft F**, Barnea-Goraly N, Haas BW, Golarai G, Ng D, Mills D, Korenberg J, Bellugi U, Galaburda A, Reiss AL. More is not always better: increased fractional anisotropy of superior longitudinal fasciculus associated with poor visuospatial abilities in Williams syndrome. ***J Neurosci*** 2007 Oct 31;27(44):11960-5. PMID: 17978036.
- b. **Hoeft F**, Lightbody AA, Hazlett HC, Patnaik S, Piven J, Reiss AL. Morphometric spatial patterns differentiating boys with fragile X syndrome, typically developing boys, and developmentally delayed boys aged 1 to 3 years. ***Arch Gen Psychiatry*** 2008 Sep;65(9):1087-97. PMID: 18762595; PMCID: PMC2864400. Press release: Stanford
- c. **Hoeft F**, Carter JC, Lightbody AA, Cody Hazlett H, Piven J, Reiss AL. Region-specific alterations in brain development in one- to three-year-old boys with fragile X syndrome. ***PNAS*** 2010 May 18;107(20):9335-9. PMID: 20439717; PMC2889103. Press release: NIMH & Stanford
- d. **Hoeft F**, Walter E, Lightbody AA, Hazlett HC, Chang C, Piven J, Reiss AL. Neuroanatomical differences in toddler boys with fragile x syndrome and idiopathic autism. ***Arch Gen Psychiatry*** 2011 Mar;68(3):295-305. PMID: 21041609. PMC4369209. Comment in: *AGP*. 2011 Mar;68(3):230-1

## 3. NEURAL MECHANISMS OF LANGUAGE & LITERACY DEVELOPMENT, AND LEARNING

A major piece of my interest and contribution to science in the past decade has been to further our understanding of the brain mechanisms underlying language and literacy development. I serve as principal investigator on most studies as well as co-investigators on collaborative projects with Haskins Laboratories and University of Connecticut, among other institutions.

- a. Myers CA, Vandermosten M, Farris EA, Hancock R, Gimenez P, Black JM, Casto B, Drahos M, Tumber M, Hendren RL, Hulme C, **Hoeft F**. White matter morphometric changes uniquely predict children's reading acquisition. ***Psychol Sci*** 2014 Oct;25(10):1870-83. PMID: 25212581; PMCID: PMC4326021. Press release: UCSF; Podcast: UCSF, NIH
- b. Pugh KR, Frost SJ, Rothman DL, **Hoeft F**, Del Tufo SN, Mason GF, Molfese PJ, Mencl WE, Grigorenko EL, Landi N, Preston JL, Jacobsen L, Seidenberg MS, Fulbright RK. Glutamate and choline levels predict individual differences in reading ability in emergent readers. ***J Neurosci*** 2014 Mar

- 12;34(11):4082-9. PMID: 24623786; PMCID: PMC3951703. Press release: Yale, NICH
- c. Rueckl JG, Paz-Alonso PM, Molfese PJ, Kuod W-J, Bick A, Frost SJ, Hancock R, Wu DH, Mencl WE, Duñabeitia JA, Lee J-R, Oliver M, Zevin JD, **Hoef F**, Carreiras M, Tzeng OJ-L, Pugh KR, Frost R. A universal brain signature of proficient reading: Evidence from four contrasting languages. *PNAS* 2015 Dec 15;112(50):15510-5. Epub 2015 Nov 30. PMID: 26621710. PMCID: PMC4687557.
  - d. Hancock R, Richlan F, **Hoef F**. Possible roles for frontostriatal circuits in reading disorder. *Neurobio Beh Rev* 2017 Jan;72:243-260. doi: 10.1016/j.neubiorev.2016.10.025 PMID: 27826071. PMCID: PMC5189679

#### 4. NEURAL MECHANISM OF READING DISORDER (DYSLEXIA)

Related to 3, another major piece of my contribution to science in the past decade has been in the neural mechanism underlying learning disabilities such as reading disorders / developmental dyslexia. I serve as the primary investigator for work I am first author during 2006-2007 mentored by Dr. John Gabrieli who is now a professor at MIT, and primary and principal investigator on all studies where I am first or last author on publications from 2008 onward. Our work has centered around both theoretically motivated work and those that has practical application.

- a. **Hoef F**, Meyler A, Hernandez A, Juel C, Taylor-Hill H, Martindale JL, McMillon G, Kolchugina G, Black JM, Faizi A, Deutsch GK, Siok WT, Reiss AL, Whitfield-Gabrieli S, Gabrieli JD. Functional and morphometric brain dissociation between dyslexia and reading ability. *PNAS* 2007 Mar 6;104(10):4234-9. PMID: 17360506; PMCID: PMC1820738.
- b. Tanaka H\*\*, Black JM\*\*, Hulme C, Stanley LM, Kesler SR, Whitfield-Gabrieli S, Reiss AL, Gabrieli JD, **Hoef F**. The brain basis of the phonological deficit in dyslexia is independent of IQ. *Psychol Sci* 2011 Nov;22(11):1442-51. doi: 10.1177/0956797611419521. Epub 2011 Oct 17. PMID: 22006060. PMCID: PMC4380286 Press release: NICHD, Psychol Sci, Stanford & MIT
- c. **Hoef F**, McCandliss BD, Black JM, Gantman A, Zakerani N, Hulme C, Lyytinen H, Whitfield-Gabrieli S, Glover GH, Reiss AL, Gabrieli JD. Neural systems predicting long-term outcome in dyslexia. *PNAS* 2011 Jan 4;108(1):361-6. PMCID: PMC3017159. Press release: NICHD, Stanford, MIT, & Vanderbilt; Covered by: Science
- d. Hancock R, Pugh K, **Hoef F**. The neural noise hypothesis of developmental dyslexia. *Trends Cogn Sci (TiCS)* 2017 Apr 8. pii: S1364-6613(17)30051-7. doi: 10.1016/j.tics.2017.03.008. [Epub ahead of print] PMID: 28400089

#### 5. INTERGENERATIONAL NEUROIMAGING

My most recent contribution to science has been the examination of the intergenerational transmission patterns in the human brain by use of familial history information, and individual differences in cognitive and neurocognitive phenotypes in parents and offspring dyads, directly in line with the current proposal. We are particularly interested in the language and literacy networks and their underlying cognitive processes. We have had 3 small scale and pilot grants to date.

- a. Black JM, Tanaka H, Stanley L, Nagamine M, Zakerani N, Thurston A, Kesler S, Hulme C, Lyytinen H, Glover GH, Serrone C, Raman MM, Reiss AL, **Hoef F**. Maternal history of reading difficulty is associated with reduced language-related gray matter in beginning readers. *Neuroimage* 2012 Feb 1;59(3):3021-32. PMID: 22023744; PMC3628690.
- b. Yamagata B, Black JM, Gimenez P, Mimura M, Yang TT, Reiss AL, **Hoef F**. Sex-specific intergenerational transmission patterns in the human corticolimbic system. *J Neurosci* 2016 Jan;36(4):1254-60. PMID: 26818513; PMC4728726. Press release: UCSF; Covered by: Scientific American; Dana Foundation
- c. Ho TC, Sanders SJ, Gotlib IH, **Hoef F**. Intergenerational neuroimaging of human brain circuitry. *Trends Neurosci (TiNS)*. 2016 Sep;39(10):644-648. PMID: 27623194. PMC5067069.
- d. **Hoef F**, Hancock R. Intergenerational transmission of reading and reading brain networks. In A.M. Galaburda, N. Gaab, F. Hoef, P. McCardle (ed). *Geschwind-Galaburda Hypothesis, 30 years Later (The Extraordinary Brain Series)*. Baltimore: Paul H. Brookes Publishing Co., Inc. 2017.

## D. Research Support

### ACTIVE

NSF1540854 SL-CN (PI UCSF/Gazzaley, Role: Co-PI)

09/30/2015 – 09/29/2018

Science of Learning - Collaborative Networks: Contributions of executive function subdomains to

mathematical cognition and reading in the classroom: Assessment and training To elucidate how multiple domains of executive functions (EFs) contribute to differences in math and reading in middle childhood.

**UCOP MRP-17-454925 (PI Hoeft)** 01/01/2017 – 12/31/2019

Science-based Innovation in Learning Center (SILC) To establish an innovative, multicampus, cross-disciplinary 'Precision Ed-Health' center across the University of CA, tackling issues associated with learning, education and health disparity in underrepresented populations.

**NIH/NICHD R01HD078351 (PI Hoeft)** 09/01/2015 – 06/30/2020

Understanding literacy acquisition through immersion in foreign languages To examine neurobiological, language and cognitive profiles as children learn a second language.

**NIH/NICHS R01HD086168 (PIs Haskins-UConn-Yale/Pugh & Hoeft)** 08/01/2016 – 06/30/2021

Neurochemistry as a moderator of brain networks for reading To test our neural noise hypothesis of dyslexia by examining relationships between neurochemistry, neural oscillation, functional activation, and functional connectivity and how these may predict individual differences in reading skills in children. UCSF does not collect data but is the data QC. Processing and higher level statistical analyses site.

**Oak Foundation ORIO-16-012 (PI Hoeft)** 09/01/2016 – 08/31/2019

Assessing the impact of mentoring on students with neurodevelopmental disorders To examine the impact of mentoring on motivation, resilience and related socio-emotional processes, and predictors of success in middle school students with neurodevelopmental disorders.

**NIH/NIMH R01MH103371 (PI UC Davis/Amaral, Role: Subcontract PI, Co-I)** 04/01/2015 – 03/31/2020

Neurophenotypic trajectories and behavioral outcomes in autism spectrum disorder To explore the relationship between brain development, behavioral abnormalities, and cognitive and functional outcome in children with ASD who are transitioning from early to middle childhood. Role: Data analysis consultation

**NIH/NIMH R01MH104438 (PI UC Davis/Nordahl, Role: Subcontract PI, Co-I)** 07/10/2014 – 04/30/2019

Neural phenotypes of females with autism spectrum disorder To examine neural mechanisms that differ between females and males with autism spectrum disorders. Role: Data analysis consultation

**BBRF Young Investigator Award (PI Keio U/Yamagata, Role: Mentor)** 01/01/2017 – 12/31/2018

Female-specific intergenerational transmission patterns of the human corticolimbic circuitry in depression To investigate correlation in resting-state connectivity in depressed mothers and their female/male offspring

**BBRF Young Investigator Award (PI UCSF/Wang, Role: Mentor)** 01/01/2017 – 12/31/2018

Preliminary investigation of the corticolimbic circuitry using a natural human cross-fostering design and resting-state fMRI To compare correlation in resting-state fMRI connectivity between mother-daughter dyads in three groups of In Vitro Fertilization (IVF) families

### COMPLETED (< 3 years)

**UCSF RAP Academic Senate Award for Junior Investigators (PI Hoeft)** 02/01/2014 – 06/30/2015

Human Intergenerational Neuroimaging of Emotion Regulation: A Feasibility Study

**NIH R01HD067254 (PI Vanderbilt/Cutting, Role: Subcontract PI)** 09/28/2010 – 07/31/2015

Predicting Late-Emerging RD: Neurobiological and Cognitive Factors

**NIH R01HD044073 (PI Vanderbilt/Cutting, Role: Subcontract PI)** 07/01/2015 – 06/30/2016

Cognitive and Neural Processes in Reading Comprehension

**NIH R01HD065794 (PI Haskins/Pugh, Role: Subcontract PI)** 05/10/2011 – 03/31/2016

Neurological Predictors of Spoken and Written Language Learning

**NIH P01HD001994 (PI UConn-Haskins/Rueckl, Role: Subcontract PI)** 08/01/2012 – 05/31/2017

The nature and acquisition of the speech code and reading

### PENDING

**NIH/NICHD P50 (PI GSU/Morris, Role: PI of Biostatistics Core)** 08/01/2017 – 07/31/2022

**UCSF Weill Institute for Neurosciences Trailblazer Award (PI Hoeft)** 08/01/2017 – 07/31/2018

**NIH/NIMH R01 (PI Hoeft)** 12/01/2017 – 11/30/2022

**NIH/NICHD R01 (PIs Hoeft & U Conn/Hancock)** 04/01/2018 – 03/31/2023