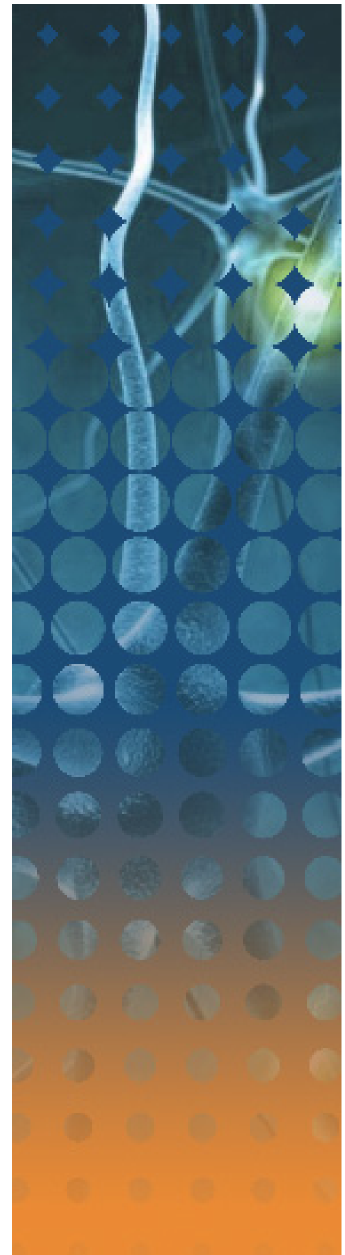
spring 2013

brainLENS

UCSF



For those with dyslexia or a very busy schedule, we have tried to make the Headings intuitive, so Headings would be all that are necessary to read.

neuroscience NEWS

brainLENS Moves from Stanford to UCSF - Laboratory for Educational Neuroscience (BrainLENS) Takes Root at Top Medical Research Institution - University of California, San Francisco (UCSF) -

January 01, 2012—Dr. Fumiko Hoeft, formerly of Stanford University's Center for Interdisciplinary Brain Research (CIBSR), was appointed Associate Professor in the Department of Child and Adolescent Psychiatry and Founding Director of the Laboratory for Educational Neuroscience (BrainLENS) at the University of California, San Francisco (UCSF) in early 2012. We would like to thank Dr. Robert Hendren, Professor and Vice Chair of Psychiatry and Director of Child and Adolescent Psychiatry, for the generous funding which enabled the move to UCSF.

About BrainLENS: UCSF's Laboratory for Educational Neuroscience's mission is to understand how children's brains develop in order to maximize children's potential to succeed in life. Drawing on developmental cognitive neuroscience research approaches, we combine the latest neuroimaging, genetic, and computational approaches to study processes such as individual differences in reading acquisition, socio-emotional development, motivation, resilience, academic achievement, and most recently, strengths and creativity. We are dedicated to the improvement of the lives and education of young learners, and are interested in understanding the neurodevelopment of healthy children, those with learning disabilities, such as dyslexia (i.e., specific reading disabilities), other conditions, such as autism, as well as those with exceptional abilities.

in this issue

brainLENS and CCC form Partnership - UCSF's Laboratory for Educational Neuroscience and Local Children's Organization Get Creative -

February 07, 2013—BrainLENS teamed up with the Bay Area Discovery Museum's Childhood Center for Creativity (CCC) to address the overwhelming evidence that creativity is drastically declining, particularly in our nation's young children. The collaboration marks efforts to translate neuroscientific research into practical solutions to increase creativity in the classroom and at home.

Investigating the neurodevelopment of creativity is a key starting point for understanding how to provide tools to reverse the growing creativity deficit faced in our country, which once celebrated and fostered innovative thinking. Creativity training grounded in science has proven successful in increasing creativity in children and the partnership with the CCC denotes the important translation between research and widespread application to the Bay Area and nation-wide.

UCSF Dyslexia Center has Launched! - Proof of concept phenotyping research project underway with partner Charles Armstrong School -

We are pleased to announce that The UCSF Dyslexia Center kicked off in late 2012! The center incorporates an interdisciplinary team of renowned scientists and educators from the UCSF Division of Child and Adolescent Psychiatry in the Department of Psychiatry, the Memory and Aging Center (MAC) in the Department of Neurology, and the Charles Armstrong School (CAS), a specialized school for dyslexic learners in Belmont, CA. The leadership team includes co-directors, Professors Robert Hendren (Chair of the Division of Adolescent Psychiatry) and Bruce Miller (Director of the MAC), as well as Professors Fumiko Hoeft (Director of BrainLENS) and Maria Luisa Gorno-Tempini (neurologist and neuroscientist at the MAC). The Advisory Board further includes Board Chair, Steve Carnevale (former Chair and President of the CAS Board), Claudia Koochek (Head of School, CAS), and Anne Moses (CAS Board Member). The ultimate goal of the center is to be a "one-stop shop" to assess and support those with learning differences, in particular dyslexia, in both their difficulties and strengths, based on the latest neuroscientific knowledge. The center has initiated the Dyslexia Phenotyping Project, which offers state-of-the-art neuroscientific assessment that integrates genetic testing and brain imaging with assessments of cognition, behavior and the child's environment.

For more information regarding the center, contact Chelsea Myers of BrainLENS, at Chelsea.Myers@UCSF.edu.

CENTER FOR CHILDHOOD CREATIVITY

The collaboration will embrace the expertise and resources of Dr. Fumiko Hoeft, Director of BrainLENS, and her team at UCSF, as well as Executive Director of the CCC, Elizabeth Reike, and the numerous leading thinkers that make up the team at the CCC. The partnership seeks to spread public awareness about the importance of understanding the developing brain, advocate for creative thinking in early childhood, and embrace the increasing technological resources available to young children eager to learn and explore.

This new and exciting opportunity to join forces with such an innovative and influential organization is bound to produce numerous collaborative efforts, the earliest of which, may include: a joint fellowship focused on creativity research, the creation of enriching exhibits at the CCC's site, The Bay Area Discovery Museum in Sausalito, CA, opportunities to participate in research, and the exciting development of a mobile app for parents that explains the neuroscience behind creative thinking. Each of these projects represent the foundational efforts to spread awareness about this critical time of brain development and ways we can embrace this knowledge to get our nation's youth thinking out-of-the-box again.

A full write-up of the announcement of the collaboration was in the SF Gate on February 07, 2013.

brainLENS in the News

Members and research from BrainLENS have been highlighted in public media outlets such as CNN, New York Times, Yahoo News!, LA Times, and SF Gate. Please visit our website http://brainlens.org for details.

Stanford (now UCSF) Reading Brain Study is Wrapping Up its Final Year - Thank you for your support! -

Summer 2012—Families and participants of the Reading Brain study returned for their third and final year of scanning and behavioral testing. The study, which began at Stanford University School of Medicine and since moved with principal investigator, Dr. Fumiko Hoeft, to UCSF, investigated the relationship between genes, brain, behavior and the environment to better predict future reading and academic outcomes in children without any family history and those with a family history of dyslexia.

Environmental, genetic, structural and functional brain, behavioral, and cognitive data were first collected at the beginning of kindergarten in 2008/2009. The children returned after first grade to repeat behavioral and cognitive testing and the study finally wrapped-up in the summers of 2011/2012 after second grade, with a final MRI brain scan and testing. Time 3 brought a little twist, as moms, dads, brothers, and sisters joined in the scanning! Our expert children got to show their parents and siblings what the study was all about.

The main goal of the study was to improve understanding of the brain bases of reading, with the hope to maximize achievement in readers of all abilities. Improving early identification of those who later develop dyslexia will likely lead to early and even preventive intervention. Through this, we hope to minimize difficulties with reading as well as the social, emotional and self-esteem issues that children with learning differences often experience. We aim to use these findings to develop brain-based interventions and early screening tools for reading difficulties / developmental dyslexia.

We are now busy analyzing our findings and have already begun to see some interesting and promising results. In addition, we are writing new grants to obtain additional funding to continue similar studies. We would like to thank all of the participants and their families for dedicating their time with us over the past five years. Your cooperation was the key to the study's success!

A number of generous enthusiasts indicated interest in supporting The Reading Brain Study, but we did not have the means to receive these gifts at Stanford. We appreciate the kind intentions of our supporters. If you are interested in continuing to support our research and outreach to children, families and schools, please refer to the "Support Our Efforts" section in the margins.

Findings thus far from the Reading Brain Study and related studies are described in the following pages.

Fumiko Hoeft, MD, PhD - *DIRECTOR*

Dr. Fumiko Hoeft is Associate Professor of Child & Adolescent Psychiatry and Director of BrainLENS at UCSF. She is a psychiatrist and developmental cognitive neuroscientist, and trained at institutions including, Keio Univ (Tokyo), Harvard, Caltech and Stanford. She is interested in using the latest computational algorithms and combining various neuroimaging techniques to understand how the brain develops and functions, particularly in healthy children, in those with learning differences (dyslexia), socio-emotional challenges and with gifts & talents. Dr. Hoeft is also Scientific Advisor to the Bay Area Discovery Museum's Center for Childhood Creativity (CCC) and holds positions at Yale University's Haskins Laboratories, Stanford University School of Medicine's Center for Interdisciplinary Brain Sciences Research (CIBSR), and Keio University's Department of Neuropsychiatry.

brainLENS
415.476.9861 | info@brainlens.org | http://brainLENS.org

Brain Scans Predict At-Risk Status, Future Reading Ability and Which Child with Dyslexia Learns to Compensate

With a large volume of unique data collected in the lab, including the Reading Brain Study, we have been able to examine the brain bases of reading, dyslexia and different subtypes of dyslexia, and crucial predictors of reading success in children with and without dyslexia, as well as in pre-readers with a family history of dyslexia.

For example, in one study, we aimed to examine if the latest brain imaging technology could be used to predict the approximately 20% of children with dyslexia who seamlessly learn to compensate for reading deficits, as there are currently no good predictors of this phenomenon. Finding strong brain predictors may lead to the development of brain-based strategies to help other children with dyslexia learn to compensate. Using functional MRI (fMRI), which measures brain activation, and diffusion tensor imaging (DTI), which measures fiber strength of white matter structures, which connect different parts of the brain, we found that greater right inferior frontal activation during a reading-related task performed in the MRI scanner (Figure 1) and right fronto-parietal white matter predict reading gains two and a half years later in children with dyslexia. The left hemisphere equivalent of these regions are very important reading networks, suggesting that children with dyslexia who successfully learn to compensate may be using the right hemisphere counterpart of the reading networks. Our group has been the leader in this field that utilizes the latest brain imaging and mathematical models to identify brain predictors of reading success, and we have published the first and only reports to date.
Source: Hoeft et al. PNAS 2011

Support Our Efforts

Interested in our efforts? One of the best resources we have to fuel our research comes from the generous and visionary support of people like you – people who share our quest to improve the quality of learning for children. We are tremendously grateful for your interest in helping support our research. Donations of any size are welcome and greatly accelerate research and our efforts to translate research to education and medicine. Donations we received from the community last year are helping us to fund research on how to measure and train motivation in lower socioeconomic and young learning disabled (LD) populations, as well as to build UCSF's Dyslexia Center.

We hope with added support , we can (1) develop the first scientifically proven smart phone application to screen children at risk for developing learning differences, (2) perform outreach in preschool to early elementary grades to improve motivation and mindsets, and (3) to accelerate our research.

Please visit the donation page of our website, www.brainlens.org/donate.html to find more information about donating online or by sending us a check.

Any Questions? Contact Lab Manager, Chelsea Myers; Chelsea.Myers@ucsf.edu

One of our ultimate goals is to identify brain markers of reading outcome even before children learn to read. So in the Reading Brain Study we looked at children's brains at the beginning of kindergarten. Children in kindergarten cannot be diagnosed with dyslexia, as they are not yet expected to be fluent readers, therefore, we investigated whether the brains of children with and without a family history of dyslexia differ. Although dyslexia has a prevalence rate of 5—17.5% in the general population, we focused on children with a family history of reading problems, as there are decades of research showing that such children develop dyslexia at higher rates, which are estimated to be up to 50%. In a 2012 publication led by Prof. Jessica Black, a former postdoctoral fellow who is now Assistant Professor of Social Work at Boston College, we found that the development of brain regions known as the fronto-parietal network in both left and right hemispheres were predicted by mothers' but not fathers' reading history. These regions are commonly associated with executive function, semantic and phonological processing, as well as other reading constructs.

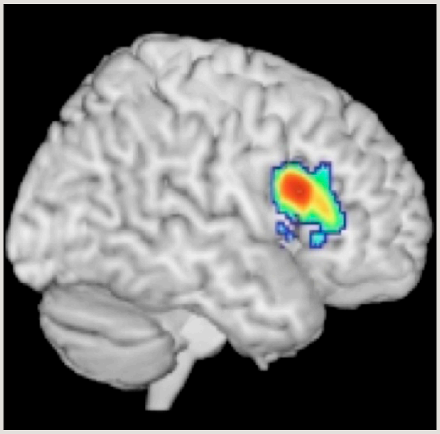


Figure 1
Right inferior frontal activation predicts which dyslexic child learns to compensate.

In a sister study published in 2013, Dr. Hadi Hosseini, another former postdoctoral fellow in the laboratory who is currently a research scientist at Stanford, found evidence of brain network differences in the kindergarten children regardless of maternal or paternal family history (Figure 2).

Continued on Page 5

Continued From Page 4

In this study, which used more detailed measurements of the brain (known as cortical surfaces and cortical thickness) and controlled for factors such as the environment, we found that the differences seemed to be stemming from prenatal influences (i.e., influences after conception but before birth). There is very little research demonstrating the importance of the prenatal period in the development of dyslexia-like characteristics with existing research only available from animal studies. Therefore, many more studies are likely needed before we can make such claims. Nevertheless, together with reports from Europe and Harvard, we show clear biological evidence of the importance of family history. We hope to take similar approaches to study how the brain is influenced by the environment to help design better interventions. *Source: Black et al. NeuroImage 2012; Hosseini et al. NeuroImage 2013*

While the results above may sound like family history (genetics) is the most important component influencing brain networks and thereby reading outcome, we are finding new evidence that learning and educational environment via white matter development may play a role that is equivalent or possibly even greater in predicting reading outcome. Specifically, we have found that left temporo-parietal white matter development, a region that has been shown to be important for reading, predicts reading outcomes above and beyond family history, children's preliterate and cognitive capacities at the onset of formal reading instruction, and family environment (Figure 3). We currently suspect factors that play a role in temporo-parietal white matter development during this critical period for reading are related to the child's learning environment as we ruled other major factors out. Nonetheless, direct and detailed measures of the learning environment in future studies may lead to improved educational instruction. *Source: Myers, Farris et al. under prep*

The next natural step of research that we are currently conducting is a large-scale international study. We do this in a very cost-effective way by combining data that have already been collected by individual laboratories using statistical approaches developed for these purposes. This allows us to test the generalizability of our findings and models in a much larger sample (10 to 15 times greater) from all over the world. We are able to do this with a fraction (2-3%) of the cost of collecting from scratch. We now have over 1,000 brain scans from partnerships with researchers from all over the US and Europe. The goal of this research is to find universal (and divergent) brain patterns that predict reading outcome. Led by BrainLENS postdoctoral scholar, Dr. Emily Farris, collaborators include: Prof. Ken Pugh (Haskins Laboratories, Yale), Prof. Laurie Cutting (Vanderbilt), Prof. John Gabrieli (MIT), Prof. Nadine Gaab (Harvard), Prof. Silvia Bunge (UC Berkeley), Prof. Terry Jernigan (UCSD), Prof. Jeff Gilger (UC Merced), Prof. Mark Ecket (Medical Univ South Carolina), Prof. Turkel Klingberg (Karolinska Institute), Profs. Kathrine Skak Madsen / William Baaré (Danish Research Centre for Magnetic Resonance), Profs. Paavo Leppänen / Heikki Lyytinen (Jyväskylä), Profs. Silvia Brem / Dani Brandeis / Urs Maurer (Zurich) and their respective teams.

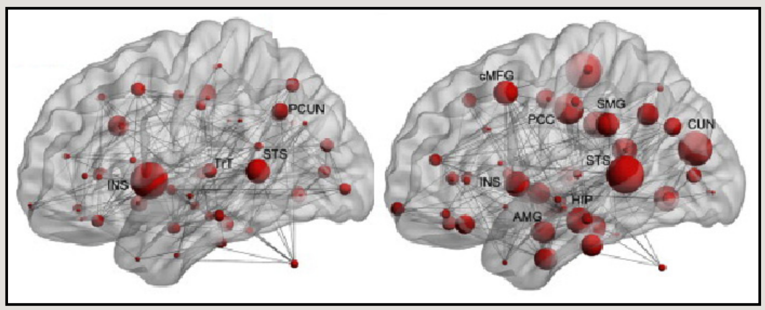


Figure 2
Differences in brain networks between kindergarten children with (left panel, indicated in smaller spheres using algorithms used to represent social networks) and without (right) risk for developing dyslexia.

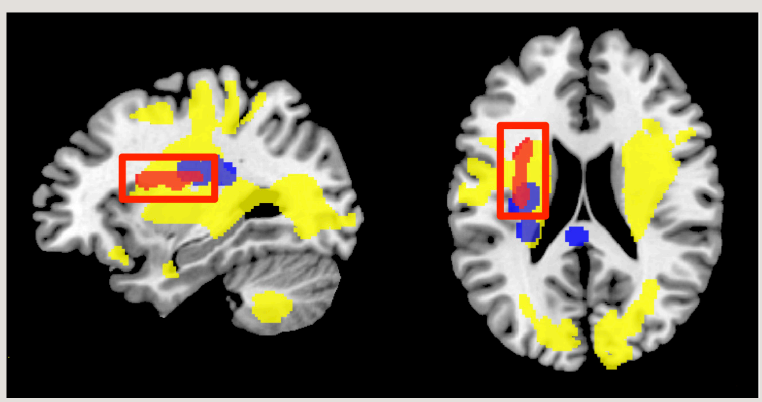


Figure 3
Development in left temporo-parietal white matter (red square) uniquely predicts reading outcome when children first learn to read.

Emily Farris, PhD - *POST DOCTORAL SCHOLAR*

Emily graduated summa cum laude from Midwestern State University in Wichita Falls, Texas with a BA in psychology prior to receiving a MA in clinical/counseling psychology from Midwestern State University. She recently completed her PhD in experimental psychology at the University of Texas Arlington under the mentorship of Dr. Timothy Odegard. Emily's research interests involve using MR imaging techniques and more traditional cognitive studies to investigate aspects of cognitive and neurocognitive development throughout the lifespan. Specifically, she is continuing to investigate response to intervention in children with developmental dyslexia using a variety of neuroimaging analyses (e.g., fMRI, DTI, and functional connectivity).

The Discrepancy Debate Revisited using Brain Scans - Reading related brain patterns are NOT different between poor readers with and without discrepantly higher IQ which suggests the need for similar accommodations for all poor readers. Brain patterns differ in good readers with and without discrepantly higher IQ, and the patterns indicate good readers with discrepantly high IQ showint brain dysfunction and compensatory strategies, a pattern similar to dyslexic children. -

The Individuals with Disabilities Education Act (IDEA 2004) no longer requires the use of IQ as criteria for the diagnosis of dyslexia. In support of this criteria change, research shows that phonological deficits and response to interventions do not differ based on a child's IQ. Despite this, the use of IQ in diagnosis is still widely prevalent in schools. In concordance, a recent study of ours, led by Prof. Jessica Black and our former research assistant, Hiroko Tanaka, MS, who is currently a pediatric neuropsychology intern at Barrow Neurological Institute at Phoenix Children's Hospital, found that activation patterns during phonological processing do not differ based on IQ. This study was highlighted by the media and at renowned institutions, such as LA Times , NIH (The Eunice Kennedy National Institute of Child Health & Human Development), Association for Psychological Sciences, Stanford, and MIT. It is important to recognize this study did not include children who are reading at average or above average levels who have very high IQ / cognitive abilities, but who may still elicit signs of dyslexia. These children with high IQ whose reading skills are not similarly high generally struggle to receive the accommodations that they deserve. Investigating 'dyslexic' patterns in the brain may support the provision of services to these children. Stay tuned, as we are currently pursuing this topic! *Source: Tanaka, Black et al. Psychol Sci '11, Gimenez, Tanaka et al. under prep*

Highly Hypnotizable Brains are Different even at Rest, a Study in Collaboration with Hypnosis Expert & Stanford Professor David Spiegel Shows.

Hypnosis is a powerful and popular means of alleviating perceptions of pain and anxiety by altering activity in brain regions associated with focused attention. However, not everyone is equally susceptible to hypnosis. In fact, some people may be categorized as low hypnotizable individuals and others as highly hypnotizable. For this reason, we sought to understand the brain bases of hypnotizability. The study showed that high compared to low hypnotizable individuals had greater functional connectivity in the left dorsolateral prefrontal cortex, an area important for executive-control, and dorsal anterior cingulate cortex, an area important for filtering out relevant information. Thus, the connectivity of those with greater ability to be hypnotized involves networks involved both in cognitive control and engagement. We believe that understanding the brain bases of hypnotizability may have important implications in helping individuals to gain control over their pain (e.g. chronic pain, child labor) and anxiety. Perhaps some of these principles can even be applied to enhance children's abilities in ways similar to mindfulness training, which has proven to be useful for children in a number of domains, such as increasing attention, awareness, social skills, and academic performance, as well as decreasing stress and anxiety. *Source: Hoeft et al. Arch Gen Psychiatry '12*

Other Members of brainLENS

Current members include: Teresa Jamie Soriano, MA; Teresa Jamie Soriano, MA; Hiroko Tanaka, MS; Nicolle Bugescu, MS; Brandi Casto, BS; Marina Kaminetskaya, BA; Emily Kutner, BA; Paul Gimenez, Mollie Bayda, BA; Kan Long, BA.

For a list of alumni, please visit our website.

ongoing **PROJECTS**

What is the Genetic Basis of Individual Differences in Brain Development?
- Collaboration with Haskins Laboratories and Yale University -

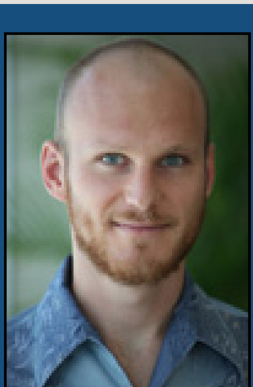
We are in the midst of analyzing relationships between genes that influence how the brain develops and structural patterns of the brain in a large cohort of children. This is a collaborative effort led by Miro Drahos MS with geneticist Prof. Elena Grigorenko (Yale), cognitive psychologist Prof. Ken Pugh (Haskins Labs) and their excellent teams. We also are consulting with Prof. Laurie Weiss, an in-house expert geneticist at UCSF.

How do the Brains of Twice Exceptional Learners (2e) including Stealth Dyslexics Differ?
- Collaboration with Vanderbilt, UC Merced & authors of Dyslexic Advantage -

We have been fascinated by and have been looking at brains of children with dyslexia who are discrepant in two or more abilities. In particular, we are looking at: 1) children who have IQs that are much higher than their reading abilities (see previous page), 2) those who have solid reading skills despite struggles with phonological processing, which is considered by many to be the cause of dyslexia (led by Brandi Casto, MS), and 3) those who have good reading comprehension despite poor single word reading abilities (led by Dr. Emily Farris). These children are known as ‘stealth dyslexics’, a term coined by Drs. Fernette and Brock Eide several years ago. In these ‘stealth dyslexics’, we find that they not only look ‘normal’ in a large portion of their reading related brain networks, but also a brain region called the temporal pole is even larger in volume on the left and right sides of the brain both when compared to poor readers with comprehension and single-word reading deficits and to typical readers. The left temporal pole is commonly denoted as a brain region important for sentence/syntactic and higher-order context processing; whereas, the right temporal pole has been shown to be important for processing social contexts. There are several projects on this topic. Main collaborators include: Prof. Jeff Gilger (UC Merced), Drs. Brock and Fernette Eide (NeuroLearning Clinic), and Prof. Laurie Cutting (Vanderbilt). We are also discussing potential collaboration / partnership with Nueva School, which is a school for gifted children (Director, Diane Rosenberg).

lectures & **TALKS**

During the last couple of years, we have also been busy with our outreach activities. These include: (1) giving lectures at professional conferences and in schools, (2) organizing symposia, and (3) giving brain scan labs (scanning and analyzing brain scans with middle and high school children). Some of the venues include: Learning and the Brain Conference (San Francisco, CA), UCSF, Stanford University, Harvard University, University of California Davis MIND Institute, University of Texas Houston, University of Arizona, University of Pittsburgh, SRI International, and University of California, Merced, the Society for Neuroscience (SFN; Washington, DC), European Association for Research on Learning and Instruction (EARLI; London, UK), GraphoWORLD Summer School (Jyvaskyla, Finland), International Mind, Brain and Education Society (San Diego), MNC Summer Institute (College Park, MD), American Academy of Child and Adolescent Psychiatry (AACAP; San Francisco), International Neuropsychological Society (INS), Cognitive Neuroscience Society (CNS), American Psychological Association (APA), and Association for Psychological Sciences (APS). Upcoming talks can be heard in Oxford UK, NY USA, Taiwan, and Hong Kong.



Miro Drahos, MS
RESEARCH ENGINEER

At BrainLENS Miro is involved in developing methods for processing MRI data, implementing processing pipelines, MRI data acquisition and maintaining IT infrastructure and website. Among his areas of professional interest belong: machine learning algorithms, fuzzy logic and applications, mathematical models, automation, and others. Outside the lab he enjoys playing the guitar, dancing, doing yoga, cooking vegan meals and supporting the open-source community.

Check Us Out!

Be sure to check out our website at www.brainlens.org to stay up-to-date on the most recent happenings of our lab!

in the WORKS

You got your eye colors, great looks and intelligence from your parents but do you know which parent you got your brain networks from? - Collaboration within UCSF, and with Harvard, Yale, & Haskins Labs -

Parents have a large influence on their offspring and are likely to play a key role in the psychopathology of many mental illnesses. Yet, there are no studies that measure the association between parent and offspring brains. We propose to study transmission patterns in the human brain by imaging parent and offspring duos. We incorporate a design that embraces the diversity of the “modern family”, from adoption, various methods of in-vitro fertilization (IVF; test-tube babies), and the “traditional family”. Research on similarities and differences between parents and offspring, i.e., intergenerational effects, in these families will help to tease apart the effect of genetic, prenatal, and postnatal environments on neuro-developmental conditions that have shown these intergenerational effects such as mood and anxiety disorders, autism, addiction and dyslexia. We hope that answering this question will provide us with essential information to develop early and preventive interventions to these common disorders. Collaborators include: emotion / mood disorders experts Prof. Ian Gotlib (Stanford), Prof. Ron Dahl (UC Berkeley), Prof. Nim Tottenham (UCLA), and Prof. Tony Yang (UCSF), neuroimaging expert Prof. Paul Thompson (UCLA), genetics / animal model expert Prof. Chris Gregg (Utah), human genetics expert Prof. Elena Grigorenko (Yale), cognitive psychologist Prof. Ken Pugh (Haskins Labs), IVF expert Prof. Lauri Pasch (UCSF), and adoption expert Prof. Lisa Albers Prock (Harvard).

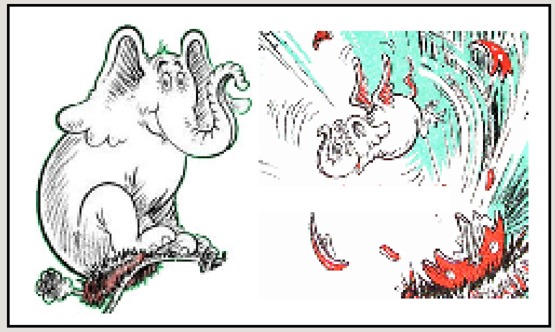


Figure 4
Cartoon depiction of a natural cross-fostering study (from ‘Horton hatches the egg’ by Dr. Seuss). Horton (rearing parent) lays a bird (genetic parent)’s egg (left panel). The newborn is heavily influenced prenatally by the rearing parent (right).

How does second language learning influence brain development? - Collaboration with UC Davis & San Francisco Unified School District (SFUSD) -

An increasing number of young students learning English are exposed to an additional language. We aim to study, using behavioral-based testing and neuroimaging, how English literacy acquisition is influenced by long-term and intensive second language learning, specifically Cantonese and Spanish, from kindergarten to second grade. We also hope to explore the potential affect of second language learning on English literacy acquisition in children at-risk for developing reading disabilities, a population that is often deterred from learning a foreign language. Collaborators include: Prof. Yuuko Uchikoshi (UC Davis), Prof. Ioulia Kovelman (Univ Michigan), Prof. Ken Pugh (Haskins Labs), Prof. Linda Siegel (Univ British Columbia), and Prof. Cammie McBride (Univ Hong Kong).

Chelsea Myers, BS
LAB MANAGER

Chelsea received her B.S. in Biology with a minor in Spanish from St. Michael’s College in Colchester, Vermont. She plans to pursue a Ph.D. in clinical psychology with a focus on neuropsychology. Chelsea is interested in the biological and social correlates of neurological development. Additionally, she has a strong interest in the translation of mental health research to educational practice and public policy.

Assessing and Enhancing Motivation, Mindset, and Grit in Typical and Struggling Learners - Collaboration with Stanford Professor Carol Dweck, Boston College and UCLA -

The adolescent years can be a tumultuous and confusing time for blossoming young adults and the amount of distractions deterring them from focusing on their studies are numerous. Some adolescents overcome the influx of changes and thrive in their learning environment, while others are falling short. According to renowned Stanford researcher and psychologist, Prof. Carol Dweck, “mindset” can make all the difference. Simply believing that you can improve your intelligence through hard work (growth mindset) and not falling victim to believing that intelligence is an innate trait that cannot be changed (fixed mindset), can improve the likelihood of success for these young students. We are teaming up with the popular Stanford researcher, to key-in on the brain mechanisms that underlie varying intelligence mindsets in hopes to understand more about interventions that could improve the quality of education for all types of students.

Utilizing the key findings that members in minority groups are more likely to orient towards believing that their intelligence level is fixed, we hope to eventually explore the mindsets and effectiveness of mindset training in children and young adults affected by learning disabilities. We believe that like minority groups, students with learning disabilities may experience the same sort of marginalization and feelings of helplessness when it comes to learning and may strongly benefit from “mindset training”. Our collaborators include: mindset expert Prof. Carol Dweck (Stanford) and Prof. Jessica Black (Boston College).

featured **PUBLICATIONS**

1. Hoeft, F., McCandliss, B., Black, J.M., Gantman, A., Zakerani, N., Hulme, C., Lyytinen, H., Whitfield-Gabrieli, S., Glover, G.H., Reiss, A.L., and Gabrieli, J.D.E. Neural systems predicting long-term compensation in dyslexia. Proc Natl Acad Sci USA 2011; 108(1):361-6. PMID: 21173250. PMCID: PMC3017159.

2. Black, J.M., Tanaka, H., Stanley, L., Nagamine, M., Zakerani, N., Thurston, A., Kesler, S., Hulme, C., Lyytinen, H., Glover, G.H., Serrone, C., Raman, M.M., Reiss, A.L., and Hoeft, F. Maternal history of reading difficulty is associated with reduced language-related grey matter in beginning readers. Neuroimage 2012;59(3):3021-32. PMID: 22023744. PMCID: in progress.

3. Hosseini, S.M.H., Black, J.M., Soriano, T., Bugescu, N., Martinez, R., Raman, M.M., Kesler, S., and Hoeft, F. Topological properties of large-scale structural brain networks in children with familial risk of developmental dyslexia. NeuroImage 2013;1(71)260-74. PMID: 23333415. PMCID: in progress.

4. Tanaka, H., Black, J.M., Hulme, C., Stanley, L.M., Kesler, S.R., Whitfield-Gabrieli, S., Reiss, A.L., Gabrieli, J.D.E., and Hoeft, F. The brain basis of the phonological deficit in dyslexia is independent of IQ. Psych Sci 2011;22(11):1442-51. PMID: 22023744. PMCID: in progress.

5. Hoeft, F. Gabrieli, J.D.E., Whitfield-Gabrieli, S., Haas, B.W., Bammer, R., Menon, V., and Spiegel, D. Functional brain basis of hypnotizability. Arch Gen Psychiatry 2012;69(10):1064-72. PMID: 23026956. PMCID: in progress.

For other publications related to autism, anxiety disorders, neurogenetic conditions, aging and imaging methods, go to: http://profiles.ucsf.edu/fumiko.hoeft, or search online using keywords, “Fumiko Hoeft”, and “UCSF Profiles.”