ATION STUDIES
VISUAL LANGUAGE AND VISUAL LEARNING (VL2)

visualize

CHANGING THE WORLD THROUGH SCIENCE

When one thinks of a "Research Center" the image that comes to mind is a physical place where a group of scientists, students, technicians and core staff come to work together on a set of research projects that cohere around a common set of questions or methodologies. While our NSF Science of Learning Center, VL2, certainly addresses closely related questions and frequently employs common methodologies, in today's technologically interconnected universe we have never needed to be defined by a single physical space, and our model continues to become ever more rich and complex.

Indeed, as we enter the ninth year of this remarkable journey, the webbing in our very broad mesh of collaborations continues to expand and strengthen. Through a network of Memoranda of Understanding (MOUs), which we report on in this issue of *Visualize*, we now actively pursue engagements with 16 leading Cognitive Neuroscience and behavioral science laboratories throughout the United States (with

international MOUs in the works!). Already, we see the development of joint proposals, the exchange of students from institutions we have not worked with before, and the nurturing of Cognitive Neuroscience sites for future summer lab rotations for our PhD in Educational Neuroscience graduate students. We see many new and eager students who are seeking collaboration and witness the emergence of a stellar cohort of young scientists. It makes us very proud of what we do.

Year 9 (of 10) of generous NSF support means the ramping down of our Center funding, and our new challenge has been exploring ways to continue to thrive. Fortunately we have had three graces: First, Gallaudet University has ensured our ongoing life through its own generous support. Second, a wealth of scientific talent has rallied around us and embraced us with voluntary partnerships that are mutually beneficial to us and to the scientists and their universities.

Third, our three Resource Hubs— Allen's Early Education and Literacy

Laboratory (EL2), Petitto's Brain and Language Laboratory for Neuroimaging (BL2), and Malzkuhn's Motion Light Laboratory (ML2)—ensure the extension of the spiritual life of the original VL2 Center as well as its vibrant student training. Each of these mini Centers is already serving as a national resource through their scientific discoveries and activities.

So the Center holds. And it all feels more organic, beautiful even. ●

– Laura-Ann Pettito and
Thomas Allen, Co-PIs, VL2

overview

BL2

GALLAUDET
UNIVERSITY

VISUAL LANGUAGE
AND VISUAL LEARNING

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Sharing VL2 Resources
TL2 Team Translates Research Briefs into ASL

Adam Stone and Erica Wilkins, VL2 Student Leadership Team (SLT) members and PhD candidates, were looking for ways to make VL2 resources more accessible—and they came up with an innovative idea.

"We were having a discussion with **Dr. Melissa Herzig** (VL2's Education and Research Translation Manager) about the need to get more of our resources out there in the community," Stone recalls. "We thought, why not make quick ASL summaries of the VL2 research briefs, all 10 of them?"

From that discussion, the Translation-Translation (TL2) project was born. Along with fellow SLT members **Jessica Contreras** and **Diana Andriola**, Stone and Wilkins put together a workshop for VL2 scholars to create videos of the research briefs. Ten students participated in the three-day session, held at Gallaudet in August.

"We paired up the students and assigned two briefs to each pair," Stone explains. "For two weeks prior to TL2, the teams worked on preparing rough drafts ready to bring to the workshop. When the workshop started, we were constantly practicing our ASL translations in front of each other, improving and making them better until we got to the final product."

Dr. Herzig and **Melissa Malzkuhn**, Director of VL2's Motion Light Lab, both played important roles in the workshop. Dr. Herzig shared principles of translation, helping the students make scientific research clearer and more relevant to the public. Malzkuhn trained participants in video and camera techniques, video editing, captioning and effective settings/environments for filming. Student mentorship leader **Dr. Peter Hauser** also supported the scholars by expanding on scientific themes and concepts throughout the workshop.

VL2 scholars returned to their home labs having developed skills to create more ASL videos to disseminate their important research findings, and the SLT will provide support for further training to advance translation of VL2 science.

The TL2 research brief videos are posted on the VL2 website. "We can use them for future outreach and presentations," says Stone, "And we hope professionals, educators, and schools will use them too, and refer to them as good examples of the advantages of visual learning and visual language for children." ●
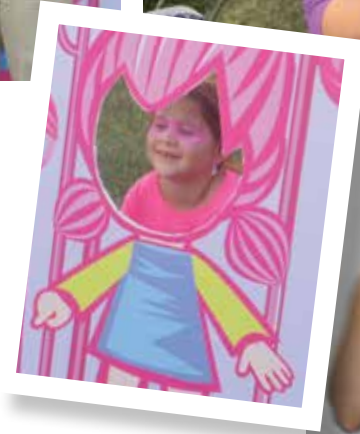
NEW VL2 Storybook App Launched! Blue Lobster is VL2's First Bilingual App for Younger Readers

The VL2 team has released its newest bilingual storybook app for iPad, *The Blue Lobster*, aimed at beginning readers ages 3 and up. The newest in the series of innovative storybook apps created in VL2's Motion Light Lab (ML2) the storybook was inspired by Toby, a rare blue lobster who resides at the National Aquarium in Baltimore, and launched at the Baltimore Book Festival in September.

"The Blue Lobster is designed to spark children's imaginations and help them experience new adventures and learn about the world," says **Melissa Malzkuhn**, Director of ML2 and VL2's Digital Innovation & Media Strategies Manager.

The Blue Lobster app offers an enticing bilingual language, learning, and reading experience, showcasing a person using sign language, animation, and accompanying English text. Various interactive features take children from printed English words to an ASL and spoken English glossary of about 50 signs.

"Our research has shown that children exposed early in life to bilingual texts become stronger readers. We know of no other bilingual interactive app for the young deaf child just beginning to read," says **Dr. Laura-Ann Petitto**, co-principal investigator and science director of VL2.

The Blue Lobster was created by an all-deaf team of designers and researchers, the majority of whom are Gallaudet alumni. Lead designer Malzkuhn explains that the app was created especially with younger beginning readers in mind.

"Conceptually, the app focuses on color concepts supported by beautiful illustrations, which all children are exploring at this development age," she explains. "Linguistically, the app allows young children to gain strong support [for reading concepts] from simple words and repetitive sentence structure. Additionally, there is a single theme focus—the search for a rare blue lobster."

The Blue Lobster joins a VL2 app library that includes *The Baobab* and *The Boy Who Cried Wolf*. *The Solar System*, an educational storybook app for ages 7 and up, will be released in fall 2014, and the next planned app, *The Little Airplane That Could*, is also in production. ●

To download The Blue Lobster for $2.99, access https://itunes.apple.com/app/id920137853.

"Our research has shown that children exposed early in life to bilingual texts become stronger readers. We know of no other bilingual interactive app for the young deaf child just beginning to read..."

- Dr. Laura-Ann Petitto

VL2 Around The Globe
Petitto Shares VL2 Research at International Conferences

Dr. Laura-Ann Petitto, Co-PI and Science Director of VL2, regularly travels to international venues to share her research findings about early language acquisition, bilingualism, reading, brain imaging technology and the neural representation of human language and findings, and the translational implications this research has for education, among other topics.

Dr. Petitto was especially honored to recently present two invited international distinguished addresses. The first, on September 19, 2014, was an invited address, spanning university, medical, public, and governmental levels, to the AQEPA (Association du Quebec pour Enfants avec Problèmes Auditifs), Institut Raymond Dewar, in Montreal, Quebec, Canada. There she presented before government officials about the biological, social and linguistic rights of deaf children. The title of Dr. Petitto's presentation was "On Revolutionary Science from Visual Language and Visual Learning: Implications for Education Today."

The second address, on November 4, 2014, was the highly esteemed invited Annual Address of the University of Belfast, Northern Ireland, spanning university, clinical, public, and governmental levels, which was sponsored jointly by the Institute for Research in Social Science, and the Centre for Multilingualism of the University of Ulster, Belfast. The title of Dr. Petitto's Annual Address was "How the Brain of the Baby Discovers Language." This was a prominently featured public lecture that was covered by the BBC press. During her time in Northern Ireland, Dr. Petitto also appeared on Good Morning Ulster, a radio program of the BBC Northern Ireland, discussing the benefits of bilingualism to a country that has been torn by war and the resulting separation of language and culture that persists into the present. ●

How the Brain of the Baby Discovers Language

VL2 Making Connections
Langdon Participates in BRAINS Event

Dr. Clifton Langdon, assistant professor for the PhD in Educational Neuroscience Program (PEN), recently participated in the Broadening the Representation of Academic Investigators in Neuroscience (BRAINS) program at the University of Washington. BRAINS was established to support career advancement of neuroscience assistant professors and postdoctoral researchers from underrepresented groups.

"BRAINS aims to increase diversity in the neurosciences by providing support for newer researchers and faculty, helping them develop into leaders and mentors who can make major contributions in our field," explains Dr. Langdon. "I was amazed by the depth and breath of topics as we discussed the range of personal and professional aspects that goes into being a successful scholar." The program also promotes retention of highly skilled scientists by strengthening networking and providing tips, tools, and skills development to prepare for tenure track success and increase career satisfaction.

"Acceptance into the BRAINS program is a major honor for Dr. Langdon and an important recognition of him as a cognitive neuroscientist," said **Dr. Laura-Ann Petitto**, VL2's co-principal investigator and science director. "We are utterly thrilled that he is a part of our PEN program." Dr. Langdon's work in the fields of linguistics and cognitive neuroscience advances understanding of the structure of all human language, language acquisition, bilingualism and reading.

Dr. Langdon says his experience at BRAINS was "enormously inspiring. I am excited to have the opportunity to broaden my mentoring network with both peers and senior scientists and also better support my students in their training. I look forward to my continued engagement in the BRAINS program." ●

VL2 On The Move Herzig Shares Translation Resources with Educators and Parents

In her role as VL2's Education and Research Translation Manager, Dr. Melissa Herzig regularly travels around the country, meeting with parents, teachers and other professionals to discuss the work of VL2 and its implications for deaf education.

"Teachers enjoy learning what the VL2 research says about children's cognitive development—they may already use effective bilingual strategies with them, but to have research backing [them] up really makes their work more meaningful," she says. "And parents come up to me after my talks about early language exposure, expressing thanks for [us] validating what they are doing with their child and requesting information and support."

"The message I want participants to take away is that any child, especially deaf/hard of hearing children, benefit from having ASL and bilingual access," she continues. "Exposing them to diverse communication opportunities [can only be beneficial.]"

One of Dr. Herzig's presentations during the summer was at the Mountain States Deaf Education Summit in Utah. Her topics included ways to use VL2 storybook apps to augment teaching in classrooms and at home (related lesson plans are downloadable at vl2storybookapps.com).

"Teachers are looking forward to the release of the nonfiction app *The Solar System* this winter," Dr. Herzig says. "And using our Storybook Creator program, story writers have unlimited possibilities to create apps in different genres and for different age groups." (The Storybook Creator program is a coding program that allows individuals to use their own videos, text and artwork to create storybook apps.)

This fall Dr. Herzig visited Boston University, the Southwest Conference for Educators of the Deaf in Texas, the Florida Educators for DHH Individuals, and the Pennsylvania and Maryland schools for the Deaf, among many other groups, talking with parents, educators and graduate students in Deaf education programs.

In addition to disseminating VL2 findings and translation projects, Dr. Herzig, Graduate Assistant **Erica Wilkins** and the Translation team are conducting usability studies for both the VL2 Storybook Apps and VL2's Parent Information Packages.

"With the information we gather about how children use our apps, we will learn what revisions are needed to improve our products and make them more accessible and useful for children, parents, and teachers," she says. "This is a great example of two-way translation; we want to learn from people who are using our products, so we can serve them better." ●

Dissemination & Outreach

Breakthrough Science Networks
Year 8-9 SFA Leaders, PIs and Studies

SFA 1: Visual and Cognitive Plasticity

Led by Rain Bosworth, University of California, San Diego

Study 1

Development of Visual Phonology in Deaf Infants: The Role of Rhythmic-Temporal Properties of Sign-Phonetic, Sign-Syllabic and Prosodic Language Perception Using Eye Tracking

PI Rain Bosworth, University of California San Diego (UCSD)
Network: So-One Hwang, UCSD
Laura-Ann Pettito, Gallaudet University
David Corina, University of California Davis

This study uses cutting-edge, high-resolution eye tracking technology to investigate where infants and children look while viewing a signer using American Sign Language. With the support of VL2 funding, Dr. Bosworth and her colleagues used this method to investigate infants' early looking preferences for visual language and non-language stimuli, with the goal of unveiling the early precursors of language learning in infants. Their results show that young infants between 5 to 6 months of age, despite never seeing sign language, are able to discriminate between real signs and other non-language stimuli like gestures or "unnatural" signs played backwards. This result suggests that infants do have an early language bias that is found for natural languages conveyed both manually or orally.

Study 2

The Impact of Early Visual Language Experience on Visual Attention and Visual Sign Phonology Processing in Young Deaf Emergent Readers Using Early Reading Apps: A Combined Eye Tracking and fNIRS Brain Imaging Investigation

PI Laura-Ann Petitto, Gallaudet University
Network: Rain Bosworth, UCSD
PEN Students Geo Kartheiser and Adam Stone, Gallaudet University
Clifton Langdon, Melissa Herzig, Thomas Allen and Melissa Malzkuhn, Gallaudet University
Kaja Jasinska, Yale University

In this study, conducted in the Petitto BL2 Laboratory for Neuroimaging, we ask if differences in early life visual language experience impact visual attention and visual allocation in the young emergent deaf reader. If early visual language experience positively impacts aspects of reading in early sign-exposed deaf children, it may suggest that select visual properties of visual sign phonology selectively enhance visual sight word recognition of the printed English word (rather than contrary predicts that early sign exposure would hinder such processes). It would further suggest the surprising conclusion that early visual sign language exposure advantages deaf children's acquisition of reading in English. This fall, we completed preliminary data collection, which indicated successful implementation of our design and enabled us to improve our methodological procedures. We are now beginning our second data collection phase in which we implement an empirical innovation: we simultaneously collect neuroimaging, eye gaze, and reaction time data via a new innovative experimental design.

Results from the present study will provide first-time research-based insights into all young children's visual attention to linguistic and non-linguistic visual information in dynamic moving scenes (such as Ipad Apps, for which the field has no knowledge), even though this combined information is commonly used in today's e-literacy technology. Our findings will also provide new knowledge for the optimal design of e-literacy and Avatar translational learning and reading tools for all children, inclusive of the young deaf visual learner.

Study 3

The Development of Perceptual Span in Beginning and Developing Deaf Readers

PI Keith Rayner, UCSD
Network: Natalie Belanger, UCSD
Jill Morford, University of New Mexico

We are examining how reading span develops in deaf children (ages 7-9, and 13-15 years). We test the hypothesis that early sensory and linguistic experience affect the size of perceptual span, having an impact on reading fixation patterns. We have completed the data collection and are currently analyzing the data.

Science

SFA 2: Language Development and Bilingualism
Led by Erin Wilkenson, University of Manitoba, Canada

Do Young Deaf Bilingual-Bimodal Readers Access ASL Forms While Reading English Words?

PI Erin Wilkenson, University of Manitoba, Canada
Network: Jill Morford, University of New Mexico
Pilar Pinar, Gallaudet University

Building on earlier VL2 research demonstrating that ASL signs are activated when adult ASL-English bilinguals read English words, this study investigates the developmental trajectory of bilingual activation. Do the lexical relationships between the two languages change over time, as children become better readers? We hypothesize that they do, and that lexical co-activation will be in evidence among children in the middle school years. We have developed age appropriate tasks for children in grades 6-8 and are working with five schools throughout Canada where data collection will take place.

Speed of Visual Sign Language Processing, and Visual Sign Phonological Awareness Processing, in Young Deaf Typically and Atypically-Developing Bilingual-Bimodal Readers

PI David Quinto-Pozos, University of Texas
Network: Thomas Allen, Gallaudet University

At the University of Texas Signed Language Lab, we have crafted ASL, fingerspelling, and written English measures to investigate visual language processing in bilingual-bimodal deaf children and adolescents. Rate of processing has been shown to be an important factor to consider in developmental language disorders of hearing children who acquire spoken language, and our study design allows us to extend this area of inquiry to deaf children who are developing bilinguals. Our measures manipulate rate of language presentation (slow, regular, and fast) for ASL and English to measure processing via response time for identifying key lexical items. We also assess the comprehension of fingerspelling across rates of presentation in order to examine this linguistic bridge between ASL and English. We are currently collecting data, which entails recruiting participants from various schools for the Deaf. We expect that our results will inform VL2's continued work on visual sign phonological awareness.

SFA 3: Reading and Literacy in Visual Learning
Led by Lynn McQuarrie, University of Alberta, Canada

Learning To Read With Visual Languages: Investigation of the Impact of Visual Phonology (L1) Training on Emergent and Developing Literacy in L2

PI Lynn McQuarrie, University of Alberta, Canada
Network: Charlotte Enns, University of Manitoba, Canada

This is a school-based training study designed to examine the effects of intensive small group signed-language phonological awareness training on English literacy outcomes over time (children grades K-4, ages 5-9 years). It will also examine the individual characteristics and contextual conditions that impact growth in signed language vocabulary and English word reading and reading comprehension in K-4 students with the goal of identifying powerful predictors of reading success in dual language learners.

Home, School and Early Language Factors Impacting the Acquisition of Reading Skills Among Deaf Children With and Without Cochlear Implants, and With and Without Early Exposure to Sign Language

PI Thomas Allen, Gallaudet University
Network: Donna Morere, Gallaudet University
Graduate Student Amy Letteri, Gallaudet University
Matthew Traxler, University of California, Davis

We are completing the data verification and entry for wave three of the Early Education Longitudinal Study dataset (which provides the data for this study) so that we can analyze the three-year growth patterns for literacy and cognition of young deaf children between the ages of three and seven. In the Study 7 analyses, we are testing hypotheses regarding the impacts of cochlear implant use and the age of exposure to visual language on growth. Last summer, we presented preliminary analysis at the Site Visit of wave 1 and wave 2 data that demonstrated clear advantages for children with early language in the development of visual attention skills. The impact of having a cochlear implant was not so clear, and we are conducting multiple analyses now to examine this group of children more extensively.

SFA 4: Translation in Education: Translational Products, Tools and Dissemination
Led by Melissa Herzig, Gallaudet University

SFA 5: Integration of Research and Education (IRE): Student Training for the Next Generation
Led by Peter Hauser, National Technical Institute for the Deaf/Rochester Institute of Technology

Renowned Scholars Come to VL2

2014-2015 PhD in Educational Neuroscience Distinguished Lecture Series

We at VL2, in conjunction with our PhD in Educational Neuroscience (PEN) program, are delighted to inaugurate the **2014 -2015 PhD in Educational Neuroscience (PEN) Distinguished Lecture Series**, bringing renowned scholars to Gallaudet to share their impactful research findings with the VL2 network, its partnership institutions, our vibrant new PEN program and the wider community. A five-point star represents the distinct sub-disciplines that comprise Educational Neuroscience. For this inaugural launch, each sub-discipline served as the inspiration for **Dr. Laura-Ann Petitto**'s design and creation of this year's theme and selection of invited presenters, *"Leaders in Educational Neuroscience."*

Math/ Numeracy
Dr. Daniel Ansari
(9/25/14)

Reading/ Literacy
Dr. John Gabrieli
(3/23/15)

Language/ Bilingualism
Dr. Denise Klein
(11/20/14)

Social-Emotional Cognition
Dr. Carol Padden
(3/12/15)

Science/ Critical thinking
Dr. David Klahr
(4/2/15)

The PEN lecture series is presented in conjunction with the PEN 701 Proseminar, taught this year by **Dr. Melissa Herzig**. All presentations are open to the public and the lectures are live streamed and archived. For more information and announcements of speakers and presentation dates, check the VL2 website at vl2.gallaudet.edu. ●

VL2 Creates Collaborative Relationships Via Memoranda of Understanding

MOUs Promote Sharing of Research and Resources with Partnering Universities

MOUs

VL2 and Gallaudet recently signed Memoranda of Understanding (MOUs) with more than a dozen universities around the country. The MOU agreements facilitate VL2's collaborations with these partnering institutions on research projects, and also promote cooperation in areas of mutual intellectual and academic interest as well as the sharing of scientific resources.

"We are thrilled with the opportunity to allow our students and faculty to collaborate with some of the most renowned and well-respected laboratories and scientists in the country," said **Dr. Laura-Ann Petitto**, co-principal investigator of VL2 and the scientist who spearheaded the creation of these MOUs. "It is wonderful to see that so many universities value our resources and want to benefit from [working with] us."

This was especially true regarding VL2's new research hubs, including the neuroimaging and behavioral experimentation resources in the **Petitto Brain and Language Laboratory for Neuroimaging (BL2)**, as well as VL2's two other resource hubs, Allen's **Early Education and Literacy Laboratory (EL2)** and Malzkhun's **Motion Light Laboratory (ML2)**. "In addition to what the other universities can provide for VL2 students, the MOU universities were clearly very interested in the unique perspectives and knowledge that our Gallaudet students and faculty could bring to their institution's advancement of science," noted Dr. Petitto.

The MOUs will provide groundbreaking research, training, and learning opportunities for VL2 and Gallaudet students, and, most significantly, enable the PhD in Educational Neuroscience (PEN) graduate students to receive direct training in Cognitive Neuroscience by training at select participating neuroimaging labs at MOU universities.

Universities who have signed MOUs with Gallaudet include American University, Georgetown University, George Washington University, Georgia Institute of Technology, Lamar University, Rochester Institute of Technology/National Technical Institute of the Deaf, San Diego State University, Stanford University, University of Connecticut, University of New Mexico, University of Texas at Austin, Vanderbilt University, the University of Indiana Bloomington, and Yale University/Haskins Laboratory, with more international and national universities to come.

VL2's PhD in Educational Neuroscience (PEN) program recently sponsored a MOU and Gallaudet Student Two-way "Meet & Greet." During the gathering, the local MOU community's students and faculty and Gallaudet undergraduates were able to come and learn about one another, and especially to communicate innovations about PEN, VL2, and the rich resources available at Gallaudet University. "This gathering was a wonderful networking opportunity for all students and faculty, as well as a way to raise campus awareness about our MOUs, welcome our new MOU community and share the many exciting features of our PEN program," said Dr. Petitto. ●

Collaboration

New PEN students Paul Twitchell and Diana Andriola (Dr. Clifton Langdon, advisor).
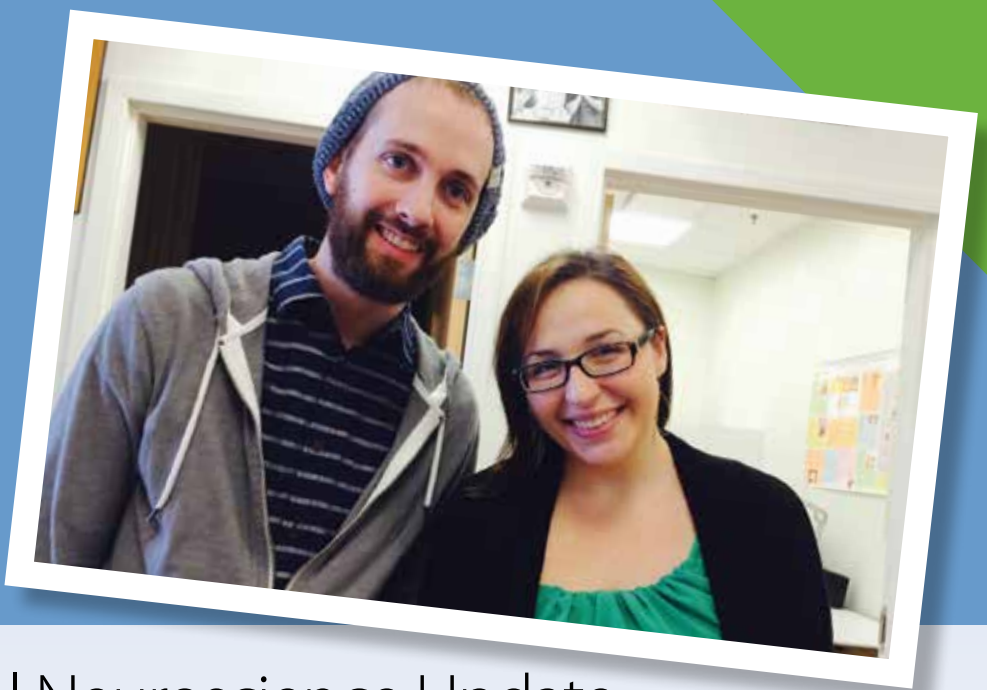
EXCITING
Developments for PEN Program

PhD in Educational Neuroscience Update

Year two of the **PhD in Educational Neuroscience** program began with "a thrilling sense of progress, of stability, of opportunity, and of pride," says **Dr. Thomas Allen**, Co-PI of VL2 and the Director of the program. Second-year students **Adam Stone** and **Geo Kartheiser** (Advisor **Dr. Laura Ann Petitto**), returned from their summer lab rotation experiences invigorated and with greater focus on their own research interests and efforts. Adam, working with **Dr. Rain Bosworth** at the University of California at San Diego, deepened his interest in understanding the mechanisms underlying the connections between fingerspelling, phonological knowledge, and literacy and the impacts of these connections in young deaf children. Geo, working with **Dr. Karen Emmorey** at San Diego State University, honed his methodological plans for research on the neuroplasticity of spatial working memory and the impact of native signing on cognitive functioning among adults. Both Adam and Geo are deeply engaged in the ongoing research efforts of the Brain and Language Lab for Neuroimaging (most intensively with the Petitto, PI, Study 2 examining the impact of early life experience on how a deaf child interacts with bilingual storybook apps), and in completing their course of studies. Their dissertation research is just around the corner!

In August, Drs. Petitto, Allen, Herzig, and Langdon welcomed their second PEN cohort: **Diana Andriola** and **Paul Twitchell**. Diana received her B.A. in Deaf Studies from California State University Northridge. She is interested in investigating the neural basis of ASL phonological awareness and examining its connection to reading skills among young deaf readers. Paul received his MS degree in Linguistics under the tutelage of **Dr. Jill Morford** at the University of New Mexico. Dr. Morford is one of VL2's Legacy Scientists and a former member of the Executive Team (she is also the liaison for VL2's Memorandum of Understanding with UNM). Paul's interest is in investigating the impact of social factors such as SES on reading and cognitive development among deaf children.

The newest PEN faculty member, **Dr. Clifton Langdon**, advises both Paul and Diana. Dr. Langdon has settled in to faculty life. He teaches the PEN Foundations of Educational Neuroscience sequence and is the Instructor of Record for the Summer Lab Rotations that keep him in continual contact with VL2's MOU partners in establishing these important training experiences. Dr. Langdon is also a co-investigator on the BL2 study of how children interact with bilingual storybook apps, and he is pursuing his own programs of research into understanding the neural representations of ASL classifiers and in examining the neural changes brought on with cochlear implants with and without a prior exposure to a visual language. ●

> *"In a very short period of time,"* Dr. Allen reflects, *"PEN has become a very important part of Gallaudet University's present and future."*

2015
Upcoming Center Events

VL2 Scientific Advisory
Board Meeting .... March 8 & 9

VL2 NSF Site Visit .... June 11 & 12

Knowledge from New Data
VL2's Early Education and Literacy Lab (EL2)

Director: Thomas Allen

Dr. Thomas Allen, VL2's Co-PI and Director of EL2, says the Hub is enjoying a period of lively activity. Dr. Allen and **Dr. Donna Morere**, Professor of Psychology at Gallaudet, along with EL2 student scholar **Amarilys Galloza**, recently collaborated with scholars from Howard University on a symposium presented at the Annual Meeting of the American Psychological Association examining the roles of language and culture on the development of visual attention. Galloza presented findings from analysis of Latino children from the Early Education Longitudinal Study (EELS) database.

EELS study data is also being used in other scholarly work. EL2 researchers have two papers In Press using EELS data; both papers examine the impacts of early exposure to visual language on literacy development. And data from both the Toolkit Psychometric Study and the EELS study have been analyzed in three recent PhD dissertations at Gallaudet, by candidates **Greg Witkin**, **Wyatt Hall**, and **Leah Murphy**.

Over the summer, the EL2 team wrote a major proposal (still pending) to the US Department of Education to extend the Early Education Longitudinal study for another four years. "Extending the study enables us to track reading and cognitive development of young deaf children through their elementary school years," explains Dr. Allen.

Finally, EL2 sponsored a two-day training with the new ASL Assessment portal, which is still undergoing final tweaks before being open for more general use. And the new Visual Communication and Language Checklist was recently published by EL2, and is being marketed. Inquiries may be made at vcsl@gallaudet.edu. ●

Research Informing Science VL2's Brain and Language Lab for Neuroimaging

Director: Laura-Ann Petitto

Montreal, Canada is a beautiful place to go, particularly in October, where **Drs. Clifton Langdon**, **Kaja Jasinska,** and **Laura-Ann Petitto** presented at the conference fNIRS 2014, where scholars advance both the theoretical and methodological state-of-art with fNIRS (functional Near Infrared Spectroscopy) neuroimaging. The BL2 team presented findings that indicate that the widely reported benefits of early language exposure also includes early sign language exposure for those learning spoken English via a cochlear implant. (Early sign language and spoken language exposure rendered healthy/normal language processing tissue as compared to speech only exposure, which is contrary to the discipline's predictions that speech only is best.)

Our undergraduate and graduate research assistants and interns continue to amaze with their ambition and nascent contributions into our understanding of language, reading, and higher cognition.

Geo Kartheiser won the prestigious National Research Service Award (NRSA) National Institutes of Health graduate pre-doctoral fellowship.

Adam Stone also resubmitted his exciting NRSA application that examines the role of early exposure to visual language and how this impacts language acquisition, reading and higher cognitive outcomes.

Laura-Ann Petitto (PI), Adam Stone (PEN graduate student leader), and our Gallaudet VL2 team are also working hard to advance VL2's NSF "Breakthrough Science Network Study 2," which studies how young children process complex visual scenes containing linguistic (text and sign) and non-linguistic (moving visual images) information, and the depth of phonological processing,

Diana Andriola submitted a competitive application to the prestigious National Science Foundation Graduate Research Fellowship Program, to support her very intriguing work into understanding the underlying mechanisms that give rise to the observed the relationship between phonological awareness and reading outcomes. **TraciAnn Hoglind**, one of our brilliant undergraduate students, is designing a new study, under the direction of Kartheiser & Langdon, on the role language plays in visuo-spatial working memory.

Finally, this fall also saw the addition of 5 new star students: (1) Doctoral PEN student **Paul Twitchell**, (2) **Bradley White**, who is dually enrolled in the Linguistics masters program and Doctoral Audiology program (3) Undergraduate Psychology student **Susie Harvey** (4) Undergraduate Bioinformatics student **Shuxu Tian** (5) Undergraduate Psychology student **Zachary Abbott**. ***Petitto is thrilled to have such wonderful new additions to the team.*** ●

Intersecting Creativity and Technology VL2's Motion Light Lab (ML2)

Director: Melissa Malzkuhn

VL2's Motion Light Lab (ML2) focuses on developing engaging, exciting educational resources based on VL2 research findings.

"We are committed to ongoing inquiry about what makes learning fun," says **Melissa Malzkuhn**, Director of ML2. "Our projects combine creativity and digital technology—such as developing bilingual ASL/English storybook apps and training developers to produce their own apps through the VL2 Storybook Creator program."

The lab is excited to announce the recent launch of *The Blue Lobster* app. Currently the ML2 team is working on Android versions of all of the VL2 apps. And under the leadership of VL2 Research and Translation Manager **Dr. Melissa Herzig**, they are also conducting app usability studies.

"These studies will help us examine and evaluate how children use our storybook apps and how they learn from them," explains Malzkuhn.

In addition, the ML2 team is growing: Intern **Bethany Weiner**, a Gallaudet senior majoring in psychology, has become ML2's in-house social media guru. She is also leading a project to examine the visual representation of fingerspelling as connected to typography. This project compares fingerspelling styles to fonts (clearly paced, bold "print" signing, versus cursive-type fingerspellers who spell fast with barely any spaces between letters) to help understand how signers visually read and interpret the various styles.

Finally, Professor **Ben Bahan**, a senior Imagineer of ML2, has been touring the country performing his story *BLEEVA*, a compelling tale about a deaf conspiracy theorist who believes he knows the answer to why deaf people exist. Dr. Bahan's work showcases presentation design and storytelling as an art form.

To learn more about ML2 activities and sign up for updates, access vl2storybookapps.com/contact, visit our website (maintained by Lauren Benedict, Creative Media Coordinator and Lab Manager) at motionlightlab.com, or find us on Facebook at Motion Light Lab or Twitter @motionlightlab. ●

SCIENTISTS OF THE FUTURE

Student Updates

One of VL2's most vital missions is **helping to train and support the scientists of the future. Our VL2 students make significant contributions to our research, translation projects and relationships in the larger community.** As always, we would like to express our appreciation to our wonderful 2014-15 **Student Leadership Team** (SLT members include **Diana Andriola**, **Jessica Contreras**, **Adam Stone**, and **Erica Wilkins**) mentored by SFA 5 Leader **Dr. Peter Hauser**, for organizing and promoting student activities and keeping students at our various sites connected. ●

Sixteen New Students Join VL2 Student Network

The VL2 Student Network is made up of undergraduate, graduate, and doctoral students from Gallaudet University and its partnering institutions. By participating in the various activities of the Network (including workshops and training sessions, seminars with renowned experts and mentors, and the weekly "The VL2 Meeting") VL2 students gain valuable research, training and networking skills.

The SLT recently spearheaded an effort to welcome new students whose experience and interests aligned well with VL2's mission. Recent MOU partnerships resulted in an expanded applicant pool, and sixteen new students were approved for membership. The SLT are excited for the possibilities that an expanded network brings, and look forward to supporting all VL2 students as they work to accomplish their research and academic goals! For more information, access http://vl2students.weebly.com. ●
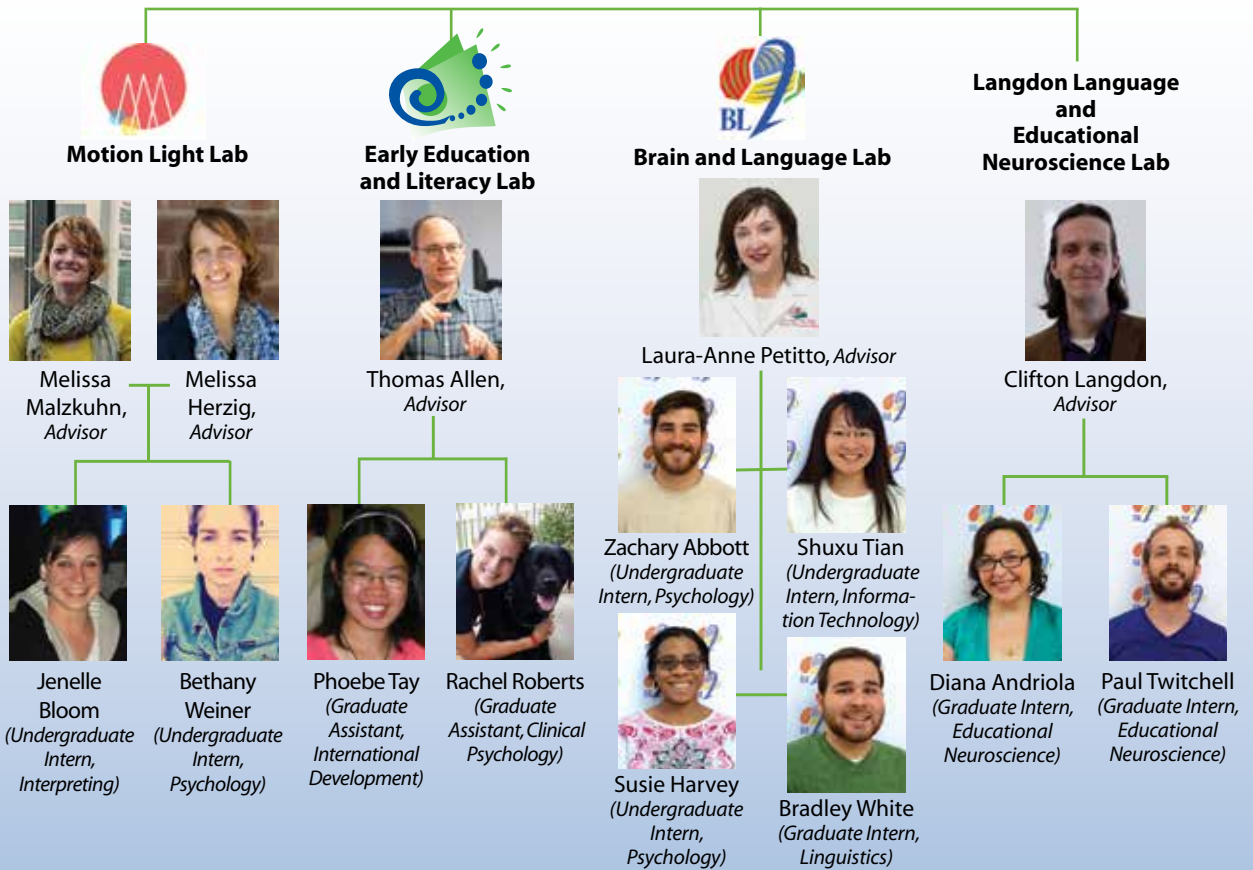
2014-2015 National Science Foundation, Science of Learning Center, VL2 Student Scholars

Each year, VL2 is privileged to invite some of Gallaudet's brightest graduate and undergraduate students to work, either as paid or volunteer research assistants or as interns, in its three Resource Hubs, the Brain and Language Lab for Neuroimaging, the Early Education and Literacy Lab, and the Motion Light Lab. Our newly selected 2014-2015 VL2 Scholars are pictured below in our "Family Tree" that shows their lab assignments and academic pedigree. They join a team of returning scholars, and together they keep our labs humming! ●

NSF Science of Learning Center, VL2 Visual Language & Visual Learning

New 2014-2015 STUDENT SCHOLARS

Motion Light Lab

Melissa Malzkuhn, *Advisor*

Melissa Herzig, *Advisor*

Jenelle Bloom *(Undergraduate Intern, Interpreting)*

Bethany Weiner *(Undergraduate Intern, Psychology)*

Early Education and Literacy Lab

Thomas Allen, *Advisor*

Phoebe Tay *(Graduate Assistant, International Development)*

Rachel Roberts *(Graduate Assistant, Clinical Psychology)*

Brain and Language Lab

Laura-Anne Petitto, *Advisor*

Zachary Abbott *(Undergraduate Intern, Psychology)*

Shuxu Tian *(Undergraduate Intern, Information Technology)*

Susie Harvey *(Undergraduate Intern, Psychology)*

Bradley White *(Graduate Intern, Linguistics)*

Langdon Language and Educational Neuroscience Lab

Clifton Langdon, *Advisor*

Diana Andriola *(Graduate Intern, Educational Neuroscience)*

Paul Twitchell *(Graduate Intern, Educational Neuroscience)*

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PEN Presentation To Gallaudet Board of Associates

Geo Kartheiser and **Adam Stone**, second year students in the PhD in Educational Neuroscience (PEN) program, recently presented an overview of the program to Gallaudet's Board of Associates. Wearing matching neckties printed with scientific images (including atoms, Pasteur pipettes, frogs, tubes, and textbooks) Kartheiser and Stone highlighted the exciting and distinctive features of PEN, and the many ways students are benefiting from research products and other opportunities.

"PEN provides fellowships, lab rotations, translation projects, and neuroethics training," says Kartheiser. "Plus we have our very own onsite neuroimaging center in the Brain and Language Lab (BL2)."

In the first 14 months of the PhD program, PEN students' milestones include a NIH NRSA predoctoral fellowship (F31), four publications, three national conference talks, completion of neuroimaging methods and neuroethics training— "and we are not slowing down!" Stone says. "Besides gaining many partnerships via VL2's new Memoranda of Understanding (MOUs) with universities nationwide, we are leading the nation in the emergence of Educational Neuroscience as a discipline for doctoral study."

Gallaudet's Board Members were very enthusiastic about the presentation, calling it a highlight of the meeting. "We found it very rewarding, having the opportunity to interact with people who play such important roles in making the PEN program possible and launching our dreams," says Kartheiser. ●

VL2 Welcomes Julian Kirkland!

VL2's new Coordinator of Budgets and Planning **Julian Kirkland** developed her financial expertise and strategic planning skills in part through her studies (she holds a MA in International Affairs from the American University School of International Service, with a concentration on education and financials). But Kirkland also gained international on-the-job experience from her work in Africa.

During two internships in Accra, Ghana, Kirkland conducted fieldwork for two Non-governmental organizations, JMK Consulting and Centre for Human Investment Promotion (CHIP) International. "I researched and observed educational programs and issues pertaining to Ghana's educational system, wrote reports on economic and social issues, and established strategic plans and recommendations to promote efficient and environmentally-friendly practices," she explains. Then, as an analyst for the Power Africa Initiative at USAID, Kirkland designed scalable investment platforms and facilitated partnerships with industry and trade groups, among other initiatives.

Now Kirkland, who was raised in Georgia, is enjoying her time at VL2 where she oversees the financial affairs of the Center, including grants management and the new Memoranda of Understanding (MOUs) with institutional partners.

What's one of her favorite aspects of her job? "I especially enjoy planning events as well as acting as a liaison person for the Center," she says. ●

McQuarrie Honored as Peikoff Chair

VL2 Researcher and Executive Team Member **Dr. Lynn McQuarrie** was recently appointed the David Peikoff Chair of Deaf Studies and the Director of the Western Canadian Centre for Deaf Studies (WCCDS) at the University of Alberta. With this appointment, she joins a prestigious list of experts whose scholarly activity and accomplishments enrich research and teaching in deaf studies.

David Peikoff (1900-95), for whom the endowed chair is named, was a renowned advocate for employment and education for deaf individuals in Canada and the United States. "I am very excited by the wonderful opportunity these appointments offer in honoring and carrying on Peikoff's dream of extending quality education to all deaf children," says Dr. McQuarrie.

Dr. McQuarrie's primary research examines reading acquisition and development in children who grow up in a dual language environment (American Sign Language and English) and explores how these languages interact to support reading. Through WCCDS, she will continue to spearhead the growth and development of a strong research-to-practice focus in the bilingual education of deaf students. ***Congratulations to Dr. McQuarrie from the entire VL2 team!*** ●

vl2.gallaudet.edu

EMAIL
VL2@gallaudet.edu

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