Transcript VL2 Knowledge Festival May 9, 2016

Introduction: Dr. Laura-Ann Petitto

Welcome. We're delighted that you're here with us tonight. Thank you so much for coming out to support our first annual VL2 Knowledge Festival.

I'm Dr. Laura-Ann Petitto. I'm the co-PI and Science Director of VL2. VL2 is the National Science Foundation's Science of Learning Center, housed at Gallaudet University. It is called Visual Language and Visual Learning, or VL2 for short. We're one of six Science of Learning Centers in the United States, and we are privileged and proud to be here at Gallaudet University.

VL2 is 10 years young now, and we began in our first five years with a focus on basic science. And then in year six, we started to identify across the different labs some synergistic scientific findings, and that led to the establishment of scientific themes and the realization that the age of language exposure is critical for human development and that the brain has neural plasticity to a degree that amazed us. And finally that there are multiple routes to learning language and to learning to read. After that, we started to redirect and target our studies to focus on breakthrough science. When I say breakthrough science, I mean scientific discoveries with the highest impact, that will have lasting impacts on society.

There are many people who have helped throughout the years. Clearly, we don't have time to name all of them tonight, but we would be remiss if we didn't mention just a few of them. I want to especially thank our Provost, Dr. Carol Erting, who's here tonight. Thank you. And representing the NSF, I want to thank Dr. Lim, who encouraged the founding of the Science of Learning Centers in the United States, and Dr. Karelsky, who has been a boon to our center since the beginning. So, I want to thank those three especially.

Now, just like a family tree or a genetic map, you can see on this slide how we have grown, our parent cells, NSF and Gallaudet, which of course led to the founding of VL2. And from VL2 we have created four knowledge resource and research hubs, and you'll be learning about each of them tonight. In addition to that, VL2 has established the first-ever program in the United States or, actually, in the world, a doctorate in educational neuroscience. And educational neuroscience is studying the brain and behavior in concert to figure out how children learn best, how humans develop, with a commitment to translating those findings to society. We take our research results and translate them into products and resources that will benefit society.

When we began, there were three of us — just the three of us — and see how we have grown. Our future looks very bright. We have three new faculty in the PEN program: Dr. Lorna Quandt, Dr. Clifton Langdon, and the faculty member who will be arriving this fall, Dr. Ilaria Bertoletti. And that's exciting for Gallaudet for a couple of reasons, one of which is that obviously new faculty members bring new knowledge to the campus. They also bring new students, in other words, helping with recruitment and with retention as well. And finally and not least importantly, they bring new grant funding to the campus, which means more money for Gallaudet.

VL2 is proud to have as many strong partnerships as we do. We have 11 science laboratories that we work with, 90 school partners, including the Clerc Center here on Gallaudet campus, so thank you, of course, to the Clerc Center. We also have 22 partnerships with other universities, which is wonderful because those universities are all over the world, and that means training and opportunities for our students to go globally to study in different labs, to meet and network with different scientists, and to get the most up-to-date training.

VL2 started by asking a set of questions. We wanted to examine knowledge. What happens to humans when knowledge is acquired through the eyes? How does this impact the brain? What happens to the brain's neural plasticity, to its cognitive function? How do children learn language? How do they learn how to read to become literate? How do they become bilingual? And how do they learn important content in school? VL2 is contributing to a revolution. We like to call it The Third Revolution. We all know the linguistics. Linguists have examined the language and understand that sign language is a real language. We all know that deaf people have a unique and distinct culture. We know that well.

Interestingly, the last third point that some continue to resist accepting is that speech and sign language have equal biological status. There are some myths out there regarding this issue. The first myth is that speech is biologically superior. The second myth is that speech exposure should be provided to young children initially, and then if you're going to expose them to sign language, it can happen at some later date. Perhaps if they failed in learning to speak, you can then place them in a signing program. Another myth is that learning sign language will impair the acquisition of English and literacy skills.

VL2 has contributed to busting those myths. All of these assumptions are wrong. They are in fact myths. Sign language and speech are equal to the human brain. The same neural systems, the same neural sites are activated. The second myth, that children acquire sign language and children acquire speech in some different kinds of ways. In fact, that acquisition happens in the same way. There are no differences; it is the same route to the acquisition of language.

And the third myth has to do with exposure to sign language, whether or not it will hurt the acquisition of English. In fact, it helps the acquisition of English. It makes children better language learners, which translates into being literate. So, I've talked about some of the similarities, but interestingly enough, we have also discovered that people who are exposed to sign language from an early age show advantages over their hearing peers. In fact, in some ways, hearing children actually lose the capacity to acquire those benefits seen in deaf children exposed to sign language early.

That has a powerful translational impact in terms of policy. We could be helping hearing children as well as deaf children. And finally and most significantly, we are contributing to a greater understanding of what it means to be human, and that has tremendous policy implications. I'll give you three examples. The first example has to do with young deaf children exposed to sign language at an early age and their strengthened abilities in visual processing. They outstrip their hearing peers. They have better eye-tracking abilities. They have enhanced visual processing abilities. They have stronger selected cognitive benefits, which leads to enhanced vocabulary, better reading skills, better social self-regulation skills compared to hearing children.

Those hearing children could have had those benefits had they been exposed to sign language at those critical years, but they've lost that opportunity. And interestingly enough, children who have been implanted with cochlear implants who focus only on learning speech skills also lose those potential benefits. That early visual exposure is vital. If we use this knowledge that's a gift that we can bring to hearing children as well to enhance their visual processing skills.

There are many myths about bilingualism, and VL2 is contributing to busting those myths. ASL and English is a bilingual situation, just like Spanish and English would be, or French and English. ASL and English is the same, and confer the same benefits of bilingualism, seeing and hearing children learning two different spoken languages. VL2 is contributing to destroying some of these myths.

For example, myth number one: children who receive cochlear implants don't need sign language. They should have only intensive speech training. That is wrong. They absolutely need early exposure to natural visual language that they can access. Many people believe that early bilingual exposure will cause language confusion. It's simply not true. Another myth is that you shouldn't sign with your baby until you are fluent. That is wrong. Children will benefit even if parents are not yet fluent in sign language. A final myth is that children should learn one language first and then be exposed to a second language. That is not true, that is wrong. Bilingual exposure means exposing a child at the same time in those critical early years.

The policy implications are that we can promote early bilingual education for all children in the United States. We can promote early sign language exposure for deaf babies. Regardless of their background, they should have exposure to sign language. And, of course, there can be enhanced speech training at the same time.

Other findings from VL2 are that if you have early exposure to sign language, young children will be able to watch sign language and pull important segments, phonological units, and map them onto letters or words on a page. They do that, mapping and decoding, exactly as hearing children do, who auditorily pull and segment phonological units to map onto the written letters and words. So, young children who have visual sign phonology will show enhanced reading abilities compared with those children who don't.

What's revolutionary about this finding is that it can also be seen as a potential aid to support hearing children who are struggling with reading. Another policy implication is that deaf children who are exposed at an early age to bilingualism and visual phonology of sign language develop into readers. It's not complicated. It's not rocket science. Early exposure to sign language will do it. It will help the brain.

Now, looking towards our future, VL2 will continue to make innovative science discoveries. In VL2, we are integrating new technologies, new kinds of tools to delve even deeper into the brain. We are integrating the fNIRS brain imaging equipment with thermal infrared imaging that will measure a child's engagement, emotional engagement, with the world. And higher cognition as measured by eye-tracking that follows where their attention is.

We are continuing to make innovative translational products as well. For example, in VL2 we are bringing together signing avatars to make new language learning tools for young deaf

babies who are not exposed to sign language otherwise, which they need to have to keep those important pathways open to stimulate their brain tissue during the right times in their development. VL2 and the Motion Light Lab will continue to make revolutionary innovative translational products. You will learn from Melissa Malzkuhn about the groundbreaking work that they are doing on new ways to capture stories in ASL digitally, and how new apps are being created and used. These include stories for young babies. And she is working with her new ML2 science director, Dr. Lorna Quandt. We have a wonderful team working together.

VL2 and the PEN program will continue to make groundbreaking achievements in education and training for young scholars. We will continue to make new opportunities and experiences possible for them, and to help our students enter STEM fields, to become scholars themselves, to own the science, doing science that they own because we are training them to become leaders.

Finally, VL2 is contributing with other researchers in the world to changing minds, to spring that third biological revolution that shows that sign language and speech are equal in the human brain. The human brain does not discriminate. The human brain doesn't care what you give it, whether it's a sign language or spoken language. It accepts both equally. We have found that scientifically there is an equivalence between sign and speech. The human brain is more neurally plastic than previously thought possible. Speech is not in fact special, but human language is special. We know now that for sign language and spoken language timing in development is key. The critical period in human language acquisition is the same for all languages. We also now understand the ultimate ways in which we learn language, when, why and how. Finally, this work has translational impact.

We are challenging decades of medical and educational dogma. We are showing with these human biological findings that fly in the face of what people have believed. And we are offering new solutions to society. Thank you. And now, as I promised, you will learn a little more about our four hubs that are bringing us into the future.

Video available at https://youtu.be/atm3LdIuUA0

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