ML2: Melissa Malzkuhn

I'm very excited to be here and to talk to you about the Motion Light Lab. My name is Melissa Malzkuhn, and I'm the Creative Director of ML2. We're excited about a new member joining us. Welcome Dr. Lorna Quandt, our Science Director and a true genius.

The Motion Light Lab is one of the four hubs here at VL2. We started in 2009, with informal discussions among colleagues. Those creative discussions then blossomed into what we now have, a state-of-the-art lab with a motion capture system and a number of new technologies. Our ongoing mission has been to take digital technology and merge it with creative literature, such as storytelling, to create immersive learning experiences and create new knowledge. That has an impact on youths and creates lifelong learning experiences.

Naturally, I have a fantastic team. We call ourselves Imagineers. We call ourselves that because we design, innovate, and create results with imagination. Innovation is our culture. We all come from different backgrounds: Deaf Studies, arts, science, neuroscience, and many other disciplines. We bring our backgrounds to work collectively. We have great interns too, and you'll see their work today. We train and grow students' skills in our lab.

A lot of amazing things are happening in our lab, and I know my time is short. But today I'm going to address three highlights, which overlap one another. Our work initially focused on young learners, ages 3 to 8. Now we're also including younger children from birth to 3, with the goal of providing a lifelong learning experience.

Our work with apps is groundbreaking because of the ways that we are utilizing technology. We look at how deaf children learn to read. Now, historically, parents and teachers have signed to deaf children while holding a book. And they still do this. Add in DVDs with the books, and you need to alternate between watching the signing and pausing to read the printed text. In this way, children acquire ASL and start to make connections for reading. The key here is learning to read and then reading to learn. Once they read to learn, the world is theirs.

Now with current technology — iPads and touchscreen tablets — we can integrate video and text into a single bilingual interface. This is what is groundbreaking. This design has never been seen before and came about through our innovative work at VL2, so that it can now be revealed for the first time.

We're not stopping with just apps. What we've developed are apps, but we've also developed a template on which to create more apps and build a digital library for the world, so our findings on bilingualism can impact children, worldwide.

Now, the third part is our new Motion Capture system. We received this through a grant, and it has really opened opportunities for language preservation. Historically, we have documented our literature on film. Now, and this is unprecedented, we can capture our literature in three dimensions. As we know, technology is progressing. We have augmented

reality, virtual reality, and more 3-D-based platforms. However, right now, you don't find sign language in any of this. We must initiate the design, and we are starting it here. We must create a way for signing in 3-D data, to be represented fluently, which in turn will boost the level of comprehension.

One of Dr. Petitto's questions to us was to think about a hundred years from now. What will that look like? I often think about that overarching question. We are starting here, and of course, we have to start at day one and keep that big end goal in sight. Language preservation is just one element. By adding imagination, we can create different learning tools. For example, imagine if we could have an avatar of Laurent Clerc. What were his experiences? His journey?

Imagine the impact we could have for learning, if immersive interactions were there. Interactivity is crucial, because that's how a child learns best. You can receive information one way, but with interaction, you can ask questions and get answers. Avatars can provide children this interaction. Avatars can be built on behavior and signed dialogue systems. They can play games and have interactive conversation. These create opportunities for learning, and those opportunities are endless.

I'd like to start by talking to you a little bit about our storybook apps. We have five now, and we have two more that will be released soon, thanks to our interns. They are working on a deadline, and I'm looking at you guys. Those hopefully will be released in the next couple of weeks. I'd like to mention that these storybook apps are just amazing. We searched carefully to select only talented deaf storytellers, outstanding ASL models, and pair them with deaf artists to create these stories. You will see distinctive styles in the apps.

We've received significant recognition with this award. Reggio Emilia, in Italy, started the Montessori Philosophy and Education, Guided Learning, which changed how we teach young children. This award was given to us in 2014. We are very proud of this.

Our storybook app design is founded on VL2 research findings on the importance of bilingualism. The information that Dr. Petitto, Dr. Allen, and Dr. Langdon shared, such as the importance of fingerspelling. We've incorporated these research findings into the design of our apps. Here's a video, a short preview. Watch and enjoy.

These apps have three modes: Watch, Read, and Learn. Children watch the entire story in sign. Then they go into Read mode and make connections to the text, and then they can learn vocabulary, all in one place. This is fantastic for hearing parents who are learning how to sign. They can sit with their children and learn together. That's very important.

Next, we are having a global impact. Starting with our very first app, The Baobab, we generated interest. Other countries contacted us. They wanted the same platform so that they could give children in those countries the experience of self-directed reading and learning. To start with, we collaborated with a team in Norway. Now, we are developing a Japanese addition, working with Miyuki. She's here, sitting back there, and I see some of you have been talking with her. She's an outstanding signer, wonderful to work with. So if you are interested in translations, please talk to her.

I'd like to show you something interesting about all of these translations. This is amazing to see. Children in other countries can benefit from this. And it also benefits children right here in the U.S. because they can see and learn sign languages from other countries. The goal, again, is being able to provide language exposure to children. We can have this global impact through our Storybook Creator program.

But we can't stop with just the apps that we've created. We need community participation and involvement to create a digital library. One of my favorite questions that I get when I show children these storybook apps is, "Well, I'm done with this one, I want more. Where's the next one?"

When children are finished reading a book, they often seek more resources. We can go to a library that is full of books in print. We need the same for bilingual sign language resources. With this program, we have created a template. For those of you who are not familiar with coding and programming, you don't need to be. We've set a framework, and you can input your own images and videos and a new script to create your own story. This can be anything. Your favorite folklore that you want to preserve, or your own story. This is a tool for you to use. We are so excited about this.

I mentioned focusing on reading for ages 3 to 5, and on to 8 and beyond. But newborn to age 3 is an important population as well. Those children need to be exposed to language and literacy for their future growth. We are collaborating with Dr. Petitto's lab and others to focus on this group. We're doing an exciting study with the others mentioned, and looking at temporal rhythmic patterns of language.

Dr. Petitto's findings show that the brain is sensitive to specific patterns, which stimulate language learning. We are searching for this algorithm, which we can then use with avatars and other technologies to create that exposure for infants. When deaf newborns are alert and ready to learn, they are receptive to this language input. We're doing this through a number of different avenues, including nursery rhymes. English has a rich literature of nursery rhymes, and we want to see that same thing for American Sign Language too.

Often, people try to translate English nursery rhymes into ASL, which is fun. But the needed rich phonology and linguistic information is lost in translation. We developed original ASL nursery rhymes with parameters, including hand shape, location, and orientation. We use MoCap to further examine the structures and temporal rhythmic patterns.

I'd like to show you this example of how the system works. With Motion Capture, we can capture data in 3-D and study the parameters of sign language through different viewpoints. We actually have a mannequin over there that you can examine in order to see how this works. We use dots, or markers, along limbs and joints. The motion capture cameras intersect on a marker to capture the 3-D coordinates. The more cameras we have, the more consistent our data is. The data we retrieve allows us to study the rhythms through the 3-D coordinates.

In this example, we are signing boat. To see what this looks like in 3-D data, we can select a marker and examine the coordinates and the frequency of the movement. This is how we examine the temporal rhythm patterns. It's truly amazing to see how technology has enabled new perspectives on our signed language. As I mentioned before — oh, and I see you noticing this slide. Remember in the slide previously, I showed you boat as it was represented

in three dimensions, and you could follow the rhythm and speed of that sign? Now, I can show you something from a different perspective, the signer's perspective.

I should also emphasize that our work includes avatars, and it's difficult, and incredibly challenging. The reason is because the avatars that are available, which you often see in computer games, are easily identified as computerized. They look stiff, and the movements look unnatural. But with MoCap, we can capture the authenticity of movement. If we can improve this fluency, we can provide young learners better quality and accessible language learning materials. We want children to better understand and not be thrown off by jerky movements. We want knowledge and we want learning to happen. We're on a mission to improve this technology, and we will share our breakthroughs with others working in avatar technology to create better systems. We are making progress.

My time is running out, but I'm going to show you a short clip. It's called My Three Animals. One of our goals is to create an avatar that looks this good and then surpass it. This is the first ASL nursery rhyme created through Motion Capture. And this is before we received our own system. For this, we worked with a team in Paris, and they were very skilled and excited to work with us in creating this ASL nursery rhyme. With the knowledge we developed in this process, we can come back here and use our knowledge, experience, signers and culture, and create a revolution.

I want to show you what we did. We commissioned a very famous storyteller, and you might recognize this person through his signing style.

Every day my dog barks, barks, barks.
Every day my cat stares, stares, stares.
Every day my bird sings, sings, sings.
All three of them every day
beg, beg, beg, for what?
For food.

You can see the repetitive patterns in the signing. I've shown this to children, and they are engaged and fascinated with the signs and colors. The vision is to, with virtual humans and avatars, create signing creatures. Right now there are none.

We can start all of this work right here, at Gallaudet University. Here's that same message in 3-D. Hope you can understand. For more information, please come and visit us at our booth. Thank you.

Video available at https://youtu.be/Dn-9bzS-kxk