

Team 24 Project



Design of a user interface that facilitates communication, one with one another despite potential communication barriers. These barriers could range from a difference of language to deafness.

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RESEARCH & INSIGHTS

Research Questions/Goals

The goal of our research was to gain input/insight into the user experience of communicating between two or more persons with either differing languages or when one or more of the parties is deaf or hard of hearing. Additionally we collected data on the types of tools used to facilitate the communications. These span from paper and pencil to tablets and mobile phones.

Included in our research are semi structured interviews with foreign language



speakers who possess limited command of the english language, individuals who have had interactions living, traveling, or doing business in or with countries with a language that is not their own, and those that are deaf or hard of hearing. We also conducted an observation where english and Chinese speakers were trying to communicate when neither group understood each other's language.

We used a semi-structured approach due to the fact that it would provide some structure and consistency between the interviews conducted but also allowed for some flexibility and additional insights. We wanted to ensure we got the perspective from both a foreign speaker and a deaf person. It turns out that each represents a different set of insights but also offers many similarities. We also thought it would be beneficial to do an observation as this would immerse us into the real time issues language barriers represent.

Our goals were as follows:

- Determine what good and bad communication experiences consist of.
- Determine how people currently communicate with others with whom they do not share a common language or with whom they only share the basics of a common language
- Determine how these language gaps are currently bridged on a social, personal, professional, and recreative level
- Determine the positive and negative aspects of the current communication situation in communicating past language gaps
- Get an idea in what kind of situations a software platform to bridge these gaps would be used
- Get an idea of how this platform would be used
- Get an idea of where difficulties from using the platform would come in

The base questions used for the structure of the interviews:

- Validate if they had actively participated in communications with a foreign speaker or a deaf person
- What make cross language communications easier or hard
- What types of “helps” have they used to over come the language barrier?
- In what situations are language barrier likely to occur?
- How important are inflections, body language and gestures to cross communications?

- What effect do accents, tones, slang and speed of speech have on communications?
- How do customs, culture and personal space complicate communications?
- What complexities do communications with a group introduce?

Process For Answering Questions:

The process we used to answer our questions was to perform field interviews and one observation was performed. Those interviewed were a foreign language speaker who is new to America, having just moved here from Armenia. This was a live field interview.

Another interview with an individual who has professional experience interacting with speakers of languages foreign to them. This individual taught English in South Korea for a year. This person is currently living in New Zealand, working in a government role where they have daily interaction with many nationalities and languages. This interview took place via Skype since the individual currently lives in New Zealand.

A third interview was conducted at the desk of “Drew”. Drew is a supervisor at the TMobile Call Center. After a brief description of our design concept, followed by some warm up questions Brandon conducted a semi-structured interview. Drew was very relaxed and thoughtful throughout.

Our final interview was conducted by Austin. This interview focused on someone who was hard of hearing. We wanted to explore nontraditional forms of “language”, in this case Sign Language to understand the unique challenges this represents. Austin felt that our final interviewee would have the proper experience involving dealing with people of different languages and communication modes. Austin was curious to see what experiences he could share and what his insight would be with a device that could assist in breaking down those communication barriers.

A group observation of engineers from both America and a group from China as they attempted to define a product when neither team spoke each other's language.

The interviews sought to uncover challenges, how those challenges are currently overcome, how a software tool might help with those challenges, and potential difficulties that could arise from such a tool. The Observation was to watch the process of communications live to see how each team overcame the obstacle of language.

Observations or Interview Responses

The interviews took place in a public settings or remotely via Skype. The observation took place in a small conference room at a corporate building. All interviews and observations were conducted during the day.

We allowed for triangulation by asking similar questions to the interviewees, and determining if we received similar answers from them. Additionally we asked questions of a similar type to each interviewee to establish consistency of response. We saw some triangulation amongst the foreign interviewees as their situations were similar. There were cases of triangulation between the deaf interviewees and the foreign speakers however there were significant differences as well. An example of the differences is the desire of foreign speakers to have audio translations were the deaf participants seemed to focus more of textual results.

The specific interview questions that were asked are listed below along with the interviewees' responses.

The following is a brief inventory of the four elements that are in place:
(additional details contained in interview/response section)

- Mostly 1:1 conversational semi structured interviews
- One group of 6 people was observed with the observer actively participating with the group.

- All interviews were conducted in public space which actually allowed the conversation to be more relaxed/free.
- The interviews conducted via Skype was done in the person's home
- Paper form to collect the responses to the interview questions, a sheet of paper used as a prop to represent the device used to aid communications and a cell phone (which the interviewee injected into the interview as a prop.
- Pen to mark form.
- The answers to questions were typed for clarity

Interviews and Observations

The people in the space

Our first interview took place on Monday Jan 26th with an individual that just came to this country from Armenia. While he understands some English, he is having a hard time communicating due to poor spoken English Skills. His understanding of English is "passable" but you must speak slowly with him, use no complex language or jargon and he seems to write fairly well although his grammar is quite poor.

For sake of privacy, we'll name this subject "Alex". Alex is 6 feet tall, about 45 years old, slightly gray hair, Olive complexion and has a full beard. Alex lives with his parents (who came over with him). He is a brilliant software engineer and was educated in Soviet Russia. He has an easy going personality, smiles a lot and is somewhat outgoing. One cultural aspect is that when Alex talks with you, he get very close. He seems to not have the same notion of personal space that we do.

The second interview took place on Sunday, January 25th with an individual Wesley has known for several years. "Gen" spent a year in South Korea teaching English. She has also traveled much of Asia. She is currently working for the government of New Zealand and interacts with people of many different nationalities in her role helping with disaster preparedness. She is also

in a long term relationship with a native of India. She has a MS in Communications.

Wesley thought she would be able to shed insight into her experiences communicating with people with whom she didn't share a common language. Gen is very blunt and forthcoming. She says what she thinks. She is medium build, was a college swimmer, has red hair, and fair skin. She is 28 years old.

Our third interview took place at Drew's desk. Drew is twenty-eight years old, married, and has a child. At work he is easy going and not big on strict structures. He was recently promoted to his position with the last sixth months. Drew's desk is located in what T-Mobile call a "pod", a pod is a combination of interconnected cubicles. Drew's pod was one of many in a large room filled with fluorescent lighting.

Our final interview took place on Jan 27th at Logan's office. "Logan", is 32 years old, blonde hair, large statute, and identifies himself as Deaf although he has moderate hearing loss. He can speak and hear well enough, but uses American Sign Language and declares it as his first language. He is the Executive Director for the state agency that deals with the Deaf and Hard of Hearing people in Albuquerque, NM. He often deals with political people and the legislative of NM.

The objects in the space

Alex and I (Eric) met at the Thailand restaurant as he loves Thai food! Alex is carrying nothing but his car keys and is wearing a ski jacket as it is about 30 degrees outside. I have my notebook and pen. Most other people in the restaurant are already seated and many coats hang on the backs of the chairs.

Gen and Wes talked via Skype because she is in New Zealand. She was comfortable in sweatpants and a t-shirt. She had taken the day off of work because she was feeling sick. Gen was happy to see me and smiled openly. We chatted for a little bit about college friends, her boyfriend, my girlfriend, and our personal activities.

Drew and Brandon met face to face with Drew sitting at his desk and Brandon sitting across from him. The only objects in the space are Drew's computer, office equipment and business documents.

The Environment

The restaurant is small with about 18 tables. The floor is linoleum and the walls are painted light green and have a few simple thai pictures of the King and Queen and one of an elephant. Another is Thai and Laotian currency. The restaurant is packed and noisy. You hear other conversations and the clinking of eating utensils. Thai rock and roll music is playing in the background. There is a wonderful smell of curry in the air.

I (Austin) am sitting by the circular desk with my laptop and facing him (Logan) whom is sitting at his desk facing me. He has a wooden desk with his full name and the position on a plaque on top of the desk.

The building: spaces, architecture, lighting etc.

Tables 1 through 10 and booths 1 through 3 are all filled. people are having lively conversations. Table T3 is particularly noisy with lots of laughter and some one with a very loud voice! There are three servers, all of whom are constantly going back a fourth between the tables and the kitchen. As they enter the kitchen, you can hear them calling out the order to the cook(s) in Thai.

Alex and I are seated at table 6 (colored in yellow). The table is covered with a thai silk tablecloth under a piece of glass that has the same dimensions as the

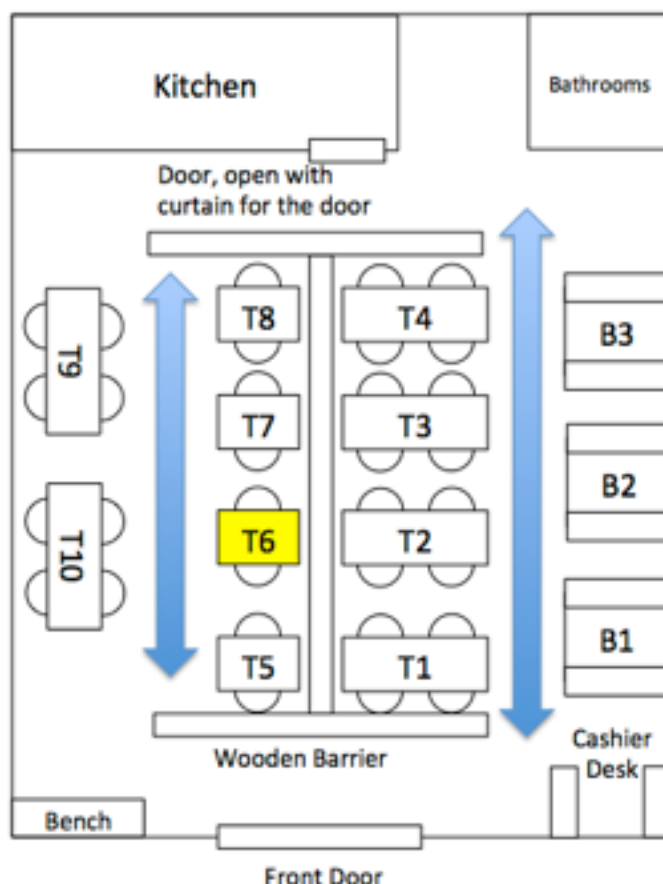


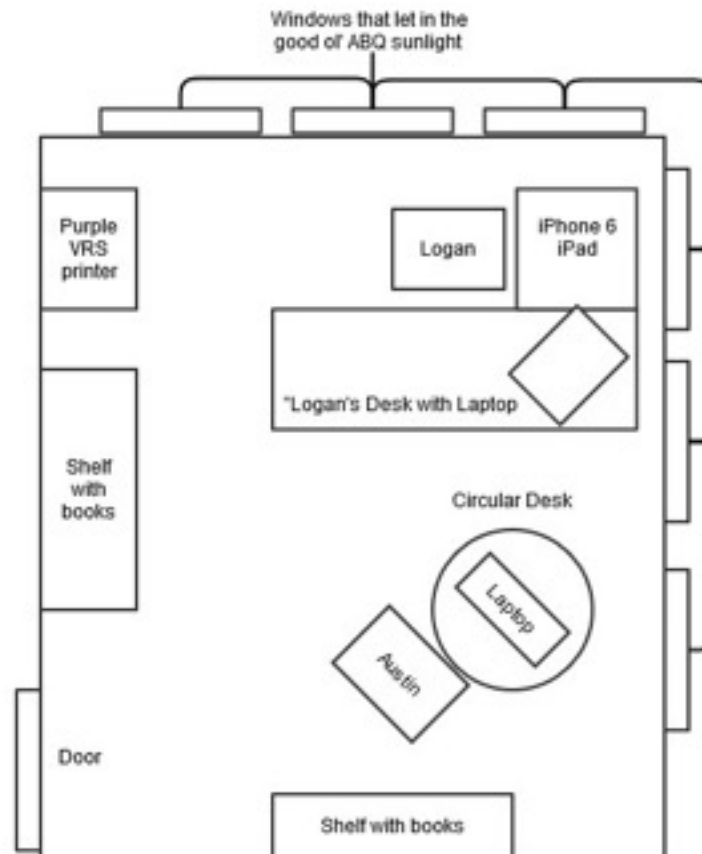
table top.

Sitting on the table in front of Alex and I are a plate filled with pineapple curry, satay or chicken on a stick with sweet thai peanut sauce, Coconut milk-based chicken soup (call Tom Ka Gai), our silverware, napkins and my interview sheet, a blank piece of paper and pen.

Gen is in her apartment in front of her laptop. It is well-lit with natural sunlight and is early morning. There is no-one else home, nor are there any noises, or other distractions going on.

Drew's pod is small self contained "modular office space" in a large room well lit by florescent lighting. It is the end of the business day.

“Logan’s” office on the 15th floor in downtown Albuquerque, NM. His office is at the southeast corner of the 15th floor with 6 windows and plenty of Albuquerque sunlight in the room. There are 3 shelves in the room, 2 are located to the north wall, and one on the west wall.



The technology

Originally, the interview with Alex, did not intended to use any technology, Alex introduced a cell phone which he used to demonstrate Siri and Google translate.

Gen an I are both in front of our laptops. While I am using mine to type her responses she is sitting casually, curled up in her chair.

Logan’s office if filled with many different technologies that are usable for communication. This is the list of the devices that he currently has in his office that either are used for communication or support communication:

- Television with Purple VRS (Video Relay System)
- Laptop attached to a monitor (Laptop also has ZVRS on it)
- Verizon mobile hotspot device (I was using that for my laptop to connect via wifi)
- iPhone 6 (which has ZVRS on it as well)
- iPad (ZVRS on it)
- CaptionCall (telephone with video screen)
- Alert system (flashes when the front door doorbell has been triggered for the whole floor)
- 10 Mbps wifi with 4 connections
- Hardline internet connection (static/dynamic)
- Wireless printer

Detailed observations & interview responses (verbal and non-verbal)

1. Have you ever interacted with someone who didn't speak your language or who was deaf.

[Alex] Yes, when I came to America, I could speak only a little english, it was especially difficult to communicate to doctors, cleaning people (Armenian to Spanish!). I also had occasions where an english speaker wanted to talk to me, I didn't understand them and had to find a way to respond.

[Gen] Gen said when she taught English in South Korea and traveled around Asia while she was teaching she had a lot of those interactions. She also has those interactions now, but it is with people from all over the world who speak English as a second or third language and have an accent, which can still make it hard to communicate.

[Logan] "I have dealt with different clients that use different languages and communication modes such as English speakers, Spanish speakers, and ASL

(American Sign Language) users but they involve their own home signs which often happens when the client isn't exposed to people that use ASL on a daily basis and the family members start to develop signs to be able to communicate with their family members.”

1.1. What was that situation?

Alex was quite animated in his response, he told me about three stories where he had to explain to a doctor that his stomach hurt, of a lost cell phone where the contacts in the phone only spoke Spanish and an unfortunate experience with a police officer.

Drew's situation was on customer calls. He indicates that on calls translations has been mixed overall. When it comes to using an interpreter sometimes you get one who is really on the ball. They are having a good day and they above and beyond in helping explain things to the customer. Other times you get those interpreters where you know they are just making the situation work or are not understanding what you are trying to explain.

Logan tells us that he has dealt with people that use different signs. When they use different signs, it really adds many layers of complexities in communicating. Each person might have a home sign system that is more orientated with their language whether it is English, Spanish, Native American, or whichever language they primarily use. Also when dealing with clients that use sign language, one must remember that there are many different sign language forms such as PSE, CASE, Spanish, ASL, home signs, LSM, etc. For situations when the person is hearing and doesn't speak English, I tend to bring in tri-language interpreters, but it is very difficult to do that, and at last minutes, it is very rare to be able to find a tri-language interpreter. Sometime we use VP (video phone) which does offer Spanish translators sometimes, so we can communicate with people using a Spanish translator through VP. And with the some devices we do have some communication assistance apps, but it is not always that efficient. Margin of error in some areas of communication is up to 80%. Also there isn't any forms of technology that is corrective of the language barriers.

1.2. How did you communicate?

In the case of the doctor, we went on line, found an Armenian web site that described the type of pain he was having. He highlighted key words, then used Google translate to translate it to english, printed out the results and took this to the doctor.

In the lost cell phone case, he called names in the contact list. The respondents answered in Spanish, he told them, in Armenian that he couldn't understand them and hung up.

In the case of the police officer, he used a combination of hand gestures and hand-drawn pictures. The officer gestured for his license by pulling out his wallet, showing him his Driver's License and indicated for Alex to do the same. Alex gave him his license. After a few minutes, the officer came back, returned Alex's license to him and gesture for Alex to leave.

Gen gave us an example of shopping in S. Korea and pointing at things and gesturing until getting to the point of buying an item. She said many of her interactions involved knowing a couple words or phrases and using this with gestures and facial expressions to get the basic level of needed communication.

In Logan's case, he says, "It depends on the situation, if it is a Deaf person, then I will make sure that I can understand them using visual communication such as sign language. Sometimes I have to use gestures to help fill in the gap if the person doesn't understand me or if I don't understand them. But most of the time, we are able to maintain some sort of communication through visual communication. When it comes with hearing people, I can speak for myself and they can understand me clearly, however sometimes if I cannot understand the person speaking I would ask them to repeat themselves. This is only for situations that are informal, if it is a formal situation, then I will definitely use interpreters to relay our information between myself and my clients/visitors, and prevent any misinformation or misunderstanding of each other."

1.3. How effective was it?

In the doctor's case, it worked, the doctor gave him a prescription and Alex got it filled.

In the cell phone case, it failed and the situation was left unresolved.

In the police officer case, depends on how you look at the outcome! It was sufficient for Alex to move on.

Gen said that it was easy if both parties were interested and wanted to try to communicate, but was impossible if one of the parties was uninterested in interacting. She said both sides had to be open to gestures, mis-understandings, repeating words. It wouldn't always work even then and would depend on the situation and person.

Logan adds, "It really depends on the situation again, using sign language, it is really effective when we both are using the same communication mode, have the same level of education, and come from the same background. Once I went traveling to Germany to talk with people from the Deaf population. There was high difficulty with using sign language because I was only able to probably get 10% of the signs they were using because it was gestures and very basic. It was very difficult to convey the rest of the information. I also realize that if we (Deaf) didn't know how to use gestures, then there is basically no way for any Deaf people of different languages to communicate with each other at all. In my job, language is so important, if there isn't any way to discuss about deep issues with my client/visitors at my job, then I can't really get that connection with that person and develop a business relationship with that person so it is very important to make sure that the communication is effective between myself and whoever I am communicating".

1.4. If you are Deaf, was an interpreter used?

Neither Alex nor Gen are deaf so this section was skipped. Logan is deaf and answered question 1.4.2.

1.4.1. If they say no, ask why didn't they use an interpreter?

1.4.2. If they say yes, ask why is it better to use an interpreter?

I do use interpreters in situations that are formal, and have more than 3 people in the group and it is difficult to understand each other when everyone is speaking at the same time and I don't want to miss any important information that each person has to share. But when it comes to 1 on 1, I normally can speak for myself and don't need to use an interpreter.

2. What makes a conversation easy/difficult?

Alex indicated that when he can watch the other person's body language or gestures, this helps. He indicated that any translation that takes time is unacceptable (continuity is important) He indicated that external help (someone who can translate) or pictures and drawings work.

Gen said that for a conversation to be easy, both parties have to be willing and active participants. She said this is even more important for when there are language barriers to overcome. She also said that being able to see a persons face and gestures helps out a lot, but that there have been times in different cultures where she has misread a facial expression, so this can also make a conversation difficult. She said both parties have to be open to listening and watching the other person and open to getting to the goal of the interaction. She said slang can make conversations difficult because you have to figure out the context and the meaning of the word.

According to Logan, The most important aspects of making a communication easy, is using the same language, using the same type of communication mode such as sign language or speaking or writing or texting, emailing, etc. "Another important thing that I have to think about what is their level of education, since sometimes I will have to modify how I approach issues with that person if they have a lack of education which can be sometimes the case with some of my clients that come in".

3. If you were to get a translation of someone speaking a different language or signing, what would be the easiest for you to understand?

Alex favored pictures, universal icons and hand gestures. He did say that cultural difference can change the easy thing into a hard or offensive thing. He introduced the idea of an electronic device to make things easier. Specifically he called out that a bigger device is easier. He complained that his cell phone is too hard to read. He favored text over audible translations.

Gen said it would need to be in her dialect - “American English” vs British or other dialects. She said she would like an option depending on the context to have something written or have it spoken. In a busy market, she said she would prefer something written. With a single person or small group she would prefer it spoken. For work like a meeting or a conference call, she thinks that both are useful so that there are notes available for review and for everyone to see and spoken so that everyone can hear.

Logan responded with, “Signing would be the easiest way for myself. It would depend on the others, some might prefer to use CART (Communication Access Real-time Translation) which provides real-time captioning of what is being spoken, or whatever they prefer to use”.

3.1. If they say verbal ask why? Ask why not a written translation?

Gen indicated that it is easier for a group to hear or to carry on a conversation between 1-2 people.

3.2. If they say written ask why? Why not a verbal translation?

Alex says that he prefers text “sub titles”. He indicated that external noise makes it hard for him to concentrate (as he is translating in his head). Sometimes the voice is really hard to hear (due to external noise), sometimes he doesn’t understand the accent and sometimes the speaker speaks too fast.

Alex seems a bit hesitant here, he asks me to slow down my speech and asks me if his response is OK. He was concerned that he had offended me.

Gen said, “It is nice to be able to re-read it similar to a text message”.

Drew added, “When you listen to someone say a bunch of words you have a tendency to kind of veg out but with written material you can really read over and absorb it.”

3.3. If they say signing ask why? Why not a verbal or written translation?

I will use an interpreter because I want to maintain the fluidity in our conversation which means that when I communicate with my client or people of importance, I must have that fluidity where our conversations do not pause repeatedly due to communication issues. It is important that we are able to engage with each other, you want to have that kind of engagement where there is prosperity, eye contact. After all, ASL uses a lot of facial expressions to emphasis things in the conversation and that can help us feel each other out in terms of emotions, intensity and all that which is involved with maintaining that connection.

4. What do you think would be the easiest way to communicate something basic to someone who couldn't understand your language?

Alex says this is situational! If he is at a store, he just points to something, if it is at the doctor's office, he draws pictures or uses the web as previous stated. He emphasizes that being able to draw something is really important as he doesn't always have the English word for something. “Objects are easy to draw, feeling are not”.

Gen said it again depends on the context and referenced what she had previously said.

Logan's response, “I always make sure that they know that I am Deaf by using gestures for basic things such as “I am Deaf” or *point to the ear* I

cannot hear. That way the other person will know how to react to me prior to starting to communicate. Once I was at the airport, and I didn't realize this man was standing next to me and trying to talk to me. He got really upset with me and thought I was giving him attitude by ignoring him. I finally realized that he was speaking to me, so I pointed to my ear and shook my head to indicate that I was Deaf. The guy reacted immediately and apologized and backed away. It is unfortunate when those type of situations do happen, but that is one way to help communicate very basic things to people, by using gestures."

5. What do you think the best way would be to provide translations to facilitate a conversation between two people who otherwise wouldn't understand each others languages?

Alex responds with the following list (in order)

- Seek out the help of someone who can interpret
- Draw pictures
- Hand gestures
- Text, people are afraid to speak even when they can read and understand the language.
- Smile, wave goodbye and walk away

Alex hesitates, stares off into space, then pulls out his cell phone again. He tells me that if he had an app that was fast enough to audibly translate from Armenian to English with English subtitles, he would really like that. He pauses then says but my cell phone is too small, "if I had a big tablet that would be better!".

Gen talked about experiences she has had using interpreters in New Zealand in her current job and when she taught in South Korea. She said that she would rely on them to communicate not just the words, but also what the person intended in terms of emotions such as if they were joking, being sarcastic, upset, etc. She said there is always the delay between the two people as the translator repeats what is said.

Logan tells us, “I believe that people need to use the same communication modes to communicate with each other. However, we both know that doesn’t always happen, so the next best thing is to provide each other access to the correct form of communication such as interpreters, text-based programs, apps, translators, etc.”

6. **Assume a device can provide verbal, written, picture, or other types of translations. What would make this easy/hard for you to use? What would minimize the negative impact on your ability to have a 1 or 2 way communication. What would maximize the positive impact?**

Given the response to the preceding question Alex is already responding to this question before I get to ask it. He adds the following details. “It is a bad thing if you hold up the tablet and face it towards me, this seems so impersonal, put it on the table in front of you”, he gestures to a spot on the table equidistant between us. His next response took gestures and text on his part to convey, he wanted me to know that if he has to enter or say a “long command” to get translation to happen that this is disruptive and he wouldn’t use the device. He also offers that sometimes he would prefer to type and therefore the keyboard has to be foreign and big enough for his fingers. He concludes with the request that the tablet shows “threads” of the conversation so he can remember what was said.

Gen said that a negative would be if the translation didn’t have the tone of voice so one could understand the context and emotion of what was being said. She said it should be easy to access like an app. She also said the languages should be easy to access. Wesley asked her to clarify this and she said that she meant the languages being translated to and from. She also said that the conversation should be saved like notes to be able to go back to and reference.

Drew said, “I think it would save us a lot of money and really drive down CRT (CRT stands for call resolution time and is a metric used to gauge performance) by shortening calls. It really would be a game changer and would really push that great TMobile customer experience.”

Logan: For this device to be effective and easy to use, it would require high quality resolution, easy visibility. It will need a pre-set profile for the user themselves, so that anytime they use their device, it is ready and already set to provide the communication form they need without any setting or tinkering with that. It would be nice to have the software/app use only a 1-touch that it will always set that setting. Sort of the concept “set it and forget it”. It would also be important to allow the person to be able to switch between any languages for the other person, but personal preferences should always remain the same for myself. “The hard part I believe with using this device is; do the Deaf people understand the text (based on their education), word-level choices, do the Deaf people’s ability to understand the language difference since the text might translate the language differently then the Deaf person won’t be able to apprehend it”. Logan also suggested that the app translate the language to reflect ASL or English, or maybe home signs. Each sign language has many different forms which can complicate things and make it difficult to use a device of the likes spoken.

7. What would make this hard to use/apply?

Alex is really into our interview at this point, he is very animated and his body language suggests he is real excited. He goes on. “If the device is slow to translate, it will break the flow of thought”, “It must translate in real-time or I can’t use it” At this point he got up out of his chair, walked over to me, sat in the chair next to me and said, “we need to share the device, like this”. He then picked up my prop (the blank sheet of paper) and held it in front of the two of us.

Gen said that lots of loading or waiting time would make it frustrating and would make her unlikely to use it. She said that if she otherwise wouldn’t interact with someone due to a language barrier, if there was a long delay or wait time, she would be unlikely to put in the effort unless it was required for work or was a friend of a friend. She also said that she has apps she has deleted because they have too many settings and are too complicated. She said it should just be really easy to use without a lot of set-up or options or tabs. She also said any options should be really obvious and self-explanatory.

Logan said, “If the device is more of a burden for myself to use, since I have to use my hands to sign, and then have to hold the device in order to translate my signing to text or voice, then it would have a negative impact on my ability to communicate. Also if it is not portable across different devices such as phone, laptop, computer, etc., then that would be an negative impact as well because depending on the situation, I might be using my phone, or my laptop so it would be nice to have that available for them all.”

7.1. Who would possess this device? the speaker or the listener?

As a follow on to the shared paper concept and in an act of immersion, Alex then handed me the paper, asked me to look at it and then started talking to me in Armenian. He said, in English, “OK if you hold it while I talk”.

I believe that it could be difficult to use if only one person had this device and had to share it back and forth with the other person. If there is a Deaf person like myself, then I would expect the listener to use it and have it translate my sign into text or voice. So in general, it is probably best for the listener to use the device, said Logan.

8. What would make this easy to use/apply?

Alex responded to this by saying that if the device or app didn’t have subtitles in addition to the audible translation it would be impossible to use as the listener may not understand the audible portion or the speaker may speak to fast. “Text makes sure you understand”

Alex again got animated and held up his phone. “It (the phone) should know where you are and should automatically translate for you” I asked how would it know what languages to translate form or to? He answered that it should recognize the language and automatically translate it to the language of the locale. He stopped thought about this then changed his mind, he said simple icons that each party would press should determine the language to translate form or to. “This is much easier!”, he quipped.

Alex added two other short responses, “background noise will make this difficult to use so text is better” and “make the text big”. He was referring to

people with poor eyesight or older people. His final remark was “if the battery is too short, it will be unusable”.

Gen said it should be very basic and obvious how to use it and should “just work”. She said if someone is relying on it for a meeting and can’t figure it out, then they are likely to just use an interpreter and not use the app again. She said the accent in whichever language should be bland and understandable. She also said it would be useful if both parties had the app so that they could get the translation on their device in their preferred language. She said headphones might make it work to have it be less intrusive in terms of having a “strange” voice in the conversation.

Drew responded with, “Well if it had some sort of written component it would really increase overall comprehension. The customer and the rep could go back over the call and really be sure what was being said instead of relying on a third party’s word.”

Logan adds, “For a deaf person like myself, it would have to be somehow hands free, it will have to allow the person to be able to use both hands for signing. Maybe Google Glasses would be a good device to put this software in. If I have to move the device in front of me to see me signing, it creates a barrier for myself to be able to communicate effectively so that needs to be prevented. Some combinations (people communicating with each other) will require a camera for the device to be able to watch the Deaf person signing and translate it into text or voice.”

9. What communication situations would you find use for this?

Alex said that whenever he speaks with an Indian (from India) he has a very hard time understanding them, this tool would be great for this situation. He added emergencies, doctors visits, technical meetings (he then asked me about supporting technical terms).

Gen listed several situations that we had discussed: conference calls for international business or politics, travel, shopping, dealing with people from other countries, - socially, at workshops, conferences, international friends in social situations.

Logan has an additional suggestion, “I believe that this device would be helpful in so many situations that I deal with daily. It would be nice to be able to have a single device that I can bring anywhere and depending on the language, being able to change which language it is, or have it auto-detect, that would be very useful.”

10. What communication situations do you think would be too hard to use this in?

If the communication is via the phone, this will be difficult to use. Alex also added that within group discussions this may be difficult to use.

She said it could be difficult if it doesn’t translate what you want, when you are ready to use it. She also said it could make it difficult to understand emotion and tone of voice.

Logan brought up visiting the doctor’s office. He explained, “it is so important to have 100% clear communication between the doctor and myself so I would not want to rely on the device for its precision when it comes to medical things.”

11. What would discourage you from using this?

Alex provided the same answer as the previous question the the following additions; If he has to repeat his statements several times (because the device didn’t capture his original conversation), If I don’t understand the accent of the audible translation.

If the device is slow to translate or the translation are inaccurate. “This is a deal killer!”

Gen said having it be confusing or hard to use and any mistranslations or misunderstandings would discourage her. She said if it worked then she would want to use it.

Drew’s response, “You have to have understanding and clarity. Those might be the same thing. Really communication is just easier when both people get what the other means or what they are talking about. It allows them to really work together instead of butting heads. “

Logan was worried about personal communications. He told us that, “If the device makes the communication impersonal, losing the connection and it isn’t a real conversation, then I would revert from using this device.”

12. What would encourage you to use this?

“If I have success communicating and it is fast and easy to use, I will go for it. Alex also indicated that he likes the idea of having a written record of his conversations.

“It would need enough options to cover a wide variety of people”, Drew replied. “For example there are many dialects out there and it would have to let you either select one or automatically detect which one is being used. Also some user customization would be nice, like being able to change the font or text color if it is a written translation. It also has to be consistent each time you use it. Customers love consistency and it creates comfort in use.”

Logan’s response was similar to our other responses. “If the device makes it easier to deal with communication barriers, and is easy to carry around, and helps me do my job better, then it would definitely encourage me to continue to use this device.”

13. When you communicate with someone, do you look at them or away from them

This was really important to Alex, he said that he wants to be able to talk with the person not the device. This gives him an opportunity to communicate on a personal level. He also said it is important to watch the other person’s body language as this tells him if he is communicating properly.

With a masters in communication, Gen thinks that body language plays a huge part in communication and always pays attention to physical cues.

This is particularly important to the deaf. Logan explains, “I almost always look at them, since visual cues are important to read the person’s body behavior when it comes to Deaf people. So with that that in mind, it would be important that I would be able to look at the other person as much as I can when I am using the device.”

14. How important is tonal inflections, body language when communicating?

Alex indicates that this is not that important! (This is incongruent with his previous responses!)

As above, Gen thinks body language is very important and relevant as an insight into the mood and emotion of the person as well as to what is being communicated behind the words. She said tones are important because sometimes it can be hard to understand someone speaking English if they have a really heavy accent. She referenced a Scot she works with that she has a hard time understanding.

Like visual cues, body language is extremely important to the deaf. “This is extremely important since we cannot hear tonal inflections, it is shown through facial/body expressions so we need that to be able to establish how the person is feeling or behaving toward us.”

15. What do you do when someone has mispronounced a word in your native language and you don’t understand?

Alex finds other words or ask the person to repeat or explain what they want/mean.

Gen indicates that this isn’t that big a deal, she asks them to repeat more slowly or phrase it a different way.

Logan adds that for the deaf, repeating only applies to situations where it is Deaf-Deaf /different sign language.

16. Do face to face communications make you uncomfortable?

Not at all, Alex prefers face to face, he says this is easier when he can see how the person is responding.

Like Alex, Logan respond similarly. “No because in the Deaf culture, it is important for us to have a face to face communication, it helps establish the connection whether its business, personal, attraction, etc.”.

17. How do you communicate in a group of people?

Alex has to process “one voice at a time” and he asks that the participants speak slower.

Gen said, “it depends”. In a meeting people take turns to speak and there is usually an Agenda. She said in personal situations depending on the number of people there can be several conversations going or people can be talking over each other. it also depends on how much people have had to drink.

17.1. What makes this easy?

Alex repeats the same response as the previous question.

17.2. What makes this hard?

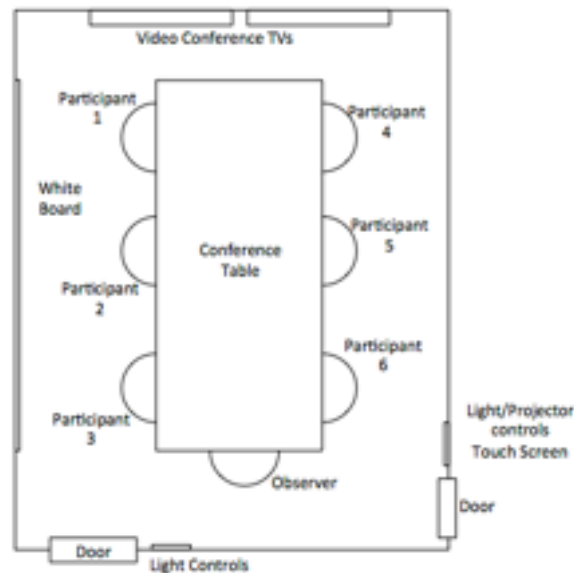
If Alex is using a device for this, he lists the following; The device needs a bigger screen (due to volume of text and faster reading), The “voice” of the device has to “have good volume”, some one has to control the flow of the conversation (again reiterates one at a time) and if the conversation is on a conference phone, the device is going to have to have a real good microphone. At this point he expresses fear that it won’t work in this use case.

This is a real challenge for the deaf. Logan explained it this way, “If it’s a group of hearing people with no interpreters, it gets hard because I cannot always understand what they are saying and will require louder speaking and be visually clear so I can watch their lips. With a group of Deaf people, I must be able to see them all visually, including their body. If it is a mix of hearing, Deaf, Hard of Hearing, it is one of the hardest situations to be in, because using an interpreter while I sign, and having them all watch me is extremely difficult to be effective. There are so many communication variables that have to be considered when speaking in a group. He then managed to realize something as he was talking to me. This device would be so good for everyone to have, it will solve all the problems in communication since we wouldn’t have to rely on different technologies such as CART, communication assistance programs, and also even interpreters. I can see how this device would be cost effective and the group meetings that I have all the time with my position, will be easier to deal with!”

Observation

The space

We are assembled in a small conference room on the second floor of an office building. The conference room has no windows, bright “can” lighting, a projector mounted to the ceiling, a long, highly polished, oak conference table and six



leather, high backed chairs. On the walls are two 60” televisions for video conferencing (they are off) and a white board that spans one of the long walls. The walls are covered with acoustic cloth and the room is very quiet. There are two electronic keypads on the wall to control the lighting (dim-able) and the projection/teleconferencing equipment. There is a tablet device and a thermostat on the wall next to the switches.

The room has two doors, one at either side and is decorated in warm colors. It is about 70 degrees in the room.

On the table is a remote control (to control the whole room) a network cable and an HDMI cable (for projection from a PC).

The people in the space

Participant 1 is a male, 30 years old, immaculately combed, blond hair and wears glasses. He introduces himself as the director of engineering. He is Caucasian, American, and dressed in business casual (slacks and shirt) attire. He is rather laid back in that he leans far back in his chair and tends to rock in the chair. He possesses an iPad and lays it closed on the table. He speaks slowly and with a bit of a southern drawl.

Participant 2 is a male, about 28 years old, balding engineer. He too is He is Caucasian, American, and dressed in jeans and a collarless shirt. He wears sandals with no socks. He has a lab book and pen as well as a computer, all of which he sets on the table. The computer is open and on. The lab book is open with a pen laying next to it. He looks like your stereotypical “geek”. He tends to speak in short sentences, pauses a lot when he speaks and appears to be a good listener.

Participant 3 is also male, about 30 years old, also balding and wears big, thick glasses. He is very tall (about 6’2” and gangly) He is Caucasian, American, and dressed in jeans and a plaid shirt. He brings nothing into the room with him. He is very friendly, vocal, he almost come off as a goof but you quickly learn that he is a very intelligent engineer. He turns the chair around, kneels on it and leans forward onto the table.

Participant 4 is male, about 5’ 3”, approximately 55 years old and is Chinese. He is soft spoken, clean cut, has straight, neatly combed black hair and wears glasses. He wears a light blue, long sleeved shirt, gray slacks and black polished shoes. He carries in a briefcase and pulls a lab book and a mechanical pencil from his case. He speaks halting English.

Participant 5 is male, about 5’5”, overweight and somewhat sloppily dressed. He wears a polo shirt, slacks and beat up worn shoes. He is balding, 50 - 55 years old, wears glasses and has a lazy eye that makes eye contact very difficult. He also carries a lab book and mechanical pencil that he lays on the table, immediately opens and starts writing. He smile a lot, makes eye contact but doesn’t speak much. He knows no English.

Participant 6 is male, about 30 years old, 5’7” and has black bushy hair. He wears a white shirt, slacks and more modern shoes. He too wears glasses. He

immediately approaches each participant and offers his business card to participants 1 through 3. He says his name and bows with each two handed card presentation. He then sits down, pulls out his lab book from a brief case, immediately opens it and commences to write (with a pen). He also has a laptop computer that he starts up and navigates to a Powerpoint presentation.

The objects in the space

The key objects in the space are participant 6's laptop from which a Powerpoint presentation is projected. Everyone is taking notes in their lab books and shortly the white board becomes the center of attention.

The meeting begins with participant projecting the first slide in his presentation. It welcomes the participants to the meeting (in English text). Everyone looks at each other and nods in acknowledgement of greeting. The next slide introduces participants 4, 5 and 6 by name and role. He points to the first name on the slide, then hand gestures to participant 4. His title is Director of Engineering for the manufacturer he represents. He looks at participants 1,2 and 3 and say hello with a brief head nod.

Participant 6 then points to the second name on the slide and hand gestures to participant 5. His title is "Manager Engineering". Again he nods and says "Johnson", this is his name. Finally participant introduces himself as "Strange Cat", bows and sits down. From the slide we learn that he is an engineer.

Participant 1 takes his cue and introduces himself by name, Director and stands to present his business card to participant 4,5 and 6. They stand graciously accept the cards and sit back down. This same procedure follows for participants 2 and 3.

At this point participant 6 advances the slide which contains specifications for a device. He repeats key words that are on the slide and pauses for a response. At this point participant 2 tries to tell the Chinese participants that there are issues with the specification. He starts identifying the errors in English. You can see by the facial expression of the Chinese that they understand the key words for the feature but don't understand his responses. He senses this and proceeds to the white board to write and draw his responses. The Chinese participant copy verbatim what he writes and draws on the board. They shake their heads in agreement and say "I understand". In only one case does participant 5 get up, go

to the board, cross out one of the drawings and corrects it. His correction was deemed correct by participant 2 and participant 2 sits down.

Participant 6 advances the slide to a mechanical drawing of the device. Participant 3 goes to the white board and redraws part of the mechanical drawing and asks if a part can be changed. The Chinese participants look at each other and proceed to have a discussion in Chinese. The American team sits silently and watches. Finally participant 5 goes to the white board, redraws the part again and says, “OK?”

This process repeats itself for other components of the project. Finally participant 6 projects a schedule for the project. Participant 1 says that the schedule is unacceptable and writes a new date on the white board. The Chinese don’t respond. At this point participant 1 opens his iPad goes to the Google translate site and types “too long”. He tells Google to translate this to Chinese and passes his iPad over to participant 4. He nods his head in acknowledgement and the three Chinese participants begin conversing in Chinese again.

After about 3 minutes, participant 4 writes a earlier date the white board to which participant 1 asks if he is sure. He makes a hand gesture for “OK” to which participant 4 says OK, smiles and nods his head. All the other participants in the room begin writing in their lab books.

Finally the second to last slide is projected with an estimated cost. There is an immediate adverse reaction from participant 1 indicating that the cost is too high. In response he grabs a sheet of paper and writes a lower number on it and passes this to participant 4.

Participant 4 reads it, passes it to participants 5 and 6 and a lively discussion in Chinese ensues. You can tell from their body language that it is impossible for them to agree to that number. They begin writing on a sheet of paper various numbers. After a while, they converge on a number and passes it back to participant 1. Now the American team begins a similar lively discussion among themselves.

Their response is to go to the whiteboard and write out an itemized list of all the parts and costs for each one. At this point, everyone comes to the white board, a verbose discussion in both Chinese and English begins. At various points in the discussion the members of each team take turns modifying numbers on the board.

After about 10 minutes, both sides are nodding in agreement, the American team is asking, “OK?” and the Chinese are smiling, nodding in agreement and saying, “OK”

The conclusion of the meeting comes with the final slide with the text, “Thank You”. Each of the Chinese participants say thank you and to their surprise participant 3 says thank you in Chinese. The Chinese participants smile and nod in appreciation.

Everyone stands, everyone shakes hands, again say thank you with each handshake and the meeting ends.

Insights and Results

Based on both experiences we’ve identified the following insights:

- The ability to dynamically draw pictures is essential to these types of communications. “Visual-ness” adds a layer of confidence to what is being said.
- Text and numbers seem to be universal to these communications.
- It is important that the device not get in the way of “fluid” communications. In a 2 person interaction, the device will need to easily move between both people to enable a “conversation” like a translator would, or it will need to facilitate the interaction in another way depending on the context.
- Options, settings, and tabs should be simple and should not be overwhelming in scale - > possibly even set and forget
- Options, settings, and tabs should be easy to use
- The users will need to indicate languages and whether audible translation is desired.
- The device will need to handle technical terms.
- Phone communications will be a challenge.
- When a table is in the area, share the device, otherwise the listener should hold it.

- Translation must be in text AND audible. There should be the option for hearing a spoken translation, written translation, or both.
- There should be a way to review the current and possibly past conversations
- The device will need to support double-byte character-based languages.
- Size of the device matters and the UI needs to adapt to screen size.
- Accuracy and speed matter! Being able to rely on the translation is critical. It will need to be able to handle accents and mistranslations. Both clarity and consistency are important.
- The interface has to be very light and icon driven. Options and settings should be kept at a minimum and should be obvious on how to use
- Watch out for cultural impact! It depends on the context of the communication situation how it will be used and it should be able to adjust to the needs of different situations
- The result may be a picture for simple commands.
- In a larger conversation or meeting the communication would need to allow for possibly multiple conversations or languages and possibly even multiple translations.
- There should be a way to view or listen to previous “messages” in a conversation
- The app should open quickly and be ready for use.
- Being able to focus on the other person is vital to the deaf.
- If you are signing, you can’t hold the device!
- Sign language has “custom” or “home” signs.
- Doing this app well will be really hard but very rewarding to all those with language barriers to overcome!