Grounded Design: A Microlearning Environment to Develop Fixed Interpretations

Jenna L. Scheetz

University of Cincinnati

Everyday people make phone calls. It is often taken for granted that we can just pick up the phone and dial-in to make an appointment, chat with a relative, check on a purchase, order delivery, pay a bill, consult an attorney, call 911… The list could go on. We can make phone calls twenty-four hours a day, seven days a week, 365 days a year, wherever we have a connection. Now, let's consider these same scenarios, but the person is deaf; unable to hear on the phone. Do deaf people have the same access to phone calls? Fortunately, the answer is yes! Sorenson Communications is a video relay service that staffs sign language interpreters on videophones twenty-four hours a day, seven days a week, 365 days a year. After twelve years of employment, I have learned a lot about this company. Sorenson Communications designs, engineers, manufactures, and provides the videophone equipment to these deaf people, for free, so that they can access the interpreter services. Sorenson Communications strives to make the phone call experience for deaf people, and people who can hear, nearly equal. They call this functional equivalence.

Need and Overarching Goal

With this incredible technology, comes trials for both the deaf people and the interpreters. Every day, interpreters encounter phone calls with scripted phone messages, like: "Please enter the last four digits of your social security number" or "Please enter your 16-digit credit card number" or even, "Please enter your 4 to 6-digit passcode". Interpreters have never encountered such a vast number of scripted lines which they are expected to interpret at top speed, demanding instantaneous responses from the deaf person. Deaf people are novices in navigating systematic phone trees, and the robotic computerization of phone systems. A successful phone call could be hindered due to these scripted, fast-paced messages. During an actual phone call, there is no time for the interpreter to clarify these unfamiliar concepts to a deaf person, nor pause to think of the

actual meanings. Account numbers, extension numbers, pin numbers, or social security numbers, have to be inputted in the short-allocated time, or the call might disconnect. With the automated system delivering scripted lines at such a fast speed, and with the stress to enter the information extremely rapidly, it causes the interpretation to be formed hastily, incoherently, or inaccurately. The deaf person might not understand what the interpreter just signed. In addition, the deaf person might not realize the message is standardized because the interpretation is not the same from one interpreter to the next. These rapid automated systems, and robotic scripted-messages place a cognitive processing load on interpreters, as well as obstruct the functional equivalence of deaf people.

Stewart, Cartwright, and Schein (1998) reference that Dr. Dennis Cokely researched the processing time studying sign language interpreters and discovered that, as their processing time was reduced (message coming in rapidly), errors in their interpretation increased (pg. 139). I feel that one possible way to solve this problem is to rely on "fixed interpretation" (Frishberg, 1990, p. 54). Frishberg (1990) explains how fixed interpretation is used when passages are constantly identical, like, the "Star Spangled Banner" or "The Lord's Prayer". Interpreting students usually learn a standardized version of how to interpret these passages. These interpreted passages incorporate all major points and are the consistent each time they are delivered (p. 54). Frishberg also feels that people appreciate fixed-text interpretation when, "the interpretation looks fluent, rhythmic, and identical to the last time the text appeared" (1990, pg. 54).

My design will treat scripted and automated phone messages as fixed interpretations, and by developing a series of microlearning trainings, video relay interpreters can learn these fixed renditions in advance, from a native user of the language. These fixed interpretations can be generated in a matter of seconds because they are retrieved from long-term memory. This will

avoid cognitive overload from the interpreting process, helping to produce a clear interpretation in sign language, all while saving precious time and improving functional equivalence.

Psychological Foundation

Sign language interpreting is a complex mental process. Stewart, Schein, & Cartwright, (1998) explain that interpreters must first understand the message that they receive, then figure out how that translates into the target language, keeping the intent of the original message intact, additionally factoring in the emotions and tones attached to that message, and finally expressing all of those elements in a way that the target audience is able to understand (p. 31). And that is just one sentence. Imagine a lecture. The sentences don't come in slowly, one by one. The sentences come in quickly, one right after another. Picture this simultaneous process: while interpreters are producing/signing concept A, they are preparing concept B in their mind, processing concept C, and listening to concept D. It is quite a miraculous process.

This complex task of taking in information and processing it for output is much like the learning theory, Cognitive Information Processing. Driscoll (2010) shows how information is received by a sensory channel (like visual or auditory), processed by pattern or recognition, placed into working memory for output, or successfully sent to long-term memory for future retrieval (p. 75, fig. 3.1). Working memory has limitations in the length of time and the amount of information it can hold and can manage "relatively few phrases at once" (Driscoll, 2010, p. 75). Driscoll (2010) also notes that the limitations in working memory could cause one to forget the beginning of a complex sentence by the time the end is conveyed (p. 75). "Anything that is to be remembered for a long time must be transferred from short-term to long-term memory" (Driscoll, 2010, p. 75). There are no capacity limitations with long-term memory and it can hold unlimited amounts of material (Driscoll, 2010, p. 75). Ideally, a complex passage could be

learned beforehand, then stored in the limitless long-term memory bank for future retrieval. This frees working memory to simply recall that passage rather than processing its complex meanings. This is exactly the goal for the fixed interpretation trainings: process and learn the interpretation beforehand, store it in long-term memory, retrieve it on cue, then produce it clearly and accurately.

Cultural Considerations

I have worked for Sorenson Communications for twelve years. It is a fast-paced environment, and being logged onto the phone system, and taking phone calls from deaf people, is top priority. The training will have to be kept to a 10-minute maximum. Sorenson also strives to provide high-quality and professional interpreters. This training will help interpreters skill level improve, and the deaf people's functional equivalence will be increased.

Since American Sign Language fluency is the main ingredient, and a highly valued component of a skilled interpreter, I envision a native deaf person modeling the fixed interpretation in the training video. When the interpreter learns from a native user, it ensures the subtleties of the language are incorporated in the translation, and the deaf callers will notice the natural flow when it is reproduced by the interpreter.

Technology

In hopes to resolve the complex process that is hindering functional equivalence, the goal is to produce a series of microlearning trainings, to be accessed on demand, to learn various fixed interpretations, as well as strategies to process future scripted passages in a similar fashion. Microlearning was chosen to align with the need for being on demand, as well as for the need to keep the training to 10-minutes or less. Freeman (2017) says, "Microlearning is learning on demand", allowing learners to access training when they need it (1:05-1:24). The material and

topics are designed into small units (Freeman, 2017, 2:30). In fact, that is the goal of Microlearning according to Charney (2017), for the training to feel brief and manageable for the learner (0:56). Charney (2017) explains that generally these trainings are about one to five minutes long, but some find ten to fifteen minutes optimal (0:48). Microlearning also aligns with our need to reduce the cognitive load the interpreters experience while actively interpreting, as well as while taking these trainings. Charney (2017) emphasizes these types of trainings quickly present material, encourage comprehension, reduce cognitive overload, and improve memory retention (1:07). These are all goals to be achieved with learning the fixed interpretations.

Sorenson uses an LMS (Learning Management System) to train interpreters. Trainings, lessons, workshops, compliance material, etc. are housed and cataloged into the LMS, where the interpreters can access them with the click of a button. Once created, the microlearning trainings would be added to the LMS site, and the interpreter would be notified via email that there is a new training waiting to be completed.

Sorenson has professional production studios, software engineers, a dedicated training department, and ample access to various e-training technologies. I would be able to produce high-quality and professional microlearning trainings.

Pragmatic Constraints

Sorenson has call centers all across the United States and Canada. The centers operate twenty-four hours a day, seven days a week, 365 days a year. Trainings have to be done electronically, and they have to be made available on demand. For example, some interpreters will be taking the training at two o'clock in the afternoon EST, and some interpreters will be taking the training at two o'clock in the morning MST. All information is proprietary and confidential, so trainings are required to be taken in the privacy of a station within the call center.

Sorenson hires deaf employees specifically to be language mentors and models for the interpreters to gain fluency and improve skill. I would have access to a native user to record the fixed interpretations. As mentioned previously, training technologies and the ability to produce them would be readily available.

Pedagogical Design Decisions

Knowing that interpreters and deaf people are struggling with automated phone messages due to cognitive processing issues, a training would be beneficial, the training time is limited to 10-minutes or less, and access to create and distribute a high-quality training is readily available, the design process can begin. Cognitive Load Theory is an instructional theory that is based on the Cognitive Information Processing learning theory. Cognitive Load Theory helps to explain the reason interpreters are having trouble processing, as well as steps designed to help them handle this complex task.

Van Merriënboer & Sweller (2005) note the working memory of a human is basically unable to process numerous elements (pg. 149). They also say working memory is only able to process between 2 to 4 pieces of information for about 20 seconds before it reaches its capacity unless the information is repeated and rehearsed (pg. 148). “Cognitive load refers to the strain that is put on working memory by processing requirements of a learning task” (Driscoll, 2010, p. 136). Driscoll (2010) define schemata as packets of knowledge and stored material, which when automatically activated, enhances comprehension (p. 136). Van Merriënboer & Sweller (2005) show that once schemata are constructed and stored and organized, they can be automated by repetition, which means there are no limits to processing in working memory due to the fact that memory handles the constructed schemata as one element (pg. 149).

Van Merriënboer & Sweller (2005) define three types of cognitive loads. The first is intrinsic load, which is the level of experience and knowledge of the learner (p. 150). The second is extraneous load, which is extra information that is not necessary for learning and can be avoided if it is distracting (p. 150). The third, is the germane load, which is related to the constructing and automating schemas (pg. 161).

According to Van Merriënboer & Sweller (2005), there are six design principles in the Cognitive Load Theory: "goal-free effect", "worked example effect", "completion problem effect", "split attention effect", "modality effect", and "redundancy effect" (pg. 151). Each of these design principles can be explained by the Cognitive Load Theory and incorporated into the microlearning trainings.

The first principle is to have a goal-free problem for the learner, because specific goals focus all the learner's attention on only the available operators presented (Van Merriënboer & Sweller, 2005, pg. 151) or creates tunnel vision. This particular problem, which will be posed in the beginning of the training, is: How to make automated messages easier for the interpreter to process and provide increased functional equivalence for the deaf callers? Notice the question is not, "How do you interpret this automated message: (specific passage)"? The goal-free problem is an open-ended question which leads to expanded thinking. This flexible thinking will continue to be beneficial as the interpreter creates new schemata in the future.

The second design principle is to use worked examples to study, because cognitive load causes "weak-method problem solving" and seeing how a problem is solved provides beneficial solutions to the learner (Van Merriënboer & Sweller, 2005, pg. 151). This will be the bulk of the training. The native deaf signer demonstrates, in American Sign Language, a sample automated passage for the interpreter to study, while listening to the automated passage. The interpreter will

be able to study linguistic features such as: sign choices, spatial uses, body postures, rhythm, speed, and conceptual accuracy. With these, what Van Merriënboer & Sweller (2005) call "useful solutions" (pg. 151), the interpreters can emulate the elements they've learned and transfer them to build new schemata. This portion of the training will need to incorporate practice time for the interpreter to work towards developing and rehearsing these translation renditions.

The third principle is partially completed problems, where part of the solution is revealed, and part of the solution is left for the student to complete (Van Merriënboer & Sweller, 2005, pg. 151). This is an inherent feature of our line of work, in that there will always be new and challenging passages which can be converted to fixed interpretations. Because of the time constraints of the microlearning sessions, this principle will have to be proposed as an independent activity at the end of the session, after studying the worked examples. This could possibly be posed as a challenge (with a goal-free problem statement) encouraging continued growth.

The fourth design principle is to reduce the split attention effect, like when one channel has to mentally integrate multiple sources of information causing an unnecessary load (Van Merriënboer & Sweller, 2005, pg. 151). The microlearning training design will have to be mindful of animations, texts, diagrams, lists, etc. and how they are presented, so that the learner isn't required to put pieces of information together mentally, using a single channel, to form an understanding. Additionally, after the training, the interpreter will be able to handle single-channel, multiple, and continued auditory passages without being so overloaded, by retrieving the schemata developed in the training.

The fifth design principle is using multimodal explanatory sources so that one channel isn't overloaded (Van Merriënboer & Sweller, 2005, pg. 151). For the microlearning training, the learner will view the sign language passage (visual channel), while listening to a simulated automated recording (auditory). Both channels will only be processing one source. If the video was accompanied by scrolling words which the learners had to read, it would create a load because the visual channel would have to process both the sign language demonstration and the words on the screen. This design principle will also help the interpreter after the training when multimodal information is competing, instead of complimenting. Since it is necessary for the interpreter to have a little bit of lag time to hear the message before it can be processed, by the time the deaf person is ready to give the information, the interpreter takes in visual information in the form of sign language, while being forced to start processing a new auditory message by the automated system. If the learner creates a schema for the auditory message as a result of the training, this overload will be eliminated, or at least relieved.

The sixth principle is eliminating redundancy when a piece of information provides enough explanation on its own, without the need to repeat it (Van Merriënboer & Sweller, 2005, pg. 151). An example of this might be if a video was presented with the deaf person signing a demonstration of a fixed interpretation, and a narrator was narrating every sign that was being performed simultaneously. The deaf person's rendition is clear enough on its own without the need to add additional information. This design principle will also apply to the actual interpreting process. Sometimes interpreters sign in a redundant fashion when things become unclear or confusing. By relieving or eliminating parts of the processing load with automated schemata, interpreting redundancy can also be eliminated.

In conclusion, Cognitive Information Processing shows why interpreters battle cognitive overload due to complex messages that have to be understood and processed within the limitations of working memory (Driscoll, 2010, p. 75). Cognitive Load Theory explains that, if the robotic and scripted passages can be converted into fixed interpretations (schemata), they should, according to Van Merriënboer & Sweller (2005), become automated, organized, and stored in the long-term memory (pg. 149). This then frees working memory by simply having to retrieve the schemata. The goal is to help facilitate the creation of automated schemata to ease the processing burden of the interpreters by developing microlearning trainings to teach fixed interpretations for future use. The trainings will be developed within the parameters set by the cultural considerations (10-minutes or less) and pragmatic constraints (on demand).

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