# Teaching Students to Decipher Fingerspelling through Context: A New Pedagogical Approach

Diana Gorman Jamrozik
*Columbia College Chicago*
Mary Jo Davidson, John C. McDonald, Rosalee Wolfe
*DePaul University*

**Abstract**

ASL and Interpreter Education students are often told to "use context" to figure out fingerspelled words. While there is anecdotal evidence and pedagogical advice regarding the use of context to improve fingerspelling comprehension, there has never been a controlled study to test the effectiveness of context in decoding fingerspelled words. This paper reports recent research on whether an ASL student's ability to comprehend fingerspelled words increases if the words are viewed with context. The results of the study paralleled research that shows that novice readers of written English use context to decode unfamiliar words. Drawing on researchers' experience with novice readers, this paper introduces categories of contextual cues in ASL that can be utilized by novice signers when attempting to comprehend a fingerspelled word. The findings have strong pedagogical implications, and this paper offers innovative approaches for incorporating the teaching of contextual cues into ASL and Interpreter Education courses.

## Background

The pedagogical literature for teaching American Sign Language (ASL) and ASL interpreting often contains the advice that a novice signer should use the context surrounding a fingerspelled word to help grasp the fingerspelled word. Yet, is this good advice? Does the use of contextual cues in fact raise a signer's ability to understand a fingerspelled word? And if it does, can the

ability to use context to improve fingerspelled word recognition skills be taught to novice signers and interpreters?

Fingerspelling is an integral part of ASL and is a necessary skill for complete communication in sign (Battison, 1978). Padden (1991) found that on average, fingerspelling makes up approximately 6 percent of the signs produced in everyday ASL conversations, but that in certain contexts, fingerspelling comprised as much as 12 percent of signs used. It is crucial that interpreters who work between ASL and another language understand a fingerspelled message, for as Taylor (2002) notes "the interpreter's ability to comprehend fingerspelling has a significant impact on the effectiveness of the interpretation" (p. 34).

For second language learners, acquisition of fingerspelling recognition skills typically lags far behind other sign language skills (Grushkin, 1998; Schleper, 2003). Patrie (2007) notes that "hearing people who are learning ASL as adults tend to have great difficulty in correctly recognizing fingerspelled words" (p. 19). Wilcox (1992) surveyed sign language students who reported that recognizing fingerspelled words was the toughest part of learning ASL. Because fingerspelling can make up such a large amount of ASL discourse, the ability to read the fingerspelling is vital.

Students often practice reading fingerspelled words through drill work (Guillory, 1967) or Patrie's (1997) *Fingerspelled Names and Introductions: A Template Building Approach.* However, students' fears of fingerspelling often block their ability to even see a fingerspelled word, let alone be able to comprehend the fingerspelled word. Therefore, students of ASL are often told to use the context surrounding the fingerspelled word to aid in deciphering the fingerspelling. Mendoza (2007) suggests that there are two different kinds of context available for interpreters to utilize to comprehend a fingerspelled word: prior knowledge of the subject discussed, and categorical knowledge. Mendoza posits that "these metacognitive strategies of categorizing, using background knowledge, and prediction are extremely helpful when learning how to understand fingerspelling" (p. ix). Likewise Cartwright and Bahleda (2002) state "if the context is a subject with which students are familiar, chances are they will be able to successfully decode the fingerspelled content based on knowledge of the subject" (p. 34). While this advice

has not been tested by a scientific study before now, the workbooks by Mendoza (2007) and Cartwright and Bahleda (2002) offer activities to build fingerspelled word recognition through contextual clues. Additionally, Patrie (2007) notes that strategies for improving fingerspelled word recognition can include, "practicing with fingerspelled words in context" (p. 20). Context is one of Groode's (1992) "three C's" for fingerspelled word recognition. Groode suggests that novice signers use categories to limit the options that a fingerspelled word could be.

Although these texts mention using context to discern a fingerspelled word, the drills in the texts provide the context for the person reading the fingerspelling. That is, these texts specifically give a context to use in the form of a superordinate category – the person reading the fingerspelling does not have to decipher both the context and the fingerspelled word. This is not what happens in the flow of discourse. In most situations, a signer will not say, "The context for the fingerspelling is…" before continuing the discourse. A person must first recognize that a contextual cue is just that, and then be able to use that cue to figure out the fingerspelled word. While ASL and fingerspelling text books tell students to use context to decipher fingerspelled words, specific instructions on how students should learn to see both the fingerspelled word and whatever contextual cue is offered in the text is not given (Cartwright & Bahleda 2002; Groode 1992; Mendoza 2007).

Unlike the lack of research related to the use of contextual cues to decipher fingerspelling, there is a great deal of research on the role of context in comprehension; however, it focuses on young students learning to read written English. The literature supports the idea that novice readers use contextual cues to comprehend individual printed words. Studies by Stanovich (1980), Perfetti and Roth (1981), and Stanovich, West, and Feeman (1981) all concur that less experienced readers recognized difficult words more easily when the words were presented within a defined context. A study by West, Stanovich, Feeman, and Cunningham (1993) found that the length of the context was unimportant. This study compared context effects between second graders and sixth graders, and found that the second graders relied more on sentence context in decoding difficult words than the sixth graders, regardless if they were presented with contexts of one, two, or three sentences in length.

The literature of reading comprehension also offers clues for how to teach students to recognize and utilize context in comprehending fingerspelled words. Graves (2006) suggests that teaching students how to use context is in fact a difficult task. It appears not to be enough to simply tell students to use context – the skill of recognizing contextual cues needs to be taught. In order to teach students to use cues, we first must teach them to recognize the cues that exist around a fingerspelled word.

Sternberg and Powell (1983) define two types of cues that novice readers of English utilize in order to decipher unknown written English words. They identify internal cues, that is, the morphemic cues within the word itself that provide insights on the word's meaning. External cues are those that are outside the word itself. These are cues that are contained in the text surrounding the unknown word. Sternberg and Powell go on to define eight categories of contextual cues that, when recognized as context, can enable a beginning reader to decipher an unknown word. Graves, Watts, and Graves (1994) and Graves (2006) developed an instructional unit on teaching beginning readers to figure out unknown words through context. As many of these eight types of contextual cues have direct parallels in ASL discourse, the cues and instruction type will be discussed in detail in the *Pedagogical Implications and Strategies* section that follows.

Before making the leap to advise that students be taught to read fingerspelling in part by seeing the contextual cues that surround the word, we wanted to evaluate whether or not the presence of a contextual cue would in fact help a student comprehend the fingerspelling. While there is literature that supports the idea that beginner readers of English use contextual cues to comprehend individual printed words, there are no previous studies that support this idea as applied to comprehending fingerspelled words. For this reason, the authors investigated the question, "Does a student's ability to comprehend a fingerspelled word increase if the fingerspelled word is viewed with context?" Such a study is a necessary first step to developing future pedagogical strategies for teaching novice signers and interpreters to comprehend fingerspelled words.

**Method**

The following section describes a controlled study that explored the effect of contextual cues on fingerspelled word recognition. The independent variable was the presence or absence of context when viewing a fingerspelled word, and the dependent variable was the number of correctly identified words. The study controlled for word length, order of presentation, fingerspelling speed, and participant knowledge of ASL.

Participants

The test participants were hearing students majoring in ASL/English Interpretation at Columbia College Chicago. Twenty-five participants were recruited through posted announcements, and each participated in the study voluntarily. All participants were students who were taking or had just completed ASL IV.

Procedure

After the test facilitator obtained informed consent, each participant filled out a short, anonymous questionnaire about personal background and experience using ASL and fingerspelling. The participants then began the test procedure, which had two parts. In one part, a participant viewed fingerspelled words with a context; in the other part, the participant viewed fingerspelled words with no context. For the part with a context, the participant was informed that the words belonged to a category, such as “animals”, “celebrations”, etc.

After viewing a fingerspelled word, a test participant responded by saying the word, and by typing it on a computer keyboard. Participants had 20 seconds to respond, and could request that the fingerspelled word be repeated once. After every six words there was a thirty-second break. At the end of the test process, each participant filled out a debriefing questionnaire, and received a small honorarium. Half of the test participants (13 of 25) first saw the series of words that had no context, followed by the words presented with context. The remainder (12 of 25) saw the words with context first, followed by the words without context.

Test stimuli

Each participant saw 60 words. Thirty of the words were drawn at random from the test bank of 98 words organized into 14 categories. These words were presented to the participant as a list of "general vocabulary", so the participant had no context for these words. The remaining 30 words were drawn from five randomly selected categories in the test bank. The test participant was informed of the category, before seeing each of the six fingerspelled words in that category. The category name provided the context to the test participant. This type of cue parallels Sternberg and Powell's "class membership cues", which specify the category to which the unknown word belongs (Sternberg, 1987, p.92).

The study controlled for average word length (8 letters per word) and the speed of presentation (4.2 letters per second). Controlling for these two considerations was essential so that each participant encountered the same level of challenge during a test, and any possibility for bias due to variability in the difficulty of the test stimuli was removed.

To avoid the complexity and cost involved in controlling for speed using videotape, the authors used a computer program, "Fingerspelling Tutor," which displays animations of fingerspelled words (Fingerspelling Tutor, 2010). Figure 1 (reprinted with permission) shows a screen capture from the software. Fingerspelling Tutor creates realistic 3D animations of fingerspelling, and unlike other Web-based or CD-based software, fully portrays the transitions (movements) between each letter in a fingerspelled word.

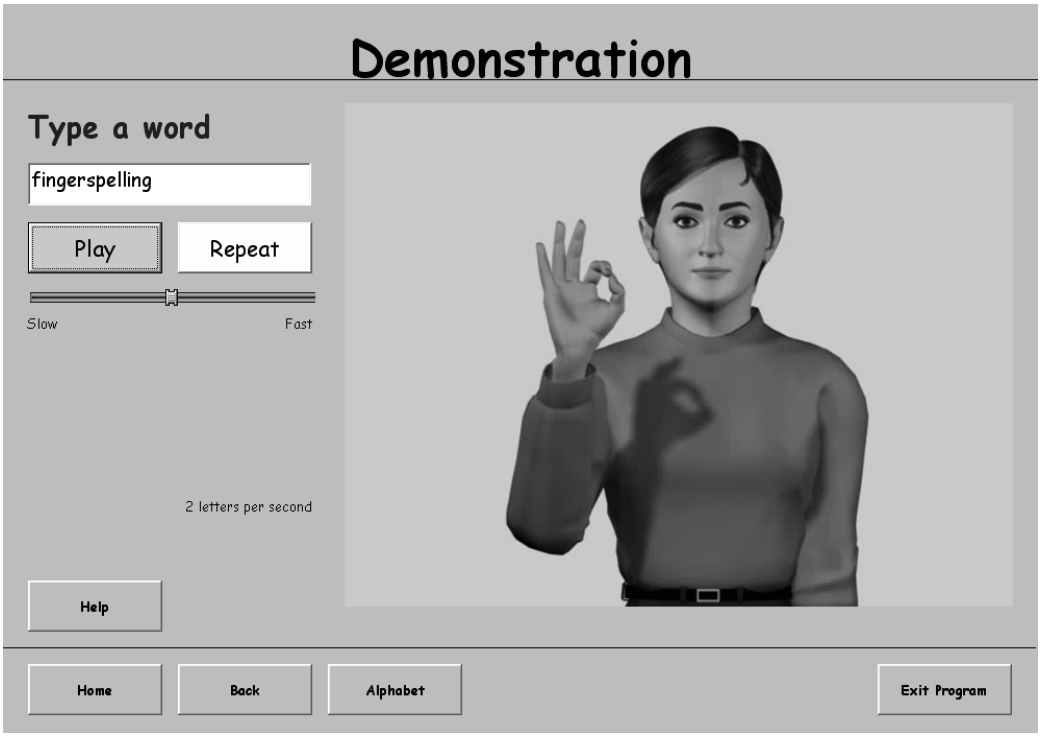


Figure 1: Fingerspelling Tutor

Results

The authors investigated the question, "Does a student's ability to comprehend a fingerspelled word increase if the fingerspelled word is viewed with context?" As Table 1 attests, the average number of words successfully recognized without a context was 17.4 out of a total of 30 possible. With context, participants correctly recognized an average of 25.72 out of 30. This is a 48% improvement. In addition, the standard deviation of 3.6 was much lower. Not only did the test participants recognize more fingerspelling words when they were presented with a context, the test participants were more consistent in their recognition. Further, the lowest score for words with context, 15 out of 30, was more than twice the minimum score for words without context, which was only 7 out of 30.

Table 1 also shows the results of computing a paired t-test on the performance scores. The difference between recognizing words present without a context and recognizing words that were presented with a context is statistically significant ($t=-8.6$; $P<.00001$) and we reject the null hypothesis.

Table 1:

*Comparing recognition of words without context and words with context.*

| | *No context* | *Context* | *Improvement* |
|---|---|---|---|
| Mean | 17.4 | 25.72 | 48% |
| Variance | 42.33 | 13.04 | |
| Observations | 25 | 25 | |

| | |
|---|---|
| Pearson Correlation | 0.681 |
| df | 24 |

The order of presentation had little effect on the recognition scores for the words without context. Those who saw words without context after the words with context performed slightly better, but not significantly so (62.5% vs 54%). Also, there was no significant difference when viewing the word with context after seeing the words without context (89% vs. 83%),

Table 2 examines the performance of the highest-scoring and lowest-scoring participants. The high-scoring participants all scored 80% or above on the non-context portion of the test and the low-scoring participants all scored 50% or less. There was a dramatic difference in the performance on the context and non-context portion of the test for low-scoring participants. Without a contextual cue, this group of participants recognized an average of 9 of 30 words, which is 30 percent correct. With a contextual cue, they recognized an average of 22.4 of 30 words, which is 75 percent correct. On average, this group more than doubled their scores when the contextual cue was present.

Table 2:

*Performance of top-scoring and low-scoring participants*

| | No context | Context | Improvement |
|---|---|---|---|
| Top-scoring participants | 27.25 out of 30 (90.8% correct) | 28.50 out of 30 (95% correct) | 3 % |
| Low-scoring participants | 9 out of 30 (30% correct) | 22.4 out of 30 (75% correct) | 149% |

**Discussion**

The data clearly show that an ASL student's ability to comprehend a fingerspelled word increases if the fingerspelled word is viewed with context. The participants who scored less than 50 % correct on the non-context portion of the text showed an even greater improvement in scores when presented words with context (see Table 9). Without a context, this group of participants recognized only approximately 30%of the words presented. With a context, their scores improved dramatically to an average of 75%. As noted, ASL pedagogical literature often advises students to use context as a strategy for decoding fingerspelled words. This study offers strong empirical evidence to support this claim, especially for novice ASL users.

Students who had the highest scores for fingerspelled word recognition with context also had the highest scores of recognizing words without context. While we did not test experienced users of ASL, our findings show that those ASL IV students with the highest scores seemed not to rely on context as much for comprehension cues. This is in line with past studies of both fingerspelled word recognition and written English comprehension. Patrie (2007) cites a forthcoming work by Patrie and Johnson in which they studied novice and experienced interpreters' fingerspelled word recognition skills. Patrie (2007) states, "in every comparison, the experienced interpreters performed better than the novice interpreters" (p.20). Additionally, in a study of written English comprehension, Perfetti, Goldman, and Hogaboam (1979) find that more experienced readers, while possibly having advanced skills in using context to decode a word, were so proficient at recognizing words without context that the use of context became less important, which is parallel to what Patrie found with experienced interpreters and fingerspelled word recognition.

While Patrie (2007) lists several strategies used by experienced interpreters for decoding fingerspelled words, further research is needed to determine at what stage these skills are being formed, and when the best time to implement them in an ASL curriculum could be.

**Pedagogical Implications and Strategies**

The empirical data found in this study clearly uphold the advice prevalent in ASL literature that students should utilize context to help comprehend fingerspelled words. However, contextual cues will not always be supplied to students or interpreters as they were in this study; in fact, in most interpreting situations, interpreters will need to identify the context through their own devices. In teaching second language learners of ASL to read fingerspelling, it is necessary to teach students to recognize contextual cues.

As mentioned previously, Sternberg and Powell define eight different types of contextual cues that novice readers of English use to decipher unknown words. These cues include "class membership cues", which specify the category to which the unknown word belongs, and "equivalence cues", which supply either a synonym or antonym to the unknown word (Sternberg, 1987, p. 92). These cues are directly parallel to some of the common uses for fingerspelling in ASL. Cartwright and Bahleda (2007) state that fingerspelling can often be used to specify a member of a class, or is used along with an equivalent sign (p.18). Likewise, Sternberg and Powell's "functional descriptive cues", which explain the purpose of the unknown word, and "stative descriptive cues", which describe the unknown word's "size, shape, color, odor, feel, etc.," (p. 92) have parallels to ASL classifiers, especially the stative descriptive movement roots as described in Valli, Lucas, and Mulrooney (2005). Sternberg and Powell's final three cues, "temporal cues", "value cues" and "causal/ enablement cues" can also offer information for deciphering a fingerspelled word. While learning the cue types, students become aware of the idea that what occurs around the fingerspelled word can be important to help decipher that word. Classifiers, the use of space, synonyms or categories, can aid novice signers and interpreters in their attempts to comprehend fingerspelled words.

Sternberg and Powell (1983) suggest that a novice reader of English goes through three mental processes in using context to decipher unknown words. The first stage is the "selective encoding" stage (p. 888), in which decisions are made as to which information surrounding an unknown word is in fact relevant context. The second stage is the "selective combination" stage. This stage involves putting together the possible contextual cues in an attempt to predict what the unknown word could be. The final stage is the "selective comparison" (p. 888) stage, in which the information is analyzed and compared with information already known through long term memory and world knowledge.

Graves, Watts, and Graves (1994) took Sternberg and Powell's work and used it as a basis for developing a plan to teach beginning readers to use contextual cues to decode unknown words. They suggest a two to four day introduction to the idea of using context, in which students isolate an unknown word, list the words or phrases that hint at the word's meaning, list the contextual cues, and guess the meaning of the unknown words. They suggest that this process for ascertaining the meaning of unknown words be reinforced when needed. Graves (2006) expands the time needed for teaching context to beginning readers to a full ten-day unit.

Students need to be taught not only different cue types, but also how to make the mental connections between the cues and the fingerspelling. Sternberg and Powell's stages and Grave's pedagogical plan have been modified to teach beginning signers and interpreting students to use contextual cues to decode fingerspelled words. For those situations where context is available, the "Jamrozik 3 Step Plan" can teach signers to utilize contextual cues to read fingerspelled words. This approach can benefit students at all levels, as it will help to reduce the anxiety that novice signers experience when attempting to decipher fingerspelling, and it will help advanced interpreters learn to make the quick mental connections necessary to decode fingerspelled words in context. This type of instruction should not be used in isolation, but rather with other methods of fingerspelling recognition in order for students to utilize all the tools possible to read fingerspelling. The authors realize that not all fingerspelling comes with context, and in those situations, template building methods for seeing internal patterns of words, such as the one put forth by Patrie (1997), are essential.

The "Jamrozik 3 Step Plan" begins by introducing the specific contextual cues to the students during a classroom lecture, with examples of each type of cue both explained and shown with signed sentences. Then students watch an ASL text and figure out the fingerspelled words and their contextual cues, if present, and then name the cue type. During this process, student can use as much time as necessary, and can re-watch the text as often as needed. It is essential to begin the process this way, for if novice signers cannot find cues for themselves in a comfortable environment, then they will not be able to do so during the time constraints of simultaneous interpreting. This step addresses Sternberg and Powell's "selective encoding" stage, as students learn to distinguish relevant vs. irrelevant information to help decipher a fingerspelled word

The following is an example of a selective encoding exercise. Students receive the blank chart and view *Signing Naturally Level 3,* Unit 24: Marlon Kuntze (signer): "How One Breathes" (Mikos, & Smith, & Lentz, 2001). In groups, they then fill in the chart and discuss the types of contextual cues present in the videotext.

| Fingerspelled word | Context Cues | Cue type |
|---|---|---|
| | | |
| | | |
| | | |

Part of a complete chart is as follows. As much discussion and viewing of the videotext as necessary can be done until the students are comfortable with the idea that context for many fingerspelled words can be discerned.

| Fingerspelled word | Context Cues | Cue type |
|---|---|---|
| O-X-Y-G-E-N | BREATHE-in WHAT<br>$O_2$<br>O | Spatial<br>Causal/ enablement<br>Class membership<br>Synonym<br>Synonym |
| C-A-R-B-O-N<br>D-I-O-X-I-D-E | C<br>O2<br>NEW DIFFERENT<br>BREATHE-out | Synonym<br>Synonym<br>Antonym<br>Spatial<br>Causal/ enablement<br>Class membership |
| T-R-U-N-K<br>B-R-A-N-C-H-E-S | CL: 5<br>TREE<br>CL: 5 (inverted tree on body) | Spatial<br>Stative Descriptive<br>Class membership<br>Spatial<br>Stative descriptive |

Step 2 of the plan works through the "selective combination" process described by Sternberg and Powell. Students receive the topic of a videotext and a cue chart with the contextual cues already in place. Students are then asked to use these cues to predict what the fingerspelled words could be. When interpreters or signers use prediction skills, they are exercising the ability to look forward in a text and make educated guesses about what logically could come next. After predicting the possible fingerspelled words, the students either watch the text for comprehension or interpret it, depending on the level of the student. It is important, after the text is viewed, for the students to analyze their comprehension or interpretation to verify if their clozure skills were accurate. By "clozure skills" we mean the ability to look back during a text and make educated guesses about any missed information. Students should then work through the fingerspelled words in the text to see if their initial predictions were accurate and then analyze the fingerspelled words and contextual cues present. It is good to have the students reinterpret a text, as this can build confidence.

This is an example of a selective combination chart, using the fingerspelled words and contextual cues in the text *The Pursuit of ASL: Interesting Facts Using Classifiers* "Air Fresheners" (Stratiy, 1998). Students are given the top chart first and asked to predict the possible fingerspelled words. The completed chart follows.

| Fingerspelled word | Context Cues | Cue Type |
|---|---|---|
| | Topic of the text<br>SMELL NICE ROOM | Synonym<br>Functional descriptive<br>Class membership<br>Value |
| | LIGHT<br>CL: claw+++ | Synonym<br>Spatial<br>Stative descriptive |
| | LIGHT<br>L-A-M-P<br>CL: B (shape of bulb) | Class membership<br>Class membership<br>Stative descriptive |

| Fingerspelled word | Context Cues | Cue Type |
|---|---|---|
| A-I-R<br>F-R-E-S-H-E-N-E-R-S | Topic of the text<br>SMELL NICE ROOM | Synonym<br>Functional descriptive<br>Class membership<br>Value |
| L-A-M-P-S | LIGHT<br>CL: claw+++ | Synonym<br>Spatial<br>Stative descriptive |
| B-U-L-B | LIGHT<br>L-A-M-P<br>CL: B (shape of bulb) | Class membership<br>Class membership<br>Stative descriptive |

In Step 3 of the plan the instructor gives students the topic of a text and asks them to use their prediction skills to brainstorm what fingerspelled words might accompany any contextual cues they might see. In doing this stage, the students fill out a blank chart, in which they make specific predictions about both the potential fingerspelled words, and the possible contextual cues that could appear with the words. They then identify the types of cues based on Sternberg and Powell's model.

The following is one possible prediction chart in preparing to interpret the text, *ADA and Interpreters* by Sign Media (signed by Brigitta Bourne-Firl) (2007)

| Predicted fingerspelled words | Predicted contextual cues/ cue type |
|---|---|

| | |
|---|---|
| • Americans<br>• Disabilities<br>• Act<br>• Bush<br>• Title<br>• Employment<br>• Telecommunications<br>• Relay | • AMERICA AGENT/ equivalence<br>• #DA/ equivalence<br>• LAW/ equivalence<br>• PRESIDENT/ class membership<br>• TITLE/ equivalence<br>• WORK/ equivalence<br>• PHONE/ class membership<br>• RELAY/ equivalence |

It is important that all three predictions take place during Step 3, as students need to be aware that they are not only looking for a fingerspelled word, but also a type of informative cue that appears near it – possibly a classifier, or an equivalent synonymous sign. If the text is particularly difficult, students can do research as if they are prepping for an interpreting assignment in order to predict other possible fingerspelled words. After the students make their predictions, they interpret the text, and then do an immediate self-analysis for their use of clozure skills and thought processing during the interpretation. The students then compare their predictions with the actual fingerspelled words that occurred in the text. In this way, students can do the "selective comparison" process while interpreting, as they are using their background knowledge to make educated guesses about the text. Again, it is beneficial to ask the students to reinterpret the text to develop self-confidence.

**Conclusion**

As Graves (2006) notes, this type of work requires a substantial amount of preparation by the instructor, as well as reinforcement throughout the curriculum. However, in addition to teaching students to use contextual cues to aid in deciphering fingerspelled words, this technique teaches students to discern signs, use prediction skills, and trust their ability to use clozure skills to understand a message. Students' fears begin to subside as they become more confident in seeing not only the fingerspelled word, but the cues around the word. This technique works well for introducing new vocabulary (non-fingerspelled) words, as well as teaching students how to use context to figure out an unknown sign in context. In addition to being used by interpreter education students, these techniques also have been used by professional interpreters to improve their fingerspelling recognition skills and to earn continuing education units (CEUs) through the Registry of Interpreters for the Deaf (RID) Independent Study Program.

**About the Authors**

Diana Gorman Jamrozik, CI/CT, is an Associate Professor at Columbia College Chicago's ASL-English Interpretation Department. She holds a Master's Degree in Interpretation from Gallaudet University, and is currently pursuing a second Master's Degree in Linguistics from Northeastern Illinois University. Her research interests include fingerspelling recognition and translation processes. Questions or comments about this paper can be addressed to dgorman@colum.edu.

Mary Jo Davidson, with an MS in Human-Computer Interaction from DePaul University, and Ph.D. in Computer Science from DePaul University, is a Lecturer at DePaul University's School of Computing. Her research interests include Human-Computer Interaction (HCI) and instructional development.

John C. McDonald, with a Ph.D. from Northwestern University, is an Associate Professor at DePaul University's School of Computing. His research interests include the mathematical foundations of character rigging and animation, and applications to the graphical display and synthesis of American Sign Language.

After earning a Ph.D. in Computer Science from Indiana University, Rosalee Wolfe was a NASA fellow at the Johnson Space Center, a faculty fellow at Sony Imageworks, and is currently a Professor at DePaul University's School of Computing. She is the team lead for the American Sign Language Project, and her research focuses on developing non-invasive technology to promote Deaf/ hearing communication.

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