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Are You Getting the Message? The Effects of SimCom on the Message Received by Deaf, Hard of Hearing, and Hearing Students

Over the past two hundred years, many approaches have been used to educate deaf students in the United States: the oral method, manually supported speech, sign language, cued speech, and so on.[1] As Lou (1987) explains, starting with the American School for the Deaf in 1817, manual communication was in vogue. However, a conflict between manual communication and methods that focused on the development of students' oral skills began in the late 1800s, when many schools decided to adopt a purely oral approach. Denton (1976) invented a system called Total Communication, which stressed the importance of both oral and manual strategies. In Total Communication, teachers used sign with students who required manual communication and speech with those who needed oral communication. Around the same time, other educators devised artificial systems for manually coding English (SEE1, SEE2, LOVE, Cued Speech), with the goal of making the English language visible to deaf students. Overwhelmed

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by the task of accommodating different communication needs and finding themselves unable to engage everyone at the same time, teachers began blending the manual and oral modes. Total Communication eventually became synonymous with simultaneous communication (SimCom)—the "attempt to produce each word in an utterance in both spoken and manual modes" (Schiavetti and Whitehead 1998, 5). This has also been referred to as "sign supported speech" (Johnson, Liddell, and Erting 1989).

The growth in popularity and the widespread use of SimCom were clearly demonstrated in Woodward and Allen's 1987 survey of almost two thousand teachers of deaf students across the United States. Of this broad sampling, the vast majority reported using voice and signs simultaneously in their classrooms. While researching these communication methods, Allen and Karchmer (1990) have found that 63 percent of teachers (1,277 out of 2,021) employed SimCom in their classrooms. More recent research shows that SimCom is still a predominant communication method in deaf education programs throughout the United States. Of the 582 programs that responded to the 2003 *American Annals of the Deaf* annual survey, 412 (71 percent) stated that they used "sign with speech" (Moores 2003). According to the *2002–2003 Annual Survey of Deaf and Hard-of-Hearing Children and Youth,* the "primary method of teaching" used with 42.9 percent of students is "sign with speech" (Gallaudet Research Institute 2003, 6). In 2007, 657 programs responded to the annual survey conducted by the *American Annals of the Deaf,* in which 78 percent (510) stated that they use "sign and speech (total communication)" (Moores 2007). In 2008, the *American Annals of the Deaf* had 497 responses to their survey and 74% (369) stated they used "sign and speech (total communication)" (Moores 2008).

It is important to note that the signing performed while speaking English is not American Sign Language (ASL), which is a naturally occurring language used within the Deaf community that displays its own grammatical structure separate from those of other languages. "It would be as difficult to sign ASL and speak English at the same time as it would be to speak one language and write another at the same time" (Wilbur and Petersen 1998). The manual component of SimCom includes signs derived from the artificial systems for manually

coding English, as well as some that are borrowed from ASL but produced according to the rules of English word order. "[T]he signs essentially shadow speech and thus become a kind of manual code for the spoken utterance. They are intended only as a representation of the speech, an encoding of spoken English on the hands. Such signing has no independent linguistic status and therefore is not a kind of sign *language*" (Johnson 1983, 49; emphasis added).

Schiavetti and Whitehead (1998, 5) have discussed the advantages and disadvantages of SimCom. Among the disadvantages were "alterations in the linguistic integrity of both manual and oral forms of communication, abbreviations of English in the manual code, deletion of grammatical markers in signs, and slowing of speech." Several studies that have investigated the effects of SimCom on spoken English have focused on fingerspelling (ibid.), preservation of acoustic cues related to place and manner (Kardach et al. 2002), speaking rate and voice onset time (Schiavetti and Whitehead 1996), and the disruption of temporal rules (Whitehead and Schiavetti 1995). A recurrent theme in these investigations is that "the attempt to speak and use manual communication at the same time demonstrates a consistent impact on temporal characteristics of speech, regardless of the type of manual system used in SimCom" (Schiavetti and Whitehead 1998, 14).

Studies have also described the effects of SimCom on manual output. Marmor and Petitto (1979) have reported that the manual component that teachers produced in SimCom was often ungrammatical. The errors, which involved declarative sentences, questions, pronouns, relative clauses, and verb tenses, occurred in these constructions more than 65 percent of the time. Baker (1978) showed that teachers using SimCom were not actually signing everything they vocalized. Comparing two different teachers, she found that their omissions were inconsistent. One teacher tended to omit verbs and subjects, while the other often left out articles, verb-agreement markers, and the word 'to' in infinitives (e.g., the teacher used 'go' rather than 'to go'). Johnson, Liddell, and Erting (1989) compared transcriptions of the spoken English and manual components of SimCom clips and found many misarticulations in the manual component that resulted in the production of signs that did not semantically reflect the English word. Examples included the use of DEVIL and HORSE[2] when the English word spoken

was "bunny." Wilbur and Petersen (1998, 206) found that "function signs—especially the question markers, inflectional markers, past tense sign, articles, auxiliaries, pronouns, adverbs, and conjunctions"—were most likely to be omitted, thereby making the meaning ambiguous. She also found that signs tended to be clipped and run together in order to keep the speech rate more natural.

According to Wilbur and Petersen (ibid., 211), "The major problem . . . is that the linguistic, cognitive, and motoric complexity of simultaneous production of speech and signing is continually underestimated." This leads many teachers who use SimCom to believe that they are expressing equivalent messages both vocally and manually. However, the studies we cited earlier have shown that the English message and the signed message produced during SimCom are not truly equal. To date, no comprehensive study has focused on the correlation between what is actually presented and what is received or understood. The goal of the current study is to ascertain whether a qualitative difference exists in the information that deaf and hearing participants receive when viewing the same SimCom presentation.

Methodology

This study examined the effects of SimCom on the degree of correct information received by d/Deaf, hard of hearing, and hearing participants. Our purpose was to ascertain whether a qualitative difference in the comprehensible input exists, which would then indicate whether all of the participants are receiving equivalent information in the classroom. Previous research on SimCom has demonstrated that the auditory and visual messages *produced* are not equivalent; the current research sought to determine whether the *received* messages are equivalent. Direct feedback from d/Deaf, hard of hearing, and hearing participants was the indicator of message equivalence.

Materials

The first step in our data collection was the selection of video clips. We searched for teachers/professors who used SimCom and were willing to have their class videotaped, and we also looked for publicly available recordings of presenters using SimCom. The Gallaudet TV/AV

department was very helpful in searching its database for potentially appropriate recordings. In the end we found one professor who agreed to have a class videotaped and two recordings that were made at public events at Gallaudet University. All three videos contained basic-level content. From the three videos we chose nine clips, each of which was less than thirty seconds in length and contained specific information expressed in complete sentences. Six of the clips were from the public presentations, and three were from the classroom lecture. All nine clips were converted into DVD files for consistent clarity.

Next we developed questions based on the content of each clip; no standardized measurement tool was utilized to develop the questions. We also created a general comment form on which the participants could indicate how well they understood the messages in the clips.

Finally, we designed demographic information sheets on which the participants self-identified their hearing status; this form also included questions about the participants' educational and family backgrounds and current language preferences.

Participants

Eighty-nine participants were involved in the study: 46 were d/Deaf, 35 hearing, and 8 hard of hearing. Sixty-five were female, and 24 were male. Five identified themselves as African American; 4 as Hispanic; 3 Asian; 1 Middle Eastern; 1 "mix/Indian," and the remaining 75 Caucasian. Ages ranged from 18 to 57, with an average age of 25. Educational levels ranged from freshmen to PhD candidates (see figure 1).

In the data analysis we focused on demographic information related to hearing status. In addition, family background, education, communication experience, and current communication preferences are also important variables. Eighteen of the 46 deaf participants and 3 of the 8 hard of hearing participants indicated that their parents are deaf. The remaining 68 participants stated that their parents are hearing. Thirty-one participants reported that their first language is ASL; 7 reported that their first language is a manual English system; 1 reported Pidgin Signed English (PSE) as first language; 1 reported SimCom as first language; 4 participants chose a combination of ASL/PSE or ASL/SimCom for the first-language question; 1 reported spoken Arabic as first language;

FIGURE 1. Demographics.

	# of Participants	Age	Educational Level	Language Preference in the Classroom					
				ASL	Spoken English	SimCom	PSE	Manual English	Combination
Deaf	46	18–49	freshman–graduate	39	0	1	1	0	3
Hard of hearing	8	18–23	sophomore–senior	6	0	0	1	0	1
Hearing	35	21–57	freshman–PhD candidate	22	2	1	2	1	4

1 wrote in a question mark, and the remaining 43 reported spoken English as their first language.

The participants' use of ASL in educational settings generally increased as they grew older; only 19 participants reported using ASL in elementary school, 18 in middle school, and 32 in high school. Of the 46 deaf participants, 39 stated that they currently prefer to use ASL in the classroom, 1 indicated a preference for PSE, 1 indicated a preference for SimCom, 3 did not indicate a preference, and 3 replied that they prefer a combination of ASL and PSE in the classroom. Of the 8 hard of hearing participants, 6 currently prefer ASL in the classroom, 1 prefers PSE, and 1 prefers ASL and PSE. Of the 35 hearing participants, 22 prefer only ASL in the classroom, 1 prefers manually coded English, 2 prefer PSE, 2 prefer spoken English, 1 prefers SimCom, 1 prefers the combination of spoken English and SimCom, 1 prefers the combination of ASL and SimCom, and 1 prefers the combination of ASL and spoken English in the classroom. Forty-seven of the participants reported that SimCom is used in their classes at Gallaudet, mostly by teachers but also by some students, guest speakers, interpreters, and teaching assistants.

Procedure

The survey was burned to a DVD and presented in PowerPoint format using written English and video clips. The first two slides informed the participants that they were taking part in a communication study, that they would receive no direct benefit from their involvement, and that the study, which showed the names of the primary researchers, was approved by the Gallaudet University Institutional Review Board. The next slide consisted of instructions. The remaining slides contained embedded video clips and corresponding questions.

To ensure that our research was double blind, we employed two research assistants, one of whom was responsible for data collection, and the other for data scoring.[3] The assistant who collected the data was not aware of the purpose of our research and did not have access to the answers to the video clip questions. The assistant who scored the data also had no knowledge of the objective of our research, never saw the survey, and did not know the video clip questions.

The assistant who collected the data visited fourteen classes at Gallaudet University. This assistant had the participants take a number, which served as an ID for collating their demographic questionnaires, answer sheets, and self-comprehension forms. After running the survey, the assistant asked the participants to fill out the demographic questionnaire. For consistency, the introduction and the instructions for the survey were in written English on the PowerPoint DVD.

The assistant allowed time for the participants to read each slide of the introduction and instructions. Before the start of each clip the assistant made sure that the participants' attention was focused on the screen. After all of the clips had been viewed and the questions answered, the assistant collected the answer sheets and passed out the self-comprehension survey.

All of the questionnaires were given to the second research assistant to score and record. The second assistant was instructed to grade strictly according to the answer key. Once the papers had been graded, the responses were categorized based on the participants' hearing status, and average accuracy percentages were calculated for each group (d/Deaf, hard of hearing, and hearing). These percentages were then compared in order to determine whether the messages received by the d/Deaf participants, the hard of hearing participants, and the hearing participants were equivalent.

Results

The following results were compiled from the responses to the questions about each video clip; the survey questions are listed in appendix A. Questions 1a–3b were from a U.S. history course. Questions 4 and 5 were from a deaf education conference, and the remaining questions, 6–9b, were taken from public events. The questions referred to specific information given in the video clips, with consideration as to whether that information was presented orally, manually, or both. Questions 1b, 2a, 5, 9a, and 9b asked for the names of specific people or locations or for concepts that the speaker had mentioned orally and also fingerspelled. Questions 7a and 7b asked for numbers, which the presenter had produced both orally and manually. Questions 1a, 2b, 3a, 3b, 4, 6a, 6b, and 8 asked about points made both manually and orally,

although the manual component did not have the grammatical and prosodic markings that would be used in an ASL message. The errors in the manual and oral components are reflective of those found in previously mentioned research.

Figure 2 breaks down the correct answers and percentages of the deaf, hard of hearing, and hearing groups per question.

Figure 3 shows the average percentage of accuracy for each question for the hearing participants and for the d/Deaf and hard of hearing participants combined. Figure 3 illustrates this same information graphically.

The percentages calculated in figures 2 and 3 indicate a difference in comprehension among the three groups. When the groups are compared (figure 4), the differences in comprehension based on hearing status become even more apparent. For the hearing group, the number of correct answers is 45.12 percent greater than for the hard of hearing group and 46.17 percent greater than for the d/Deaf group.

For all fifteen questions, the hearing participants scored higher than the d/Deaf and hard of hearing participants. The hearing group scored 52 percent higher than the d/Deaf and hard of hearing group on question 1a, 68 percent higher on question 1b, 49 percent higher on question 2a, 36 percent higher on 2b, 38 percent higher on 3a, 29 percent higher on question 3b, 62 percent higher on question 4, 53 percent higher on question 5, 32 percent higher on question 6a, 22 percent higher on question 6b, only 2 percent higher on question 7a, 36 percent higher on question 7b, 64 percent higher on question 8, 79 percent higher on question 9a, and 69 percent higher on question 9b.

Responses on five of the questions (2b, 4, 6a, 6b, 7a) resulted in less than 70 percent accuracy for all groups. We wondered about the reason for this and whether these five questions were strongly impacting the overall results; therefore, we removed those five questions and calculated the results anew. Removal of those five questions had only a minor impact overall. The hearing group's average percentage of accuracy increased by 9.71 percent for a new total of 84 percent. The d/Deaf group's average percentage of accuracy increased 1.23 percent for a new total of 29.33 percent. The hard of hearing group's average percentage of accuracy increased by 7.08 percent for a new total of 36.25 percent. As figure 5 illustrates, the hearing group's percentage

Figure 2. Correct answers and correct percentages by question.

		QUESTIONS															
		1a	1b	2a	2b	3a	3b	4	5	6a	6b	7a	7b	8	9a	9b
DEAF	Number Correct	19	11	10	15	24	21	2	17	1	12	29	20	3	1	9
	Percent Correct	41%	24%	22%	33%	52%	46%	4%	37%	2%	26%	63%	43%	7%	2%	20%
HARD OF HEARING	Number Correct	4	5	2	1	5	5	0	4	0	1	4	2	1	1	0
	Percent Correct	50%	63%	25%	13%	63%	63%	0%	50%	0%	13%	50%	25%	13%	13%	0%
HEARING	Number Correct	33	34	24	23	32	27	23	31	12	16	21	27	25	29	30
	Percent Correct	94%	97%	69%	66%	91%	77%	66%	89%	34%	46%	60%	77%	71%	83%	86%