DEAF CHILDREN CREATING WRITTEN TEXTS: CONTRIBUTIONS OF AMERICAN SIGN LANGUAGE AND SIGNED FORMS OF ENGLISH

The objectives of this descriptive study were to investigate the ways in which American Sign Language (ASL) and English-based sign allow for comprehension of text content, and to determine how these two avenues of communication might mediate the process of reconstructing "signed meaning" in a written text. The authors argue that comprehensible input in a visual mode is possible in either ASL or English-based sign. They further claim that English-based signing may be an effective means of bridging the gap between inner speech and written text.

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Background

For most deaf students, achieving a high level of English literacy is a challenging endeavor. It is often reported in the literature that, on average, deaf students graduating from high school are not functioning much beyond a fourth-grade level in English (Paul & Quigley, 1990). Educators and researchers continue to grapple with how best to address this unacceptable situation. In recent years, there has been a move in the field toward the adoption of bilingual-bicultural models of education for the Deaf. Many proponents of this approach are firm in their belief that, if American Sign Language (ASL) is well established as the L1, or primary language, then English literacy can be achieved by means of reading and writing without exposure to English in its primary form through speech or English-based sign (Hoffmeister, 1990; Israelite, Ewoldt, & Hoffmeister, 1992; Livingston, 1997; Mashie, 1995). Research to investigate whether this is the case has not yet been widely reported (although see Strong & Prinz, 1997).

The difficulties deaf children have with writing, however, are well documented, and

> evidence suggests that the problems deaf children face in mastering written English are more formidable than those they face in developing reading skills. A deaf person can resort to compensatory strategies to understand a message when grammar and vocabulary skills are limited. It is much more difficult to express oneself clearly in writing in the face of such limitations (Moores, 1987, p. 281).

Paul and Quigley (1990) point out that most deaf students have not developed an internal representation of English and cannot express their thoughts in English in a primary mode such as speech or sign. It could be argued, therefore, that it is highly unlikely that they will be able to express themselves adequately in writing. (For a detailed discussion of this point see Mayer and Wells, 1996.)

In the past, research tended to focus primarily on the written product of deaf writers (see Kretschmer & Kretschmer, 1978; Quigley & Paul, 1984), but more recently attention has turned to the processes deaf students employ when they compose (Ewoldt, 1985; Kelly, 1990, 1995; Kretschmer & Kretschmer, 1986; Mayer, 1998, 1999; Truax, 1985). From our perspective, one aspect of such investigations would be a consideration of the relationship between signed production and written language and the nature of the "inner language" deaf children use as they engage in the act of writing.

To address these concerns, we would argue that within an expanded bilingual-bicultural model (Mayer & Akamatsu, 1999), there is a role for English-based sign, in addition to those played by ASL and English in print. The key function of this signed form of English would be to serve as a model for English text, rather than as the primary language for face-to-face communication. Further, this "through the air" English might provide a basis for developing a form of inner speech[1] that would support the development of higher levels of English literacy, which elude so many deaf students (Paul, 1992).

It is also critical to point out that this English-based sign would espouse the documented characteristics of effective simultaneous communication (Akamatsu & Stewart, 1992; Hyde & Power, 1991; Stewart, Akamatsu, & Bonkowski, 1990), and that, in particular, it would take into account and accommodate the visual, three-dimensional nature of signed lan-

guage. In addition, such a form of simultaneous communication, which represents spatially what is presented in speech linearly, would not detract from intended meaning (Maxwell & Bernstein, 1985; Newell, Stinson, Castle, Mallery-Ruganis, & Holcomb, 1990).

In the present, descriptive study, we aim to develop knowledge as it relates to how deaf children tackle the problem of composing English text, and to investigate the ways in which two forms of signed language (ASL and English-based sign) allow for comprehension of content, and mediate the process of reconstructing signed meaning in a written text.

Method

Participants
The present study involved three children in grades 7 and 8: one deaf child of deaf parents (called PMDP) and two deaf children of hearing parents (called JRHP and RMHP). These students were enrolled at an inner-city school for the Deaf where both ASL and English (in sign and in print) were used as languages of instruction.

JRHP was a 12-year-old, profoundly deaf girl who was introduced to sign language when she entered the school kindergarten program at 4 years of age. The language of her home was English and her family used a combination of speech and English sign to communicate with her. RMHP was also 12 years old, and profoundly deaf. He was signing fluently before he entered the kindergarten program at the school at the age of 4 years. His parents could sign in both ASL and English, but had decided to stress English sign to support their son's reading and writing development. PMDP was a profoundly deaf, 14-year-old boy who had been born in Czechoslovakia. He entered his school program at the late primary level when he was 8 years of age. His first language was Czech Sign

Language, but since coming to Canada, he had become bilingually fluent in ASL. The language used in his home was a combination of Czech Sign Language and American Sign Language.

Materials
For the present study, signed videotapes were made of two different English texts of comparable length and similar genre. The text genre chosen was that of the fable (Andrews, Winograd, & DeVille, 1996; Paris & Tracy, 1984). Although the students had done classroom study of fable structure (narratives with a moral) and elements (e.g., personification), there were still many specific fable texts with which they were unfamiliar.

Both fables used in the present study were of comparable length and complexity in their written English forms. One fable was translated into ASL and recorded on videotape by a deaf native signer who was bilingually fluent in ASL and English. The other fable was translated into a modified form of signed English (Stewart, Akamatsu, Hunter, Krugh, & Ng, 1989) by a hearing interpreter who was bilingually fluent in ASL and the modified form of signed English. This, too, was videotaped.

Procedures
Over the course of two sessions, students watched each of the videotapes (the ASL version at one session and the English version at the other). They then produced a written version of the text they had viewed. Students were allowed to re-view the videotape while they were in the process of revising and editing their written work. Finally, the students were interviewed about their perceptions of the text generation process and the comprehensibility of the two signed texts that had been presented. They were asked the following questions: (a) Was the

task "hard" or "easy"? (b) Did you understand the signed stories? (c) Did you understand the moral? (d) Was one of the stories harder to understand than the other? (e) How do you know what to write in English? As well, students were asked directly to explain various lexical choices and revisions they had made, or were observed to have made, while they were writing.

Analysis

The data that were collected consisted of the students' written versions of the two texts (see Appendix 1) and their responses to the interview questions. We used four frameworks in scoring the written texts: *retelling/comprehension, propositions, lexical and grammatical analysis,* and *feature analysis.*

Retelling/Comprehension

So that we could evaluate the level of comprehension and the ability to retell the fable in writing, we used scoring criteria from the Toronto Board of Education Benchmarks (1989). Specifically, Language Grade 6—Benchmark 13 was used. The Benchmarks employ a holistic scoring criteria which evaluates performance over a range from levels 1 through 5, with 5 representing the most highly developed level of performance.

Propositions

Each signed fable was analyzed with respect to the number of propositions presented in the text. For our purposes, a *proposition* consisted of a verb and its arguments. Because the signed fables were of slightly differing lengths, the proposition scores are given as percentages reflecting the ratio of propositions represented in the students' texts to the total number presented in the signed stimulus.

Lexical and Grammatical Analysis

Each text was scored for lexical and grammatical errors using a modification of a scoring system developed by Crandall (1978). This system classifies errors according to the degree to which they affect a reader's ability to comprehend a text.

Feature Analysis

Feature Analysis of Students Writing: Narration (Kelley, 1992, p. 87) was used for feature analysis. This tool assesses four areas of writing: content, linguistic considerations, mechanics, and sentence structure.

Results

Student texts were scored collaboratively by the research team on the basis of the four frameworks.

Retelling/Comprehension Scores

The students' retelling/comprehension scores reflect an adequate understanding of the signed texts in both languages. JRHP, who had little difficulty retelling either of the signed texts, scored 4's on the 5-point scale in both ASL and English. RMHP's ASL score was 4 and his English score was 3. His retelling of the English text was hampered by a misunderstanding of two signs that have differing meanings in the American and Canadian contexts. PMDP's retelling was quite accurate, but his written English was not commensurate with his understanding. His ASL score was 3 and his English score was 4.

Propositions

JRHP encoded an almost equal proportion of the signed propositions from each of the fables: 61% ASL and 60% English. RMHP encoded roughly equal proportions of the signed propositions (39% ASL and 42% English), but added several lines of dia-

logue on his own. Although they made the story more interesting, he did not receive credit for these additions. PMDP encoded a far larger proportion of propositions presented in English (49%) than in ASL (26%) in his writing. This is interesting because the ASL-signed text actually had more propositions than the English-signed text. PMDP's written retelling of the English text was actually longer than his retelling of the ASL text.

Lexical and Grammatical Analysis

All three students made numerous errors of verb inflection and usually omitted articles. Although JRHP's scores on grammaticality were similar regardless of the language of the signed stimulus (7.5 ASL and 7.9 English, lexical and grammatical scores for the entire text), she scored slightly higher when the text was presented in English. Her English-based text was also slightly easier to read, as suggested by the error profile (see Table 1).

RMHP scored slightly higher when the stimulus text was ASL (8.1, as opposed to 7.5 for English). As already noted, his English comprehension was hampered by lexical misunderstanding, and therefore his retelling was similarly affected. He made more errors of derivational morphology when the original signed text was ASL, but more errors of free morphology (functors, prepositions, etc.) when the original text was in English.

Like RMHP, PMDP scored slightly higher when the original signed text was in ASL (5.3, vs. 4.9 for English). Although his error profile reflects a similar distribution of errors (see Table 1), it is interesting to note that his writing based on the ASL text contained errors of omission of main nouns and verbs, whereas his writing based on the English text contained errors of word order.

Table 1
Lexical and Grammatical Analysis, Error Profiles by Language of Signed Stimulus

	ASL original		
	JRHP	RMHP	PMDP
Error type			
Main noun/verb; word order	1	0	3
Lexical choice	1	0	3
Free morphology; prepositions	3	0	8
Derivational morphology	2	7	2
Inflectional morphology; articles	6	14	32
Spelling, punctuation	2	7	2

	English original		
	JRHP	RMHP	PMDP
Error type			
Main noun/verb; word order	0	0	4
Lexical choice	1	1	5
Free morphology; prepositions	2	3	6
Derivational morphology	0	0	3
Inflectional morphology; articles	10	14	32
Spelling, punctuation	1	12	5

Feature Analysis

Results of the feature analysis are presented in Table 2. As mentioned previously, the feature analysis checklist takes into account four aspects of a written text: content, linguistic considerations, mechanics, and sentence structure. Each area is given a score from 1 to 5 based on the descriptors provided in the checklist. The content area is considered the most important and is weighted more heavily than the other three areas.

The results in Table 2 are consistent with the preceding three analyses. All three students were able to write enough English to convey the content of the stories. However, JRHP and PMDP appear to have benefited from having the content signed in English for the purposes of later expressing themselves in writing. It is clear that JRHP was quite competent in both the mechanics and the linguistic structure of English. Her writing reflected a greater ease of movement from English signing to English writing. RMHP needed much work on his mechanics of written English. PMDP's English knowledge was still limited, but he could write enough English to get his ideas across. A reader familiar with ASL might be better able to comprehend his writing than one who was unfamiliar with ASL.

Interviews

All three students wrote their texts quickly and confidently; indeed, RMHP and PMDP reported that they found the writing task "easy." JRHP said that it was "in the middle" in terms of difficulty. All three students reported that they had no difficulty understanding either of the signed stories, although they commented that the signing in the second story was "fast," and PMDP said that the second story was "a little bit harder to understand." JRHP and RMHP both were able to articulate the moral of the story, while PMDP was unclear as to the moral or lesson presented in either of the fables.

The three students gave differing

Table 2
Feature Analysis Scores

	JRHP	RMHP	PMDP
ASL content	18	24	18
ASL linguistics	8	8	4
ASL mechanisms	10	4	8
ASL sentence structure	6	6	2
English content	24	18	24
English linguistics	8	8	4
English mechanics	10	4	8
English sentence structure	6	6	2

Notes. Content maximum = 30; linguistic considerations maximum = 10; mechanics maximum = 10; sentence structure maximum = 10. *ASL* (American Sign Language) and *English* refer to the original signed stimulus.

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answers to the question about how they knew what to write in English. JRHP reported that when she was composing English text, she was "talking in her mind" and that she was thinking about the "speech." She went on to say that she had to plan it in order, make it exact, and write "to match the signs in the row." If she saw ASL, she said that she had to think it in English to write it down. If she wrote it in ASL, then she needed to change it to English. RMHP explained that he thought in linear signed "chunks." PMDP said that after he viewed the videotape he imagined a series of pictures (not signs) in his mind, and then he tried to match English to the pictures. He added that this was hard to do.

JRHP expressed concern about the correctness of the pronouns in her writing. In the second fable she chose to give the characters names, rather than deal with the pronoun problem. She also articulated rules for the use of articles, which resulted in her making flawed revisions to her text. She incorrectly changed *the* to *a* in the sixth sentence of the second fable and continued to use *a* throughout the remainder of the text. When asked why she used words like *hey* in her writing, she explained that she learned many new words from watching closed captions on television. She was also aware that her phrase *stone wall* was not a correct gloss for *well*, but she said she did not know the correct English word or English sign for the item. It became evident, from what she reported and the substantial number of revisions she made as she wrote, that this student had a strong awareness and sense of English correctness.

RMHP often signed and fingerspelled to himself as he wrote and, when questioned, said that he was "trying to sign what LA [the deaf teacher in the video] signed." After writing the words *big hole* to mean the well in the first fable, he signed, "I know it's not a hole but I had to think

of a substitute word." In his first fable, he wrote "How did you come to fall in?" Since this was an unusual construction, he was asked to explain it. He signed "How come to fall?" and continued to write, "I didn't come to fall in! I came here for walking in the froset [sic]." It was clear that he was using his signs to create the English text and inadvertently stumbled upon a correct and sophisticated construction. It was also clear from what he signed and what he subsequently wrote that he did not actually understand the less common meaning for the word *come.*

The comprehension errors RMHP made in the second fable were also the result of his close attention to the signed prompt. He was not familiar with the American (as opposed to Canadian) signs used for *pretend* and *fooled;* therefore he glossed them as *mouse* and *hit.* In his writing, he tried to make these interpretations fit into the meaning of his text as a whole. RMHP also mouthed while he was writing and used this as a strategy for figuring out the spelling of words and making decisions about English word order. RMHP also used many natural English expressions such as *Ha!; Yuk!; Hey, what's up?;* and *Humph!* He attributed his knowledge of these expressions to the Archie comic books, which were his favorite reading material at the time.

PMDP was the only student to request English translations for signs (e.g., *finally* and *suddenly*) presented in the videos. When asked about his use of the word *reek* in the second fable, he said it meant *smell* and that it was a good English word. His teacher later reported that this vocabulary item had recently been discussed in class. PMDP completed the writing in the shortest amount of time, paused infrequently, and did not reread his text as he wrote. When asked why he wrote more for the second fable, he reported that this was because it had more explanation, and that, because there

were more signs, he needed to write more. The first story, he said, had less description, so it was shorter. It appeared that PMDP, although he understood both fables, had fewer English resources to draw upon when it came to the task of creating written texts for the signed videos. This made the task, as PMDP himself reported, difficult.

Discussion and Implications
Our objectives for the present study were to investigate the ways in which two forms of signed language (ASL and English-based sign) allow for comprehension of content, and to determine how they might mediate the process of reconstructing signed meaning in a written text. The study represents one aspect of a larger study concerned with the composing processes of the deaf student writer. As such, it is still very much a work in progress. Nevertheless, as a result of our investigations, we are able to make some preliminary observations with respect to the stated objectives.

Comprehension of Signed Texts
Results obtained from the retelling, proposition, and feature analysis scores, and from the interviews, all point to the conclusion that all three students understood the fable texts whether they were presented in ASL or English-based sign. These results provide additional support for the argument that comprehensible input in a visual modality is possible in either ASL or English-based sign (Akamatsu & Stewart, 1998; Hyde & Power, 1991; Maxwell & Bernstein, 1985; Newell et al., 1990; Stewart et al., 1989). The minor confusion RMHP experienced on several occasions was a result of misunderstanding specific lexical items, not misunderstanding the language as a whole. And although PMDP did not articulate the moral of either fable, we speculate that he had not yet developed a full understanding

of this genre, and that this accounts for this omission. Further, we would suggest that major pedagogical implications follow from our contention that both ASL and English-based sign afford comprehensible input, as in our view both could be seen as viable and effective for the development of cognition and concepts (Fischer, 1998).

The Composing Process: The Written Product

Having considered both the written products and what the students reported as their writing processes, we felt that it was evident that students who can already write in English are thinking in English (in speech or sign) as they do so, and that consequently it could be argued that English-based signing is an efficient tool for bridging between inner speech and writing. The one student whose English literacy was at an earlier stage of development did not report using any English in his intramental processes. Rather, he relied heavily on the support provided by the English-based signs presented in the video to express himself in English.

Mayer and Wells (1996) argue that becoming literate involves mastering three modes of language use: social speech, inner speech, and written text. For the hearing learner of a written language (L1), all three modes employ the same underlying language code, and the connections between them can be made via the bridge of spoken language. If this person joins a new community that has a written language, the process of becoming literate in the L2, according to the linguistic interdependence model (Cummins, 1989) is supported by two bridges: the spoken form of the L2, once some fluency in the spoken mode of L2 is gained, and the written form of the L1 (see Figure 1).

Mayer and Wells (1996) go on to argue that in the case of the profoundly deaf learner of English, these bridges are not available, and thus a double discontinuity exists. Since ASL has no written form, deaf students cannot acquire literacy skills in it to transfer to the written form of an L2. Further, since most deaf learners are not able to access the auditory-oral channel, they are deprived of the support that hearing learners of the written mode of an L2 receive from the growing mastery of its spoken form. Implications of this double discontinuity are presented in Figure 2 below.

Based on the aforementioned argument, Figures 3 and 4 reflect predictions about the literacy acquisition of
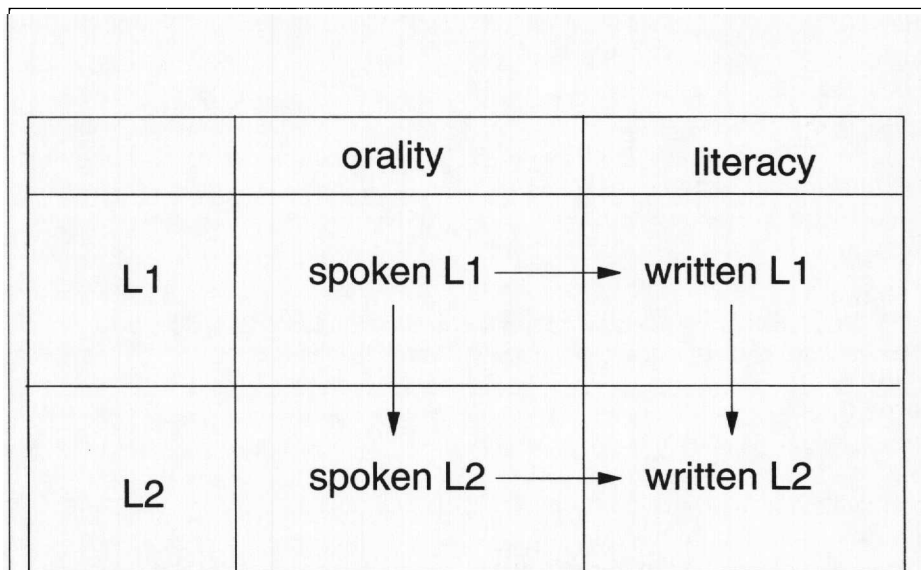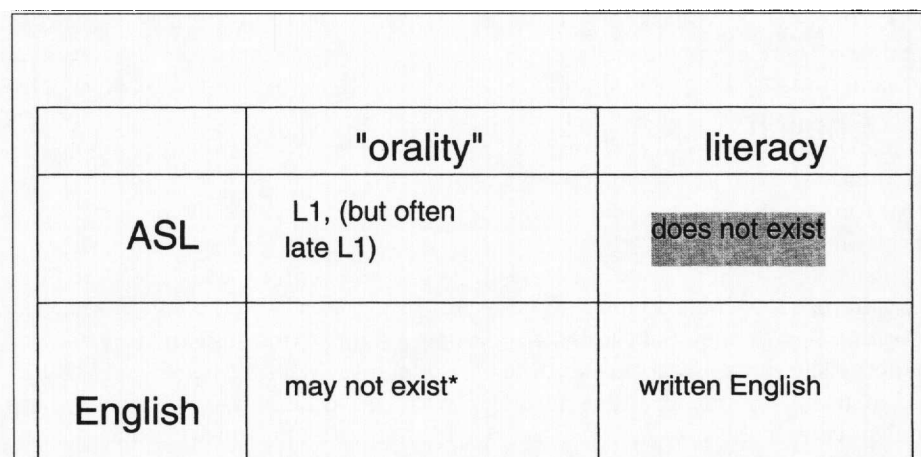
	orality	literacy
L1	spoken L1 ——→	written L1
L2	spoken L2 ——→	written L2

Figure 1
Paths to Literacy in L2, According to the L1 Model

	"orality"	literacy
ASL	L1, (but often late L1)	does not exist
English	may not exist*	written English

*Spoken English is highly dependent on hearing ability. Hard of hearing individuals who develop spoken English likely develop English literacy by the same mechanisms as (although with greater difficulty than) normally hearing people.

Figure 2
The "Double Discontinuity" Model

Figure 3

	"orality"	literacy
English	signed English = L1 ⟶	written English = Lit 1
ASL	↓ L2	does not exist

Figure 3
One Prediction About Literacy Acquisition in Deaf Students, Based on Implications of the "Double Discontinuity" Model

	"orality"	literacy
ASL	(possibly late) L1	does not exist
English	↓ signed English = L2 ⟶	written English = Lit 2

Figure 4
Another Prediction About Literacy Acquisition in Deaf Students, Based on Implications of the "Double Discontinuity" Model

deaf students depending on whether the L1 is English-based sign (Figure 3) or ASL (Figure 4).

It could be contended that JRHP and RMHP were following the literacy path outlined in Figure 3, while PMDP's development is best described by considering Figure 4. The obvious question arising from this description is whether one path has any inherent advantage or benefit over the other. Based on the results of the present study, two claims could be made: first, that either ASL or English-based sign is effective in transmitting concepts and content, and second, that students who are more proficient English writers (as shown by the evaluations of their written texts) think in English as they write.

Conclusion

If English-based sign can be used to communicate readily and effectively, and if some internal model of English is necessary to engage successfully in the composing process, then it could be contended that, especially for deaf children of hearing parents, English-based sign would be an appropriate choice for developing an L1.[2] Thoughtful discussion with respect to this premise would have timely and important repercussions with respect to current pedagogical models of deaf education. We are aware that the issues raised and questions asked will inevitably invite much feedback, comment, and debate. The ensuing dialogue can only serve to enhance and sharpen the final reporting of the present study, and other related research.

Notes

1. Vygotsky's notion of *inner speech* is an abstract internal representation used for verbal thinking that is not tied to a particular modality, but which for hearing people has its origins in spoken language. For some deaf people, this might well be represented by a visual-spatial means with origins in signed language. It is as an intermediary between one's internal verbal thinking and the externalizing of the process through writing (Mayer & Wells, 1996) that the term is called into play.

2. This suggestion in no way precludes the child's acquisition of ASL, either as a simultaneous L1 or as an L2.

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