Directionality in ASL-English interpreting

Accuracy and articulation quality in L1 and L2

Brenda Nicodemus and Karen Emmorey
Gallaudet University / San Diego State University

Among spoken language interpreters, a long-standing question regarding directionality is whether interpretations are better when working into one's native language (L1) or into one's 'active' non-native language (L2). In contrast to studies that support working into L1, signed language interpreters report a preference for working into L2. Accordingly, we investigated whether signed language interpreters actually perform better when interpreting into their L2 (American Sign Language, ASL) or into their L1 (English). Interpretations by 30 interpreters (15 novice, 15 expert), delivered under experimental conditions, were assessed on accuracy (semantic content) and articulation quality (flow, speed, and prosody). For both measures, novices scored significantly better when interpreting into English (L1); experts were equally accurate, and showed similar articulation quality, in both directions. The results for the novice interpreters support the hypothesis that the difficulty of L2 production drives interpreting performance in relation to directionality. Findings also indicate a disconnect between direction preference and interpreting performance. Novices' perception of their ASL production ability may be distorted because they can default to fingerspelling and transcoding. Weakness in self-monitoring of signing may also lead novices to overrate their ASL skills. Interpreter educators should stress misperceptions of signing proficiency that arise from available, but inappropriate, strategies.

Keywords: directionality, American Sign Language, accuracy, articulation quality

1 Introduction

A number of linguistic, cognitive, and social factors can influence the success — or failure — of an interpretation (Gile 2005; Marmaridou 1996; Martin 2005). One factor debated among professional interpreters is the influence of *directionality*; that is, whether interpretations are of better quality when performed into the

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native language (L1, commonly referred to as the 'A' language) or into a second, non-dominant language (L2, or 'B' language)[1]. Some argue that performance in relation to directionality is determined by an interpreter's degree of fluency in each of the languages concerned, or by language-specific features (Gile 2009: 197–199). A factor less often considered is the *modality* of the languages involved in the interpretation. Spoken language interpreters work between languages that are produced and perceived in the same modality; they use the vocal tract for articulation and the auditory system for perception. In contrast, signed language interpreters work between languages that are produced and perceived in different modalities — a spoken language and a signed language, which uses the hands, face, and body as articulators and is perceived through the visual system (Valli & Lucas 1992). Does language modality influence the effectiveness of a given direction in signed language interpreting and, if so, what may drive such an effect?

Spoken and signed language interpreters share the same fundamental goal of ensuring correspondence between message content in the source and target languages (Christoffels & de Groot 2005: 454; Janzen 2005: 8). However, there is debate among interpreters on how directionality impacts the accuracy and quality of their work. Among spoken language interpreters, many (but not all) practitioners maintain a bias for working from their L2 into their L1. This predisposition may be encouraged by interpreter trainers who argue that interpreters can create linguistically and culturally appropriate messages only when working into their native language (Déjean le Féal 2003; Donovan 2003, 2005; Seleskovitch 1978, 1999). Although this bias for interpreting into the native language often permeates interpreter education programs, many interpreters nonetheless work into their B language (L2) for economic and practical reasons. While some studies support the superiority of interpreting into L1, results have not been conclusive and suggest that other factors may affect the quality of interpretation.

Using a questionnaire-based survey, Bartłomiejczyk (2004) investigated student and professional interpreters' perceptions of their performance when interpreting simultaneously into their A language vs. B language. The professional interpreters generally perceived that they performed better when working into their native (A) language; on the other hand, only half of the student interpreters held that perception and 26% of them actually reported that their interpretations were better when working into their non-native (B) language.

1. Here we use the terms *native language* and *L1* to mean the language that an individual acquired at birth (or in early childhood), and which is regarded as the dominant language. The terms *non-native*, *secondary*, and *L2* refer to a language that is not the mother tongue of the interpreter, and is not dominant in relation to the L1 (but which may be considered as an 'active' language for the interpreter).

A later study by Bartłomiejczyk (2006) examined strategies used by 36 advanced interpreting students when working in two directions: from English (B) into Polish (A), and vice versa. Bartłomiejczyk analyzed retrospective remarks provided by the participants after they had listened again to the source texts and their interpretations. The results suggest that strategic processing differed considerably when interpreting into Polish and into English. Bartłomiejczyk attributed the differences primarily to directionality, but also noted how language-pair specificity may have played a role in the outcomes.

In a related study, Chang and Schallert (2007) addressed strategies in simultaneous interpreting by examining retrospective interview comments made by ten professional Chinese-English interpreters after interpreting two speeches from English into Mandarin and two speeches from Mandarin into English. The results indicated that professional interpreters who regularly work in both language directions develop different strategic approaches to cope with the different demands of A-to-B vs. B-to-A interpreting. These differences were attributed to the asymmetry between their A- and B-language proficiency. Other factors included their awareness of the limits of their language proficiency, their expectations regarding audience needs, and other norms they believed applied to their performance.

To examine the impact of working into a B language, Donovan (2004) conducted a survey of conference delegates and interpreters (French-English) at some 30 conferences in Paris (from 2001–2002), to ascertain both delegates' and interpreters' attitudes toward interpreting into B. The findings revealed that the conference delegates did not regard directionality as an issue for quality of interpretation; however, the interpreters reported a reluctance to accept working into their B language, even calling it "a necessary evil in a given market situation" (p. 206). In this respect, the interpreters reported that they felt less secure when working into B, and that self-monitoring was harder. They also reported problems when switching to an "unexpected conceptual area" (e.g. jokes, anecdotes), and commented that gauging register correctly was more difficult when working into B.

An experimental study by Darò, Lambert and Fabbro (1996) raised the question of whether conscious monitoring of attention affected the number and the type of mistakes made by simultaneous interpreters in different situations and language directions. The results indicated that the overall error count was influenced by the direction of interpretation and that one class of mistakes (i.e. those leading to loss of information) occurred more often during active interpreting (from L1 into L2) of difficult texts.

Research on second language acquisition and bilingualism has lent support to the frequently reported preference for interpreting from L2 into L1 among spoken language interpreters. For example, in terms of lexical processing, word-for-word translation from L1 into L2 was found to be slower than from L2 into L1 (de Bot

2000), a phenomenon referred to as "translation asymmetry" by Kroll and Stewart (1994). Further, syntactic production has proved to be less automatic in L2 and, in many cases, to require greater conscious monitoring (Ullman 2001). Evidence of this kind, indicating greater demands for cognitive resources when interpreting into L2, has been used to justify the practice in many interpreting organizations of having interpreters work only into their native language (Schweda Nicholson 1992), and has led to the claim that interpreting into one's L2 both requires more effort and produces poorer results (Seleskovitch 1999).

In contrast to these studies, some spoken language interpreters have argued for the benefits of working into L2. For example, Denissenko (1989) maintained that comprehension of the source language is the most critical aspect for successful interpretation, because errors in language production can be repaired but gaps in source language comprehension may not even be recognized. Given that comprehension of the source message during interpreting will tend to be easier when the source language is the dominant language (L1), Denissenko suggests that L1 into L2 interpreting will result in interpretations of higher quality.

A small-scale study by Tommola and Helevä (1998) investigated the propositional accuracy of interpretations from English into Finnish and from Finnish into English, produced by student interpreters whose A language was Finnish. Although no significant difference in propositional accuracy related to language direction was observed for simple texts, A-B interpretations of complex texts were judged to be more accurate. The results, which are in direct contrast to the findings of Darò, Lambert and Fabbro (1996), provide some support for Denissenko's (1989) views. Thus, it may be argued that interpreters who listen to the source text in L2 face a greater challenge to comprehension and that this, in turn, affects their production of the target text, even when working into L1. Comprehension difficulties in such cases may, of course, reflect gaps in an interpreter's linguistic and cultural knowledge of L2.

Where do signed language interpreters stand on the issue of directionality? Anecdotally, they often express a strong preference for interpreting into L2, when it is a signed language. This preference has been reported in various language pairs, including American Sign Language (ASL)-English (Nicodemus 2008), Sign Language of the Netherlands-Dutch (Crasborn 2006; van den Bogaerde 2010), and Australian Sign Language-English (Napier et al. 2005). Recently, Nicodemus and Emmorey (2013) conducted a large survey ($N = 1{,}359$) to investigate both spoken and signed language interpreters' preferences for interpreting direction. The results supported the traditional bias of spoken language interpreters for working into their L1 and, for the first time, confirmed that the majority (82%) of the signed language interpreters preferred working into their L2 (in contrast to 28% of the spoken language interpreters). Further, the signed language interpreters rated

themselves as more proficient when working into their L2 — in this case, ASL. Notably, the preference of signed language interpreters for working into their L2 was stronger among novice than expert interpreters (88% of novices vs. 72% of experts). In contrast, novice and expert spoken language interpreters did not differ from each other with respect to their preferred language direction, with both groups expressing an equal preference for working into L1.

Although Nicodemus and Emmorey (2013) found that novice ASL-English interpreters expressed a strong preference for interpreting into their L2 (ASL), it remained unclear whether novice (or expert) interpreters actually work better in this direction than into English (their L1). In the present study, we set out to investigate for the first time whether this general preference for interpreting into ASL is reflected in interpreting performance. Specifically, we focus on the accuracy and articulation quality of interpretations by novice and expert ASL-English interpreters when working in both language directions.

One hypothesis is that interpreting performance is aligned with direction preference, which predicts that signed language interpreters will render superior interpretations when working into their L2. As stated earlier, it has been argued that some spoken language interpreters perform better when working into L2 because the source speech is better understood in L1, and the interpreter is thus in a better position to reformulate content in L2 (Denissenko 1989; Williams 1995). Support for extending this hypothesis to signed language interpreters comes from a study by van Dijk, Boers, Christoffels and Hermans (2011), who found that these interpreters produced more accurate propositions and higher quality interpretations when working from L1 (spoken Dutch) into L2 (Sign Language of the Netherlands).

On the other hand, it is possible that signed language interpreters may show the same trend as most spoken language interpreters and work more effectively into L1. Such a finding would support the hypothesis that interpreters meet the high cognitive demands of language production best when working into their native language. Evidence that language production involves higher cognitive and linguistic demands than language comprehension has been documented in many psycholinguistic studies. For example, production ability lags behind comprehension ability in language acquisition for both child and adult learners (e.g., Clark & Hecht 1983; Izumi 2003). Even some proficient adult bilinguals anecdotally report that speaking a second language is more difficult than comprehending it. Further, Nicodemus and Emmorey (2013) found that spoken and signed language interpreters alike rated language production as more difficult than comprehension for both L1 and L2, but this difference was much less pronounced in L1 for both groups, probably reflecting stronger L1 than L2 production. It follows, therefore, that interpreters should find it easier to work from L2 into L1, which requires them to produce the interpretation in their native language. Consistent with this

argument, empirical studies have shown that spoken language interpreters make fewer grammatical errors and fewer omissions of information when interpreting into L1 (Lee 2003).

If signed language interpreters were also found to work better from their L2 (ASL) into their L1 (English), this finding would provide support for the hypothesis that the greater ease of L1 than L2 production drives interpreting performance and would indicate that both signed and spoken language interpreters are most often more effective when working into their L1. Further, such a finding would also indicate a striking disconnect between signed language interpreters' preferred direction of interpreting and their actual performance.

In sum, we investigated whether ASL-English interpreters' documented preference for working into their L2 is in fact supported by interpreting performance. Specifically, we set out to examine whether novice or expert ASL-English interpreters achieved higher quality and greater accuracy when working into their L2 (ASL) or their L1 (English), or whether directionality made no difference.

2. Methods

2.1 *Participants*

Two groups, each made up of 15 ASL-English interpreters, participated in this study — novice interpreters in one group, and expert interpreters in the other. Novice or expert status was based on: 1) years of professional experience; 2) interpreting credentials; 3) self-ranking of interpreting skills; and 4) types of professional interpreting experience (see Table 1 for criteria). Of the novice interpreters, eight indicated a preference for interpreting into ASL, three indicated a preference for interpreting into English, and four indicated no preferred direction. Of the expert interpreters, nine indicated no preference, three indicated a preference for interpreting into ASL, and two indicated a preference for interpreting into English. The interpreters' mean age was 25 years (range: 20–30 years) and 42 years (range: 33–53), for novices and experts respectively. Both groups were composed of 13 females and two males. All participants had normal hearing and normal or corrected-to-normal vision. All were right-handed. Each of the participants stated that s/he was a native English speaker who had acquired ASL as an adult. All held an associate degree or higher, and all were working full-time as professional ASL-English interpreters.

Table 1. Criteria for categorization of "novice" and "expert" interpreters

Criteria	Novice	Expert
Years of Professional Experience	Five years or less of full-time professional interpreting work.	Ten years or more of full-time professional interpreting work.[a]
Interpreting Credentials	May hold state certification, or none; may be a candidate for Registry of Interpreters for the Deaf certification.	National certification from Registry of Interpreters for the Deaf at one of the following levels: CSC, CI and CT, NIC-Advanced or NIC-Master.
Self-Ranking	≤4 on Likert scale of professional experience (from Novice = 1 to Highly Experienced = 7).	6 or 7 on Likert scale of professional experience (from Novice = 1 to Highly Experienced = 7).
Experience in Interpreting Settings	Has interpreted in a limited number of settings.	Has interpreted across a variety of settings (e.g., mental health, educational).

[a] According to Ericsson and Lehmann (1996), the most compelling evidence for the requirement of expertise in domain-related activities prior to attaining high levels of performance is that even the most "talented" individuals need approximately ten years of intense involvement in the activity.

2.2 *Materials*

The stimuli for the interpretation task consisted of four short texts (spoken or signed), each approximately three minutes in length. Two of the texts were light, personal narratives ("Home Carnival", "Accident Prone"), and two were informational in nature ("The Brain", "AAA Insurance"). All four narratives contained original material created by a native user of English or ASL, and each text was spoken or signed either as original material or through a translation process. For example, the deaf signer originally developed the material for "Home Carnival" and "AAA Insurance" in ASL, shaped the narratives to the desired length, created written ASL glosses to use as a script, and practiced delivering the narratives several times prior to the final filming. Following filming, the ASL narratives were then translated and retold by the native English speaker, controlling for speed, length, prosody, and content. The process was conducted in both language directions, that is, from ASL into English and vice versa. In this way, the two versions of the narratives were nearly identical, differing only in the language used. Both texts contained numbers and technical terms (typically considered challenging to interpret); they were delivered by women of a similar age, spoken or signed at an appropriate speed to accommodate interpreting (neither too fast nor too slow), and included discourse and prosodic markers throughout the narrative.

2.3 *Procedure*

Each participant interpreted four stories, two from English into ASL and two from ASL into English. Participants were presented with one personal narrative story and one informational story in each language, on a laptop computer. The stories were counterbalanced across participants, and presented in different orders. For each participant, half of the stories were presented by the original storyteller in the language of creation, and half were presented in their 'retold' form in the other language. Half of the participants were exposed to two stories presented in English followed by two presented in ASL, and the other half were presented with the opposite ordering. Prior to interpreting, the participants were shown a short video of the speaker or signer providing a brief introduction of herself, so as to familiarize them with the presenter's style. In addition, they were given a practice trial with a one-minute sample of speech/signing by the presenter, in order to become accustomed to her language use. Finally, participants saw a brief video of the deaf and hearing audience members for whom they would be interpreting, so as to have an idea of the target audience. The audience video was not shown again during the experimental task. Participants were instructed to provide the best ASL and English interpretation possible, and to continue interpreting even if they made errors or omissions. Their interpretations were video-recorded.

2.4 *Assessment*

2.4.1 *Raters*

Two native English speakers rated the participants' English interpretations from ASL, while two highly fluent ASL signers rated the interpretations from English. The ratings comprised two measures (see below). None of the four raters were professional interpreters.

The researchers showed samples from the practice interpretations to each group of raters and provided them with definitions of the rating scale (omitted, inaccurate/skewed, or semantically equivalent) in writing, in spoken English (for the hearing raters), and in ASL (for the deaf raters). Further, the raters were given exact transcriptions of the source language sentences that were being rated. One of the researchers observed the raters individually as they compared the practice interpretations to the source transcriptions, and answered any questions before the raters began the actual assessment. Inter-rater reliability was 77% for accuracy of interpretation and 73% for articulatory quality (raters were allowed to differ by 1 on the Likert rating scales, with the mean taken as the final value). All disagreements were resolved by discussion.

2.4.2 *Measures*

Interpretations were rated across two measures: 1) accuracy of semantic content of the interpretation; 2) articulation quality of interpretation (flow, speed, and prosody). Assessments were based both on transcriptions of the recorded interpretations and on visual appraisal of the video recordings.

2.4.3 *Accuracy of interpretation*

For the accuracy assessment, ten sentences (equally distributed throughout the text) were pre-selected as being critical for comprehension of the English and ASL narratives. The raters were given transcriptions of the ten sentences in each source text, against which to compare the target interpretations. Using a scale from 0 to 2, the raters assessed each critical sentence on how accurately the content was interpreted. A score of 0 indicated that the concept was omitted; a score of 1 indicated that the content was present, but inaccurate or skewed; and a score of 2 indicated that the original source message was fully interpreted into a semantically equivalent message. It is possible that omitting a concept altogether in an interpretation may cause less harm than skewing it. However, the ratings were not designed to reflect judgments of error impact; rather, the rating system was used to identify only the nature of the target language sentence as omitted, inaccurate/skewed, or equivalent. Accurate and inaccurate interpretations from ASL into English are illustrated in Example (1), below.

(1) ASL source message
"WHERE?// OUR BACK Y-A-R-D/ WE INVITE++ KID INDEX++ NEIGHBOR/"[2]
   a. *Accurate English interpretation*
   "It took place in our back yard and we invited the kids from the neighborhood."
   b. *Inaccurate/skewed English interpretation*
   "It took place in the park and all the kids from the neighborhood came."

For each participant, interpreting accuracy was calculated by summing the scores of the critical sentences and calculating the percentage of correct items for the narrative. For example, if five of the ten critical sentences were accurate, the interpreter would receive a score of 50 percent for that narrative.

2. Transcription symbols used include: 1) single and double backslashes (/ and //), which indicate utterance boundaries (WHERE?//); 2) hyphens (-), which indicate fingerspelled segments (Y-A-R-D); 3) crosses (++), which indicate repeated signs (INVITE++); 4) 'hash' signs (#), indicating a lexicalized fingerspelled word (#BURN).

2.4.4 *Articulation quality of interpretation*

For the assessment of articulation quality, judges rated the participants' interpretation on a scale from 1 to 7. Three aspects of articulation quality were assessed: 1) flow; 2) production speed; 3) use of prosodic features.

Flow was defined as fluid and smooth language production, with words or signs connected together in phrasal units featuring minimal disfluencies. Conversely, disfluent articulation was identified as halting in its production, segmented into unnatural phrasal units, or has multiple disfluencies. The judges rated the participants' flow on a scale from 1 ("halting or poor phrasing") to 7 ("smooth or good phrasing"). Both extremes are illustrated in Examples 2 and 3 below, for English and ASL respectively:

(2) English
   a. *Smooth English interpretation:* "My sister Alice and I decided to set up a home carnival."
   b. *Halting English interpretation:* "Uh, my sister…Alice… and I decided, um … to create a … oh, yeah, a carnival, a carnival at home."

(3) American Sign Language
   a. *Smooth ASL interpretation:* "ME CHOOSE AAA INSURANCE/ WHY/ GREAT PRICES, EXCELLENT SERVICE//"
   b. *Halting ASL interpretation:* "ME CHOOSE AAA…INTER… (shakes head) INSURANCE BECAUSE … (pause) GREAT PRICES AND… SERVICE, GREAT SERVICE."

The second articulation quality assessed was *production speed*, defined as signing or speaking speed in relation to the ideal of a clear and comprehensible interpretation. Ineffective speed of production was defined as being unnaturally fast or slow and, as a result, distracting or difficult to understand. Speed was rated on a scale from 1 ("unnaturally fast or slow") to 7 ("well-paced").

The third articulation quality measure assessed was *use of prosodic features* — i.e., intonation, pitch and volume (in English); and velocity, eye blinks, head nods and body movements (in ASL). Language that is lacking prosodic features will seem unnatural, flat, monotonal, and unexpressive. Language with exaggerated prosodic features is also unnatural, since it seems overly expressive, theatrical, or emotional. The interpreters' prosody was rated on a scale from 1 ("exaggerated or flat") to 7 ("natural intonation/pitch").

3. Results

3.1 *Accuracy of interpretation*

Not surprisingly, expert interpreters achieved a higher percentage of accurate interpretations of the critical sentences than novice interpreters: 74.2% vs. 41.7%, $F(1, 28) = 48.176$, $p < .001$. Overall, interpretations were more accurate when working from ASL into English, $F(1, 28) = 6.446$, $p = .017$. However, this effect was primarily driven by the novice interpreters, who were significantly more accurate when working from ASL into English (50.7%) than when working from English into ASL (32.7%), ($t(14) = 4.48$, $p < .001$). In contrast, expert interpreters were equally accurate when working into ASL (72.7%) and into English (75.7%), ($t(14) = 0.693$, $p = .500$). The interaction between participant group and interpretation direction was significant, $F(2, 28) = 12.634$, $p = .001$. This significant interaction reflects the fact that novice interpreters were more accurate when interpreting into their L1 (English), whereas expert interpreters were equally accurate when working into either their L1 or their L2. The results are illustrated in Figure 1.

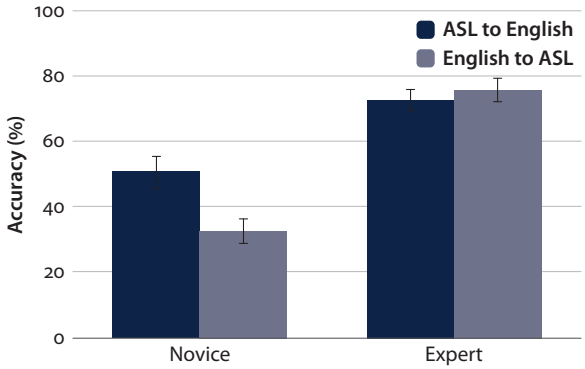

Figure 1. Percentage of critical sentences interpreted accurately by novice and expert interpreters, when working into English (L1) or into ASL (L2). Error bars indicate standard error.

Novice interpreters produced significantly fewer skewed interpretations of the critical sentences when working into English (41% of sentences) than when working into ASL (56%), ($t(14) = 3.146$, $p = .004$), whereas the percentage of skewed interpretations was very similar for expert interpreters in both directions: 26% into English and 24% into ASL. Expert interpreters rarely omitted the critical concept in a sentence: this occurred in only 2% of cases when working into English, and 1% when working into ASL. In contrast, novice interpreters were less likely to miss the

critical information when working into English (8%) than when interpreting into ASL (11%), but this difference was not statistically significant, $t(14) = 1.348$, $p = .199$.

3.2 *Articulation quality of interpretation*

The results of the articulation quality analyses are presented in Figure 2.

3.2.1 *Flow*

For novice interpreters, flow was similar when working from ASL into English (mean rating = 3.57) and from English into ASL (mean rating = 3.63), $t(14) = 0.251$, $p = .805$. For the expert interpreters, flow was judged to be somewhat better when working into ASL (mean rating = 5.83) than into English (mean rating = 5.32), but this difference was not significant, $t(14) = 1.906$, $p = .077$.

3.2.2 *Production speed*

The speed of interpretation of the novice interpreters was judged to be better when speaking (ASL into English: mean rating = 4.83) than signing (English into ASL: mean rating = 3.93), $t(14) = 4.895$, $p < .001$. In contrast, there was no significant difference in production speed for the expert interpreters when speaking (mean rating = 5.58) and signing (mean rating = 5.83), $t(14) = 1.357$, $p = .196$.

3.2.3 *Prosodic quality*

Novice interpreters produced interpretations with more natural prosody when speaking (ASL into English: mean rating = 4.65) than when signing (English into

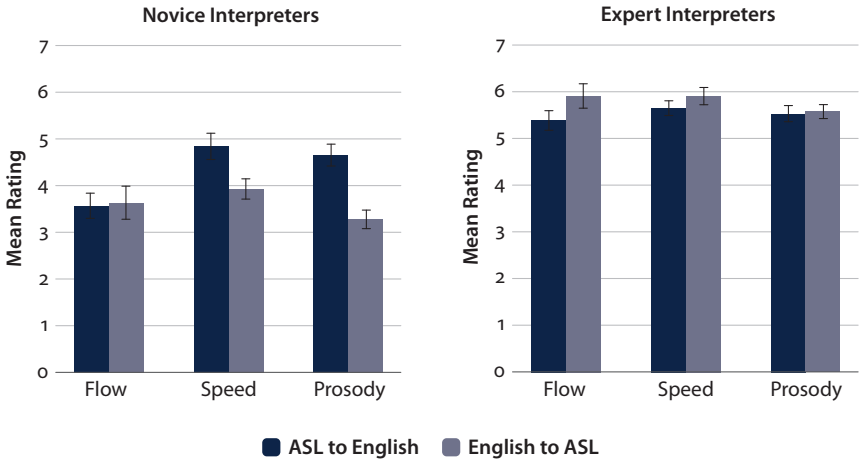

Figure 2. Mean articulation quality ratings for novice and expert ASL-English interpreters. Error bars indicate standard error.

ASL: mean rating = 3.27), $t(14) = 9.980$, $p < .001$. There was no difference in prosodic quality for expert interpreters working into English (mean rating = 5.45) and into ASL (mean rating = 5.50), $t(14) = 0.216$, $p = .832$.

4. Discussion

This is the first study (to our knowledge) to investigate whether ASL-English interpreters render superior interpretations when working into their L2 (ASL) or into their L1 (English). Measures of both interpretation accuracy and articulation quality indicated that the novice interpreters provided superior interpretations when working into their L1. This result is notable, since Nicodemus and Emmorey (2013) found that novice interpreters strongly preferred to work into ASL rather than into English, and this was also the case with the majority of the novice interpreters in the present study. This result also indicates that signed language interpreters pattern like spoken language interpreters with respect to interpreting direction performance. The novice interpreters rendered superior interpretations when working into their L1, supporting the view that, at least before interpreters acquire more fluency and experience, the high cognitive demands of language production are best met when interpreting into their native language..

Given these results, why do novice ASL-English interpreters prefer (and also rate themselves as more proficient at) working into their L2, when the performance data indicate poorer interpretations in this direction?

We suggest three possible explanations for this general disconnect between preference and performance by novice signed language interpreters, and we argue that these explanations are tied to modality differences between the languages used by signed language interpreters. The manual modality of signed languages allows for certain strategies that are not possible when interpreting between two spoken languages. In addition, the nature of the perception-production interface (i.e., how we perceive our own productions) differs for signed and spoken languages, and this can affect how interpreters monitor their output.

First, when interpreting from English into ASL, novice interpreters can default to fingerspelling an English word when either they do not know the corresponding ASL sign or there is no standard sign for an English word. This compensatory strategy is to a certain extent accepted, because deaf consumers are almost always bilingual in (written) English and ASL. In contrast, when novice interpreters are working in the opposite language direction (ASL into English) and encounter an unknown ASL sign, they have no equivalent "fallback" strategy for representing the sign in spoken English. As a result, the English interpretation can easily break down. In addition, comprehending fingerspelling is notoriously difficult for

novice interpreters, as evidenced by specific coursework, workshops, and video instructions devoted to improving fingerspelling reception. Thus, fingerspelling decreases the difficulty of interpreting from English into ASL, but increases the difficulty of interpreting from ASL into English. This difference in difficulty according to language direction may lead to misperceptions about proficiency when working into ASL.

It is worth noting that the use of fingerspelling as a "default strategy" in interpretation is often unsuccessful, because the deaf consumer may not know the English word that is fingerspelled; further, ubiquitous fingerspelling violates linguistic constraints on its use in ASL discourse (Battison 1978; Wilcox 1992). Below, in Examples 4 to 6, we reproduce three cases of fingerspelling produced by novice interpreters when working from English into ASL. Fingerspelling is used here as a default strategy, when no standard ASL lexical correspondent exists (i.e., "map") or when the interpreter does not know the ASL equivalent (i.e., "prone," "drill," "passport").

(4) English source: "…accident prone"
Novice (02): "…CARELESS TEND P-R-O-N-E"

(5) English source: "…using a drill"
Novice (03): "…USE D-R-I–L-L"

(6) English source: "…they offer road maps, passport"
Novice (04): "…FREE M-A-P, P-A-S-S-P-O-R-T"

A second explanation for the difference between preference and performance by novice signed language interpreters is the ability to *transcode*, i.e., produce ASL signs in the word order of English. Transcoding results in a sign-for-word translation that does not incorporate ASL morphology or syntactic markers, and thus frequently leads to ungrammatical constructions in ASL. The production of signs with the English word order is also characteristic of invented signed systems such as Signed Exact English (SEE). Despite this, transcoding maintains a degree of acceptance among deaf consumers; in fact, some deaf consumers may actually request transcoding because of their language and educational background. Further, "English-like" signing has been regarded as superior and more erudite than the signing used in everyday interactions within the Deaf community (Padden & Humphries 1988), a language attitude that has undoubtedly been promoted by some hearing signers. Another reason for perpetuating the practice of transcoding is that deaf consumers frequently have no say in the quality of the interpretation that they receive (Bontempo et al. 2014). Thus, although transcoding often does not result in effective ASL interpretations for many deaf consumers, it is still employed in interpretation. In contrast, when interpreting from ASL into English,

transcoding is unacceptable to hearing consumers because the resulting output is ungrammatical and sounds like 'broken' English.

Transcoding was also present throughout the interpretations of the novices in our sample. In Examples 7 to 9 below, each of the novices produced ASL signs following the same word order as in the English source text, without incorporating ASL morphology, syntactic markers, or discourse style. For comparison, each example is accompanied by an expert interpretation of the same sequence from the English source text.

(7) English source: "If your hand is burning, it's the nerves that are sensing that."
Novice (14): "IF YOUR HAND BURN, N-E-R-V-E-S FEEL THAT."
Expert (01): "HAND #BURN (point to hand)? NERVE SENSE-nod."

(8) English source: "In our brains we have about ten billion neurons."
Novice (07): "OUR BRAIN HAVE TEN MILLION B-I–L-L-I-O-N
N-E-U-R-O-N-S."
Expert (14): "BRAIN TOTAL-intense TEN MILLION B-I–L-L-I-O-N
N-E-U-R-O-N-S, 2-hand classifier depicting neurons firing back and forth."

(9) English source: "But her friend convinced her that it would be fine."
Novice (04): "HER FRIEND CONVINCE FINE."
Expert (13): "BUT MOM FRIEND (eye gaze as if toward another person)
COMMENT++ gesture-'oh' FINE FINE, GO-ON GO-ON."

Fingerspelling and transcoding are options only when interpreting from English into ASL. Such tactics are either not possible (fingerspelling) or are recognized as ungrammatical (transcoding) when interpreting from ASL into English. Thus, one explanation of novice signed language interpreters' preference for interpreting into their L2 (ASL) may be the leeway that this direction gives them for fingerspelling and transcoding as default strategies, especially as compared to expert interpreters. We suggest that the availability of the fingerspelling and transcoding options when interpreting into ASL may give novice interpreters the impression that they work more proficiently in this direction.

A third possible explanation for signed language interpreters' preference for working into their L2 is related to the nature of *self-monitoring* while interpreting. Signers do not appear to monitor their language output in the same manner as speakers (Emmorey, Bosworth & Kraljic 2009; Emmorey, Gertsberg, Korpics & Wright 2009). For example, auditory feedback appears to play a larger role in catching overt speech errors than visual feedback does for catching signed errors (Emmorey, Bosworth & Kraljic 2009). Speakers can use their language comprehension system to monitor their own vocal output for errors. However, for signers, visual feedback is quite distinct from the visual input received when comprehending

another person's signing: self-produced signs are perceived in the periphery of vision, with a view of the back of the hands, and one cannot see one's own face. Emmorey, Boworth and Kraljic (2009) found that signers were not able to easily understand signs that were presented from a self-produced viewpoint (i.e., seeing the back of the hand in the periphery of vision). In that study, the authors argued that signers do not visually monitor their output for signed errors, but rely on somatosensory feedback to catch errors (see also Emmorey, Korpics & Petronio 2009). In other words, signers must be able to detect errors in articulatory representations by feeling them, rather than by seeing them.

We therefore suggest that signed language interpreters may not monitor their signed language output as successfully as they can their spoken language output. Novice signers may be particularly ill-equipped to detect their signed errors because they are less fluent in ASL, and they may not yet have developed modality-specific self-monitoring skills. Expert interpreters may be better able to monitor their performance in both language directions, due to acquired skill in recognizing somatosensory feedback. Further, monitoring the auditory feedback received when interpreting into English may interfere with the interpreters' 'online' formulation of their output, whereas the visual feedback that occurs when producing ASL may cause little or no interference when formulating an ASL interpretation. This lack of interference may lead the interpreters to rate their ASL interpretations as superior to their work in English. Thus, it may be that novice ASL-English interpreters are not accurately assessing the feedback from their ASL output via self-monitoring.

We note that novice interpreters' preference and proficiency self-ratings for working into their L2 are not necessarily unique to signed language interpreting. Spoken language interpreting trainees have also been found to prefer working into L2 in the early stages of their learning, especially because of their inability to fully monitor and judge the quality of their L2 production. However, we do suggest that working in a visual language modality offers signed language interpreters certain default 'strategies' (especially fingerspelling and transcoding) that warrant consideration in addressing the question of directionality preference, as well as in curriculum planning for interpreter training.

Interestingly, the results of this study contrast with the only other study of directionality performance in signed language interpreters (that we are aware of). In that study, Signed Language of the Netherlands-Dutch interpreters actually showed *stronger* performance when working into their L2 (Signed Language of the Netherlands) (van Dijk et al. 2011). The characteristics of the participants and the judges, along with the criteria used for measurement, may have played a role in the different outcomes of the two studies. Van Dijk et al. (2011) examined 25 highly experienced interpreters, ten of whom had acquired signed language at birth from

their deaf parents. In contrast, we examined only interpreters who had acquired ASL as their L2 in adulthood. It is possible that acquisition of a signed language as an L1 leads to better signed interpretations, particularly because signed language interpreters may receive more training and practice in this direction (see Nicodemus & Emmorey 2013). We note that the expert interpreters in our study were equally proficient in both directions, although their articulation quality was judged as slightly better when interpreting into ASL (see Figure 2). Van Dijk et al. asked certified interpreters to serve as judges by responding to the question "How good do you think the interpreted narrative is in comparison to the source narrative?" They also judged propositional accuracy, in both language directions. In contrast, our study used native English speakers and deaf ASL signers (all non-interpreters) to rate both semantic accuracy and articulation quality (flow, speed, prosody). The judges did this only in their native language. In other words, they were able to rely on their native competence in either ASL or English to assess the target language output, which more closely represented the experience of consumers of interpreting services.

Nicodemus and Emmorey (2013) found that expert interpreters also preferred to work into ASL, although this direction preference was less strong than for the novice interpreters. And yet we found that the *performance* of expert interpreters was equal when working either into English or into ASL. We suggest that experts may still have a preference for interpreting into ASL, for reasons similar to the novices. Thus, the availability of fingerspelling and transcoding, as well as the difference between self-monitoring for spoken and signed production, may all contribute to a preference for working into ASL — even for expert interpreters, who perform equally well in both directions. In addition, as reported in Nicodemus and Emmorey (2013), signed language interpreters have much more practice in working into ASL than into English, and this too might give even expert interpreters a preference for working into ASL.

Our findings hold implications for the signed language interpreting profession, particularly for interpreter education. Based on these results, interpreter education programs might incorporate lessons that analyze the effects of language modality on interpretation. For example, instructors could discuss the use of fingerspelling and transcoding as common default 'strategies' that are possible only in signed language interpretation. Students could be instructed to analyze how interpreting between two different language modalities can result in inappropriate or ungrammatical interpretations, and examine how their use of transcoding and fingerspelling may result in faulty interpretations. Such discussions could be framed within the context of the educational and sociolinguistic backgrounds of deaf people. Interpreter education programs might also incorporate more training on the differences in self-monitoring between a spoken language and a signed

language. Students could be trained using a simultaneous video feedback loop during their signing production, so they could experience real-time monitoring of their ASL production from an audience perspective. Instructors could provide training for the development of somatosensory self-monitoring skills when producing a signed language. Finally, interpreter education programs must continue to address issues related to ASL fluency, since students are often still learning ASL while training to become interpreters (and even when they begin to work as interpreters). If students are required to have fluency in ASL prior to entry before admission to their course, this means that all the more attention can (and should) be given to issues of fingerspelling, transcoding, and self-monitoring within the curriculum.

5. Summary and conclusion

This study examined novice and expert ASL-English interpreter performance when working into their L1 (English) and L2 (ASL). In measures of accuracy, novice ASL-English interpreters were found to be significantly more effective when interpreting into their L1 (English) than into their L2 (ASL), whereas expert interpreters were equally accurate when working in either direction. For the flow measure of articulation quality, novice interpreters exhibited similar performance in both interpreting directions, while expert interpreters were slightly (but not significantly) better when interpreting into ASL. Speed of interpretation of the novice interpreters was judged to be significantly better when working into English than into ASL, while there was no difference between interpreting directions for production speed for the expert interpreters. Finally, novice interpreters produced more natural prosody when working into English than into ASL, while there was no difference in expert interpreters' prosodic quality between the two languages.

A priori, one might expect that interpreting performance would align with interpreters' general direction preference; however, our results suggest this is not the case. Rather, our findings indicate that performance by novice interpreters is better when working into their L1 (English), a result that patterns with most studies on spoken language interpretation. The findings support the hypothesis that the cognitive demands of rapid language transfer are best met when working into one's native language, particularly for novice interpreters. We suggest that the disconnect between direction preference and actual performance is fostered by the availability of modality-specific strategies which are not possible in spoken language interpreting. The use of transcoding and fingerspelling, along with weakness in accurate self-monitoring of their signed language production, may lead

novice interpreters to have a more positive perception of their performance when working into ASL.

The anticipated benefits of this study are to increase understanding of questions related to directionality in signed language interpreting, and to raise awareness of the effects of language modality on perception and performance. Specifically, the results may influence how interpreter educators discuss self-monitoring, L1 vs. L2 production, and default strategies that are possible in a signed language but may lead to misperceptions of proficiency in signed language production.

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Authors' address

Brenda Nicodemus
Department of Interpretation
Gallaudet University
800 Florida Avenue NE
Washington, DC 20002
USA

brenda.nicodemus@gallaudet.edu

Karen Emmorey
Laboratory for Language and Cognitive Neuroscience
San Diego State University
6495 Alvarado Road, #200
San Diego, California 92120 USA

About the authors

Brenda Nicodemus is Associate Professor and Director of the Center for the Advancement of Interpreting and Translation Research (CAITR) at Gallaudet University. Her areas of research include translation asymmetry in bimodal bilinguals, healthcare interpreting, and ASL prosody. Publications include *Prosodic Markers and Utterance Boundaries in American Sign Language Interpreting* (Gallaudet University Press, 2009), and co-edited volumes *Advances in Interpreting*

Research (Benjamins, 2011) and *Investigations in Healthcare Interpreting* (Gallaudet University Press, 2014).

Karen Emmorey is a Distinguished Professor in the School of Speech, Language, and Hearing Sciences at San Diego State University and the Director of the Laboratory for Language and Cognitive Neuroscience. Dr. Emmorey's research focuses on what signed languages can reveal about the nature of human language, cognition, and the brain. Her research interests also include bimodal bilingualism (i.e., sign-speech bilingualism) and the neurocognitive underpinnings of reading skill in profoundly deaf adults.