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Abstract

This study investigates how Sign Language interpreters when transliterating utilize pauses in the source message as they construct the target message. Twenty master Sign Language interpreters were asked to transliterate an eleven minute monologue, which contained normal speech pausing, and then to transliterate the same passage in which inappropriate pausing and reduced intonation had been incorporated. The analysis showed that interpreters when transliterating do render source message pauses with visible signals. The source message contained three kinds of pauses: within–sentence (WSP), between–sentences (BSP) and between–topics pauses (BTP). Interpreters when transliterating render these different kinds of auditory pauses with different behaviors, alone or in combination: gaze shifts, held signs, filled pauses, and empty pauses.

Interpreters use of pauses

Sign language interpreting, for the most part, is performed simultaneously. That is, "the interpretation is delivered nearly instantaneously after the original message" (Frishberg 1986: 21f). Sign language interpreting is very similar to foreign language interpreting; in both the interpreter changes a message produced in one language into that message in another language. For sign language interpreters, those two languages are American Sign Language, a visual, gestural language, and English, a spoken auditory language.

Sign language interpreting differs from foreign language interpreting, however, because Sign language interpreters can also interpret between modes or channels within one language. *Transliteration* is the term applied to the process of receiving a spoken English message and changing it into a signed English message or vice versa. Both sign language interpreting and transliteration require the interpreter to analyze fully (i.e. understand) the source message in order to determine an appropriate transformation for presenting the equivalent target message.

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Seleskovitch (1978) views the interpreter's primary function as analyzing the style and content of a source language, and conveying it into a target language. For the translator working from and to the written word, this is a fairly straightforward task, and the process can be pondered and reflected upon. The simultaneous interpreter faces a much greater challenge.

> He [the simultaneous interpreter] must make a constant effort to be clear and accurate, especially as he only hears the speaker's message once, only states it once, and thus has only one opportunity to make himself understood. (Seleskovitch 1978: 106)

Thus, the interpreter must carefully decode the source language message to determine the precise meaning or semantics. It is only after a clear semantic understanding is achieved that the interpreter can commence encoding the message in the target language. The truly remarkable aspect of this process is that the interpreter must keep both linguistic systems in mind at the same time. The interpreter continually determines what the message unit means in the source language, and simultaneously determines how to express this meaning in the target language.

The interpreting task is akin to building a suspension bridge, piece by piece, while simultaneously walking across it. Each successful step will be dependent on the strength of the construction behind you, all the while monitoring your current construction to be sure it is correctly aimed at a predetermined spot on the other side of the ravine. The speaker gives the interpreter building materials. Sometimes it's a bolt; sometimes it's a steel beam. Sometimes the interpreter can use the material immediately, at other times the interpreter must wait for several pieces before the next segment can be constructed. If the speaker gives the interpreter a faulty piece of material, the interpreter will not blindly use it, for to do so might cause the bridge to miss its mark. The interpreter might take the time to repair the faulty material or decide to reject it altogether for a stronger, more useful piece. During the process the interpreter may need to add a few sky hooks, crack filler, and structure stretchers, but, nevertheless, if all has gone well, the bridge will successfully span the ravine.

Several factors have been shown to influence the interpreting process; fatigue, inattentiveness and stress (Kopczynski 1980),

the length of the interpreters processing time (Cokely 1986), and rate of input (Goldman–Eisler 1968).

Of primary interest to this study is how auditory pausing in the source message (spoken English) is utilized by interpreters when constructing the visual target message in transliterated English with visual behavior replacing the spoken utterance. As will be discussed below, pausing does serve a significant paralinguistic function in conversation. How then do interpreters utilize these pauses when constructing a transliteration? Assuming that the pauses are reflected in their output, how do interpreters transform an auditory paralinguistic phenomenon into a visual paralinguistic representation? By studying how master sign language interpreters, while transliterating, utilize source language pausing, we may understand this complex process better.

In developing a theoretical foundation for this study it is important to look at three separate aspects of pausing. First, a discussion of the function of pausing in spoken English, second, a discussion of how pauses function and are expressed in conversational sign language and signed English, and third, the effects of input pauses on the performance of foreign language interpretation and sign language transliteration. To date this phenomenon has not been investigated in sign language interpreters.

Pausing in spoken language

A pause, according to Crannell, is the absence of speech immediately before or after an utterance. "It is a temporary stop in verbalization, but with a continuation of thought" 1987: 233). Pauses can result from hesitations in speech, such as those that occur during word or phrase correction, stuttering, repetition, or slips of the tongue. These pauses have been shown to affect adversely the speakers' credibility and dynamism (e.g. Miller & Hewgill 1962), however, they contribute little to the overall meaning of a message.

Goldman–Eisler's 1968) research focused on speech pauses that function to organize messages into meaningful segments. She found that these pauses or gaps in speech provide a mechanism enabling the listener to group words semantically, thus, aiding the listener in properly decoding the message; e.g. consider

how a change in pausing results in a change of meaning in the following sentences:

(a) Short boys (pause) and girls will be permitted to play.
(b) Short (pause) boys and girls will be permitted to play.

In (a) the placement of the pause creates two semantic groups; "short boys" in one, and "girls" in the other. However, in b the pause after the adjective "short" works to group "boys and girls" together.

Goldman–Eisler also found that a significant number of speech pauses occur at "semantically determined [points] and at grammatical junctures" 1968: 13). Pauses of this kind are very predictable and occur at the following speech junctures:

1. Punctuation points; e.g. the end of a clause and sentence
2. Immediately before a conjunction; e.g. and, but, or
3. Preceding interrogative pronouns; e.g. who, whose
4. Before and after a rhetorical question; e.g. I don't know (pause) whether I will go
5. Before adverbial clauses related to time; e.g. when, where, how
6. Before and after parenthetical comments; e.g. "I'd like to go to the Caribbean (pause) now this is the frugal me speaking (pause) for under eight hundred dollars."

The duration of the pauses can also vary according to where the pause occurs. Pauses within sentences are much shorter than pauses that occur between topics and between sentences (Lane & Grosjean 1973). Research on the exact length of these pauses reports varying results; however, it appears that within–sentence pauses generally range between 0.245 and 0.445 seconds and pauses between sentences are equal to or greater than 0.445 seconds (Grosjean & Collins 1978).

Pauses also appear to be related to speech style. Duez (1982) found the frequency, duration, and distribution of speech pauses to be significantly different in casual interviews and prepared speeches. She found that the total time of silent (vs. filled) pauses was 50% greater in prepared speeches. These pauses may serve a "reflection function" by providing the listener with an opportunity to think about what has been just said.

Pauses in sign language.

Pauses function in sign language much the same way as in spoken languages, however, the form of the pause is very different. As Covington (1973) notes, the hands remaining motionless or in a "hold" position constitute a pause in conversational signing. Thus, the pause at the end of a sentence can be accomplished by sustaining the hand configuration of the last sign produced. Baker (1977) found that pauses in sign are not only regulated by holding the sign but also by gaze; e.g. a pause with the intent of continuing to speak will be composed of a held sign and the absence of eye contact with the addressee. A pause at the end of a sentence with the intention of yielding the turn will be signaled when the hands drop relaxed and eye gaze is maintained.

Grosjean and Lane found that

> [T]he distribution of pauses in a signed [conversational] text was not random; the holds appear to cluster the signs together in an orderly manner: long holds appear to mark the end of sentences [more than 0.229 seconds], but shorter holds tend to occur within these sentences [0.106 to 0.134 seconds]. (1977: 107)

Pauses in interpretation & transliteration

Speech pauses have been found to be significant features for foreign language interpreters. Gerver (1971) found that source language pauses that fall at grammatical junctures do aid interpreters in their ability to decode and encode messages. He presented his subjects, who were students of interpretation, with two different texts. One containing normal stress, intonation, and pausing. The second text had greatly reduced stress and intonation and no pauses. The results showed that a higher proportion of correct interpretations occurred with the normal French passages. In addition, Gerver's analysis showed that the interpreters' interpretation contained more syntactically appropriate pauses when the source language contained pauses, stress, and intonation than when they were absent, and he has suggested that input pauses, stress, and intonation assist the interpreter in the decoding and segmentation of the source language message (1971: 88).

My purpose in this study was to examine the effect of source language pauses on sign language interpreter's performance

when rendering the message by transliteration. As pauses occur at syntactically important points in speech, it might be expected that a sign language interpreter's pauses in the target message would coincide with the source message pauses. Of greater interest is how sign language interpreters show the auditory pause in a visual form. Held signs and gaze shifts will undoubtedly be utilized by the interpreter a way to add time for processing, but it is expected that an interpreter will need to utilize other mechanisms or modify existing ones when the source message is a lecture and not a conversation. Whether interpreting bedtween languages or between modes (transliterating), sign language interpreters must need to take account of the longer pauses found in monologues or lectures than in conversation. To discover how pausing in sign language interpreters' transliteration varies with pausing in the source language, I modified Gerver's method by putting pauses in the wrong places instead of eliminating them.

The subjects were twenty sign language interpreters employed at the Department of Interpreting Services in the National Technical Institute for the Deaf, on the campus of the Rochester Institute of Technology in Rochester, New York. All were certified by the National Registry of Interpreters for the Deaf and possessed an average of 11 years, 7 months of professional experience. The female to male ratio was 3 to 1, close to the overall female to male ratio found in the profession. The average age was 36 years, 3 months. Academic degrees were:40% Associate degrees, 40% Baccalaureate degrees, 20% Masters degrees. All data were collected between April and September of 1992.

The materials were two 11–minute monologues by a professional actor. The text used was an excerpt from a professionally produced audiotape on assertiveness training (Cocco 1983). After several rehearsals, the monologue was read and recorded twice by the actor. For the first reading, rendition "A", the actor used natural speech with animated voice quality and natural inflection. For the second reading, rendition "B", the actor inserted random speech pauses and used a monotone voice. The actor was cued for this by a retyped version on the script in which all punctuation and capitalization were removed. The actor was instructed to read the script in a monotone and pause only at the end of

each typewritten line. (Appendix A contains samples of Renditions A and B.)

The actor recording these monologues timed her presentations to approximately 150 words per minute for both renditions—this is the usual rate of the academic lectures that the research participants interpret and/or transliterate on a daily basis. After the monologues were recorded, the actual rate was measured. Rendition A was recorded at 154.6 words per minute. Rendition B was recorded at 155.2 words per minute. Use of a t–test showed that this difference was not significant.

After the research participants were taped transliterating the audiotaped monologue, they filled out Questionnaire 1 (Appendix B), which asked about their age, sex, years of experience, professional certification level, and education. It also presented three performance scale: Scale 1 asked the interpreters to rate their daily transliteration performance from 0 to 100%; Scale 2 asked them to rate their transliteration performance on the audiotaped monologue from 0 to 100%. Scale 3 rated the difficulty of the passage from 0 to 100%. On the first two, 100% was the rating for an excellent transliteration; on the third, 100% was extremely difficult.

Participants were then asked to state in writing, the challenging aspects they found in the source lecture and to account for any differences between their daily performance and their current performance.

After transliterating Rendition B (about a week later) the participants completed Questionnaire 2, repeating the three–scale rating for the second rendition and a written account of the aspects they found challenging as well as their opinion about the differences. In addition, they were asked if their second performance was significantly influenced by having interpreted the same lecture previously, and if it so, in what way.

The participants were asked to imagine a particular deaf student that they had previously worked with, and to direct their transliteration of Rendition A to that student. With the assistance of a video technician, each participant was seated and recorded on 3/4–inch videotape using a camera shot that included the area from the top of the head to the waist. They were then scheduled

to return approximately one week later to transliterate Rendition B, with the same instructions—to imagine that they were transliterating for the same deaf student. After completing Questionnaire 2, they were debriefed in an open discussion of the research questions. Each of the 20 research participants completed both A and B for a total of forty videotapes.

At the time the videotaping took place, it was not possible to insert a time code bar. After all forty 3/4–inch videotapes were completed, they were re–recoded onto 1/2–inch videotape with a time code bar inserted.

Data analysis

Coding pauses in the audiotaped source message

Both renditions were approximately 11 minutes in length. From the 11 minutes, the same one minute segment was selected for analysis from each. Those segments began seven minutes into the lecture to allow the participants time to become familiar and comfortable with the topic and process. The audiotaped segment was analyzed by three judges, who reached 100% agreement as to the location of the source message speech pauses and the type of each. For Rendition A, the judges identified 22 speech utterance units. An utterance unit was defined as any length of speech preceded and followed by a pause. Of these utterance units, 14 were identified as ending with a within–sentence pause (WSP), seven with a between–sentences pause (BSP), and one with a between–topics pause (BTP). The salient characteristics of these pauses were duration of the pause: the within–sentence pauses were the shortest in duration and the one between–topics pause was the longest. A secondary feature was change in intonation: the pauses were often preceded and followed by a change in intonation. The average duration of the pauses were as follows: WSP, 0.53, BSP, 1.11 and, BTP, 2.97 seconds. The 22 utterances that make up this one–minute segment were scripted for use during the coding of the transliterated target message.

In Rendition B, the same one minute segment contained 12 utterance units as verified by the judges. One of these utterance units ended at a location that would normally have a within–sentence pause. This unit was eliminated from the analysis. The

judges agreed that the duration of the remaining pauses were approximately that of between sentence pauses and that all occurred at syntactically and grammatically inappropriate places. The average duration of these pauses was 1.18 seconds. These 11 utterances were also scripted for use during the coding of the transliterated target message.

Coding of transliterated target messages

Using the script and a videocassette playback unit equipped with a frame by frame advance, each of the forty videotaped transliterations were analyzed. Each sign produced by the interpreter was assigned a written English equivalent. In the case of fingerspelling, each letter produced was noted. The following behaviors were also noted: gaze shifts, held signs, non–specific gestures (termed "filled pauses"), and the brief absences of transliteratation (termed "empty pauses"). Gaze shifts and held signs have been previously noted as significant behaviors related to pauses in ASL conversations (Covington 1973, Baker 1977). However, filled pauses and empty pauses were observed as unique to interpreting and transliterating. Each behavior is described in detail below. With the exception of gaze shifts, the duration of each behavior was measured using a time code bar superimposed on each videotape.

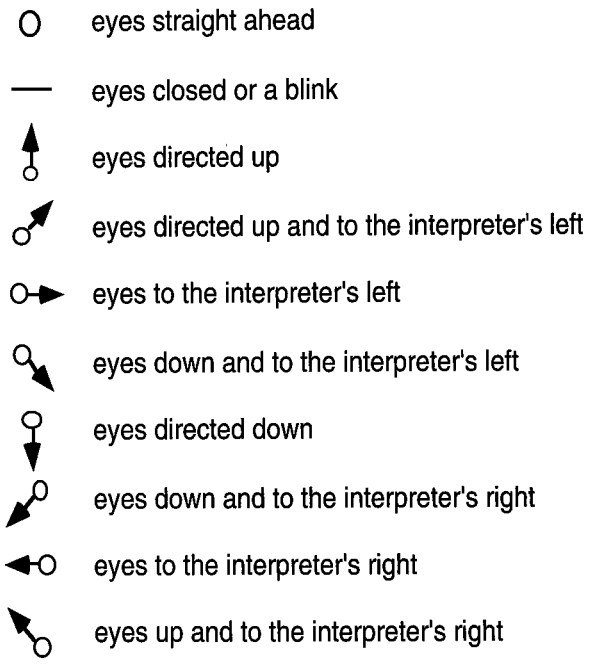
1. Gaze shifts

Shifts in eye gaze are defined as any movement of the interpreters' eyes including blinks. Figure 1 lists the 10 positions of the interpreter's gaze that were coded. These positions include the eyes straight ahead, closed, and the eight locations that surround the interpreter. An eye shift was judged to occur when the eyes moved from one defined location to another. Shifts in eye gaze where often separated by eye blinks which were also noted in the coding.

This analysis noted gaze shifts any time they occurred during the one minute segments of Renditions A and B. In order to find the relationship between gaze shifts in the target message and pause points in the source message, the 22 pause locations in Rendition A were analyzed and compared with the same no pause locations in Rendition B. To determine the effect of inap-

propriate source message pausing on the target message, the 11 locations in Rendition B where artificial pauses were inserted were also analyzed for gaze shifts.

Figure 1. Coding of Interpreter's gaze shifts



2. Held signs

A sign was deemed "held" when after the sign was fully produced, the final position and handshape were maintained for at least 0.33 seconds without any additional movement. This criteria was determined with the assistance of two native signers, who, when independently shown 30 different videotaped segments, indicated signs that they felt were "held." Judge number one identified 42 held signs and judge number two identified 32. Of

these, they agreed on 27. From this sample, the minimal amount of held sign duration was determined to be 0.33 seconds. The time code bar was used to measure the duration of held signs.

The analysis of held signs first looked at frequency throughout the entire one minute segments of Rendition A and B. Secondly, the occurrence of held signs was compared to the 22 pause–point locations in Rendition A and the same no–pause locations in Rendition B. The 11 artificial pauses in B were also compared with the 22 locations in A. This last analysis was based on percentage of occurrence because Rendition A has twice as many points of analysis. In addition, duration was analyzed in three different ways: the total time devoted to the production of held signs, the average time devoted to the production of held signs for all interpreters, whether or not they produced a held sign, and the average time devoted to the production of held signs for only those interpreters who utilized that strategy.

3. Filled pauses

The interpreter was coded as producing a filled pause when not producing a sign but either gesturing or showing a facial expression that communicated a generality or non–specific information. For example, a frequent filled pause seen in the transliteratation of Rendition B was the palms facing up, eyes cast downward, and the head shaking "no" with a furrowed brow.

The number of filled pauses in Renditions A and B were noted and compared. Next, the pause points in Rendition A and the same no–pause locations in Rendition B were analyzed for the occurrence of filled pauses. The percentage was calculated of filled pauses at the 22 pause points in Rendition A and the 11 artificial pause points in Rendition B. The duration of all filled pauses was measured using a time code bar. Comparisons were done of total time devoted to filled pauses, average time devoted to filled pauses of all twenty interpreters, and the average time devoted to filled pauses of only those interpreters who used filled pauses.

4. Empty pauses

A pause was coded "empty" if the interpreter assumed one of two positions: if the hands were placed in the lap motionless, usually one over the other, or if the hands were held at waist level

motionless, usually one over the other. Behaviors that often accompanied these two positions were downcast eyes and a neutral facial expression. In other words, the visual channel was empty; no specific communication was occurring, but the interpreter was still engaged with the process.

An analysis of empty pauses first involved a count of their frequency as they appeared anywhere within the one minute segment of A and B. Empty pauses in relation to pause points in Rendition A were compared to the same no–pause points in Rendition B. The percentage of the 22 pause point locations in Rendition A was compared with the percentage of the 11 artificial pause points in Rendition B. Duration comparisons were conducted on total time devoted to empty pauses, average time devoted to any one empty pause (all twenty interpreters), and the average time of an empty pause of only those interpreters who used empty pauses.

Combinations

As the data analysis progressed, it became clear that these four behaviors—gaze shifts, held signs, empty pauses, filled pauses—regularly occurred in combination; e.g. a gaze shift, followed by a held sign, followed by a gaze shift. Fourteen behavior combinations were identified and their distributions compared to pause type. For Rendition A separate distributions were created for the WSP, BSP, and BTP. Distributions were also complied for the same no–pause locations in Rendition B.

Lag time

The interpreter's lag time was measured at three points within the selected segments of both Renditions. This measurement required identifying three key words on the audiotape. A measurement was taken between the point where the word on the source tape could be heard and the point where the interpreter produced the sign representing that word. From these measurements each interpreter's average lag time was determined for both Renditions. The actual number of signs produced during the lecture segment was counted and converted to signs per minute. Frequency distributions and *t*–tests were conducted on the majority of the data. Some data required the use of a nonparametric statis-

tic. In these cases, the Wilcoxon matched–pairs, signed–ranks test was used. The distribution of the fourteen interpreter behaviors related to the pause types is presented in bar charts, Figures 2–7.

Results

The major findings of this study are (a) that sign language interpreters visually represent the audible paraliguistic pauses of the source message, and (b) that the pauses produced in signed target message and those in the source message coincide in location. interpreters transliterated a pause with four visible behaviors: gaze shifts, held signs, filled pauses, and empty pauses. These behaviors occur either alone or in combination. Furthermore, certain combinations tended to coincide with specific pause types. With respect to duration, interpreters devoted the most total time to the production of held signs, followed by filled pauses and then empty pauses, but the average duration of any one produced pause was longest for an empty pause, next a filled pause; held signs used the shortest amount of time.

Gaze shifts analyzed

Analysis of the interpreters' eye movements showed that gaze shifts occurred frequently throughout the transliterated passage and appear to function in a variety of ways; e.g. gaze shifts accompanied verbs that moved from one location to another and served to designate a change in speaker. The interpreters' total number of gaze shifts, during both Rendition A and B, were fairly consistent; it is important to note, however, that the location of the gaze shifts differed greatly between Renditions (Table 1). This is best shown through a comparison of gaze shifts at the 22 pause points in Rendition A and the same no–pause points in Rendition B. Iinterpreternterpreters averaged significantly more gaze shifts at the pause points in Rendition A than at the same no–pause points locations in Rendition B. Rendition B also presented the interpreter with 11 artificial pauses. An analysis of the interpreter's behavior at these 11 points showed that the artificial pauses were rarely included in the transliteration. When compared with the 22 pause point locations the difference was significant.

Rendition	*Mean*	*Stand. Dev.*	*t-Value*	*2-t'd. prob.*
Total, A	45.50	11.10	2.01	0.059
Total, B	40.50	9.27	2.01	0.059
22 pause points in A	17.70	3.79	5.71	0.000
22 no-pause points in B	11.65	3.79	5.71	0.000
22 pause points in A*	0.80	0.17	10.31	0.000
11 artificial p-points, B	0.26	0.18	10.31	0.000

* Means differ because of different occurrence percentage.

Table 1. Interpreters' gaze shifts compared.

Held signs analyzed

Table 2 summarizes the analysis of held signs. Apparently held signs have a more limited function than gaze shifts. They appear to function almost exclusively as a means for communicating a pause. During the one minute segment of Rendition A, interpreters produced an average of 2 more held signs than in B. In A almost all of the held signs produced were located at pause points corresponding to pause points in the source message. The few that did not coincide were held signs produced at semantic pause locations created by the interpreter; e.g. the following phrase had no pause in the source message:

... they're in a hard position right now and they have ...

However, several interpreters inserted a pause in the form of a held sign after the word "position" and eliminated the phrase "right now."

When pause points in Rendition A were compared with the same no pause locations in B, there was a significantly lower incidence of held signs in B. In addition, held signs were rarely found to coincide with source message locations where an artificial pause was inserted.

Rendition	*Mean*	*Stand. Dev.*	*t-Value*	*2-t'd. prob.*
Total, A	8.85	3.66	2.16	0.044
Total, B	6.55	3.90	2.16	0.044
At 22 p'se points in A	6.45	2.80	6.30	0.000
At 22 no-p. points in B	2.55	2.11	6.30	0.000
At 22 p'se points in A*	0.29	0.13	8.03	0.000
11 artificial p-points, B	0.05	0.06	8.03	0.000
Duration, p-p, 22 in A	3.37	1.88	6.36	0.000
Dur. no-p-p 11 artif. in B	1.28	1.21	6.36	0.000
Av. dur. p-p, 22 in A	0.51	0.14	1.97	0.063
Av. dur.no-pp, 22 in B	0.41	0.18	1.97	0.063

* Means differ because of different occurrence percentage.

Table 2. Interpreters' held signs compared.

The salient characteristic of held signs was time of duration. Specifically, 0.33 seconds or longer. In Rendition A the total time devoted to held signs was almost three times greater than in Rendition B. However, while the occurrence of held signs significantly differed between the two renditions, the average time devoted to the production of any one held sign was very similar.

Filled pauses analyzed

Filled pauses had a low occurrence throughout the one minute segment (Table 3). interpreters averaged three filled pauses in each rendition; however, like held signs, the location of the filled pauses differed between the renditions. When pause points and no–pause points were analyzed, the analysis showed there was a significant difference between A and B in occurrence between filled pauses at pause points in Rendition A The interpreters rarely used a filled pause at the artificial locations. The total average time devoted to filled pauses at pause points in A was more than twice that used in B. The average duration for any one filled pause was not significantly different in A and B.

Rendition	*Mean*	*Stand. Dev.*	*t-Value*	*2-t'd. prob.*
Total, A	3.50	2.16	0.31	0.757
Total, B	3.35	2.62	0.31	0.757
At 22 p'se points in A	2.60	1.67	2.80	0.012
At 22 no-p. points in B	1.30	1.42	2.80	0.012
At 22 p'se points in A*	0.12	0.08	5.15	0.000
11 artificial p-points, B	0.03	0.05	5.15	0.000
Duration, p-p, 22 in A	2.02	2.14	2.27	0.035
Dur. no-p-p 11 artif. in B	0.89	1.17	2.27	0.035
Av. dur. p-p, 22 in A	0.58	0.29	2.00	0.059
Av. dur.no-pp, 22 in B	0.38	0.37	2.00	0.059

* Means differ because of different occurrence percentage.

Table 3. Interpreters' filled pauses compared.

To get a better picture of the duration of filled pauses, a recalculation was done eliminating all non–occurrences. The average duration of filled pauses of those interpreters who used them was 0.61 for Rendition A (19 out of 20) and 0.63 for Rendition B (12 out of 20). Like held signs, filled pauses also show similarity in duration although the duration required is longer.

Rendition	*Mean*	*Std. Dev.*	*M rank*	*z-Value*	*2-t'd prob.*
Total, A	1.65	1.69	6.07	–0.21	0.834
Total, B	1.9	2.3	8.08	–0.21	0.834
22 pause points in A	1.6	1.56	7.00	–1.22	0.222
22 no pause points in B	1.2	1.77	7.00	–1.22	0.222
Duration, 22 p-p in A	1.57	1.71	7.55	–1.31	0.192
Dur. 22 no-p-pts in B	1.02	1.60	9.25	–1.31	0.192
Avg. dur. 22 p-pts in A	0.59	0.47	8.60	–1.48	0.139
Avg. dur. no p-pts in B	0.37	0.48	6.80	–1.48	0.139

Table 4. Interpreters' empty pauses compared (Wilcoxon matched pairs, signed ranks test).

Empty Pauses analyzed

As can be seen from the means, the occurrence of empty pauses was very low. For this reason all statistics for this area were calculated using the Wilcoxon matched–pairs, signed–ranks test. Slightly more empty pauses occurred in B than in A. In A all empty pauses occurred at pause points. Comparison of the pause points showed no significant difference between A and B. However, the location and function of these pauses was very different between renditions. In B empty pauses were often used when the

interpreter was confused by the source message and needed to stop the process and listen before continuing. In A empty pauses appeared to have a very specific function; i.e. they were found to be the most frequent behavior for a between–topics pause. In addition, empty pauses did not occur at artificial pause points in Rendition B; therefore, this calculation was eliminated from analysis.

Of all pause types, the least total time was devoted to empty pauses, however, the production of an empty pause required the longest duration. The average duration of an empty pause was not found to be significantly different between renditions. A recalculation of the average duration of empty pauses using only the data from those interpreters that actually produced empty pauses at pause points yielded an average empty pause duration of 0.73 for Rendition A (14 out of 20) and 0.73 for Rendition B (9 out of 20).

Questionnaire

A summary of the questionnaire data can be found in Table 5. There was no significant difference in the interpreters first and second rating of their daily performance. However, the rating of "current performance" of Rendition A and Rendition B was found to be significantly different.

Besides rating "current performance," the participants were asked to comment in writing on the challenging aspects of transliterating Rendition A and B and to identify any major differences between their current performance and their daily performance. The comments made after transliterating Rendition A were mostly related to external issues affecting the interpreter. For example, the most frequent comments were related to the mechanics of videotaping: being in a formal television studio, bright lights, having their performance videotaped, etc. Several interpreters also commented that the absence of a deaf consumer made a difference in their performance; they rely on feedback from the deaf consumer when assessing the clarity of the message.

The comments about Rendition B mostly reflected the internal process required by the task. The most frequent comment made was that the unnatural pausing did not allow complete concepts

to be understood. As a result the interpreters felt they made many errors, became tired very quickly, and had to maintain a much longer lag time. Several viewed the task as a mental challenge that they were determined to meet.

Rendition	*Mean*	*Stand. Dev.*	*t-Value*	*2-t'd. prob.*
Daily perf. rating, A	84.25	7.04	–1.26	0.222
Daily perf. rating, A	85.10	6.88	–1.26	0.222
Curr. perf. rating, A	74.35	12.61	3.17	0.005
Curr. perf. rating, B	63.25	16.49	3.17	0.005
Text difficulty, A	61.50	19.47	–5.26	0.000
Text difficulty, B	78.40	14.08	–5.26	0.000
Lag time, Rendition A	2.29	1.26	–0.99	0.033
Lag time, Rendition B	2.66	1.45	–0.99	0.033
Signs/min. in A	106.00	13.16	1.31	0.205
Signs/min. in A	102.90	13.21	1.31	0.205

Table 5. Interpreters' self–ratings, lag time, & signs/minute.

On average, the interpreters rated their transliteration of Rendition A more than ten percentage points higher than their performance of Rendition B. The interpreters were also asked to rate the difficulty of each text. On average, B was found to be almost 17 percentage points harder than A. An analysis of the lag time supports the level of difficulty. B required the interpreters to maintain a longer average lag (2.66 seconds) than did A (2.29

seconds). The order in which interpreters completed the audiotapes was found to influence their lag time. Although a week was required between the completion of Renditions A and B, a practice effect was found. For this reason the computation of lag time included only the interpreters' first videotape and not the second.

The actual signs per minute produced by the interpreters was not found to differ significantly between the two renditions. However, as will be discussed below, the quality of the transliteration was much better in A than B.

Pause types

The coded behaviors coinciding with source message pauses (i.e. gaze shifts, held signs, filled pauses, and empty pauses) occurred either alone or in combination. Table 6 lists all of the observed interpreter behaviors that coincided with source message pauses. The frequencies of these 14 behaviors were calculated and analyzed with respect to the three pause types found in Rendition A (i.e. WSP, BSP, and BTP). Furthermore, these same locations in Rendition B, where no pause actually occurred, were also analyzed with respect to the 14 behaviors.

Table 6. Interpreter behaviors coincident with source message pauses.

1. GS,	Single Gaze shift
2. GS HS,	Gaze shift followed by a held sign
3. GS FP,	Gaze shift followed by a filled pause
4. GS EP,	Gaze shift followed by an empty pause
5. GS HS GS,	Gaze shift, held sign, gaze shift
6. GS FP GS,	Gaze shift, filled pause, gaze shift
7. GS EP GS,	Gaze shift, empty pause, gaze shift
8. HS GS,	Held sign followed by a gaze shift
9. FP GS,	Filled pause followed by a gaze shift
10. EP GS,	Empty pause followed by a gaze shift
11. GS GS,	Gaze shift followed by a gaze shift
12. HS,	Single Held sign
13. FP,	Single Filled pause
14. EP,	Single Empty pause

Within–sentence pauses (WSP)

An analysis of the interpreters' within–sentence pauses in Rendition A is represented in Figure 2. The source message segment selected for analysis contained 14 within–sentence pauses. Of the 280 data points (14 within–sentence pauses by 20 subjects), 45 did not contain any of the coded behaviors. Figure 2 shows the distribution of the remaining 235 points. The two most frequent interpreter behaviors were single eye shifts (GS) and held signs followed by a gaze shift (HS GS). Gaze shifts at WSP points accounted for more than 60% of the data. More than 27% of the data are accounted for when all behaviors involving a held sign are totalled.

Of the total WSPs, the 14th showed the highest agreement among interpreters. The source text surrounding it was:

> Manipulation happens personally (WSP #14) and professionally.

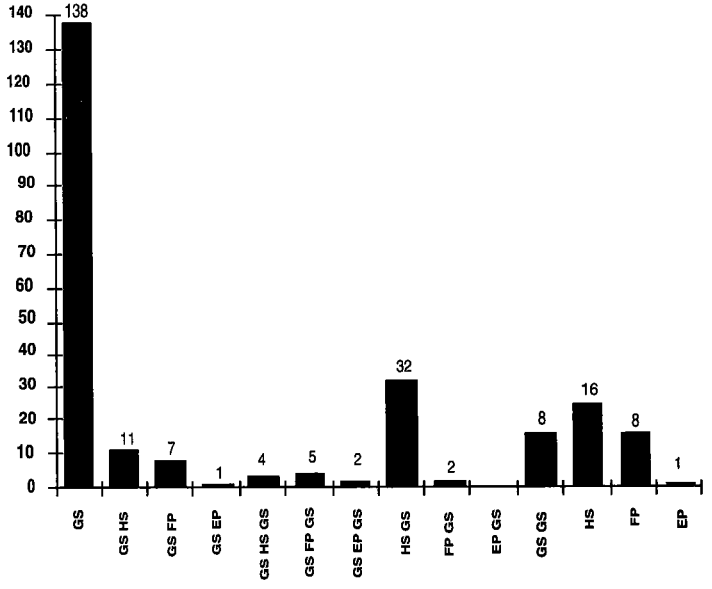
Of the 20 interpreters, 16 generated a single gaze shift following the transliteratation of the word *personally*. The remaining four did not exhibit any of the coded behaviors. However, WSP numbers four and five generated the most diverse behaviors:

> Your goal here is to express what you think or feel (WSP #4) allow your ...
> and
> ... friends the opportunity to comment (WSP#5) and come to some sort of compromise.

The majority of the behaviors were found to be gaze shifts and held signs followed by gaze shifts; however, the remaining behaviors were spread out over nine different behavior categories. One possible explanation for this diversity in behavior may be related to the conflicting messages the interpreter receives at this point in the source message. The phrase "Your goal is to express what you think or feel," appears to the interpreter to be a complete sentence grammatically; but in the source message, the speakers' vocal intonation rises after "feel" and then continues with the next phrase. The second phrase in the above sentence;

"allow your friends to comment," repeats the same type of conflicting message as the first phrase, possibly leaving the interpreter uncertain as to the type of pause to be interpreted.

Figure 2. Distribution of interpreter behaviors which coincide with source message, within sentence pauses. (Rendition A)



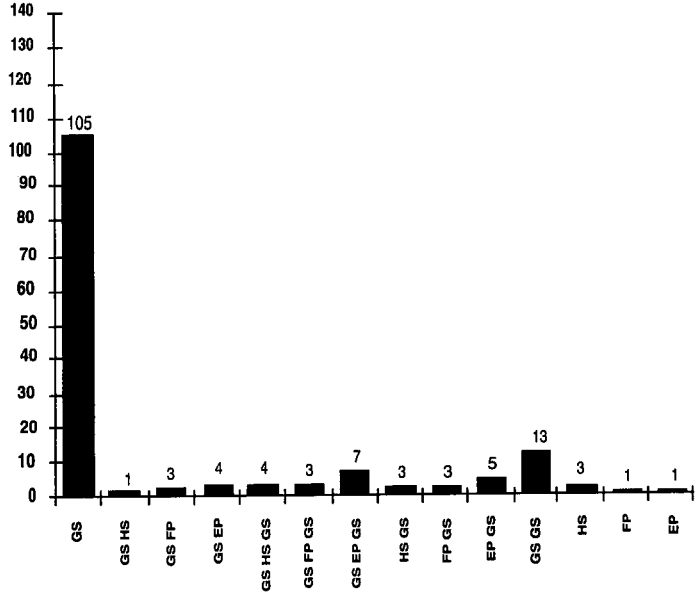
The same 14 data points were analyzed in the transliteratation of Rendition B. None of these points contained vocal pauses; so all behaviors resulted from semantic information received by the interpreter. Of the 280 points analyzed, 124 did not contain any of the coded behaviors. Figure 3 shows the distribution of the 156 behaviors; most frequent, gaze shifts, which accounted for more than 75% of the data.

Between–sentence pauses (BSP)

The source message segment in Rendition A selected for analysis, contained seven BSPs. Of the 140 points, at which data were collected, sixteen did not contain any of the coded behaviors. An analysis of the remaining 124 points are represented in Figure 4. The most frequent interpreter behavior was a held sign followed

by a gaze shift (HS GS), which accounted for 27.3% of the behaviors. Single gaze shifts (GS) was the second most frequent behavior and accounted for 14.2% of the coded behaviors. A tally of all behaviors involving held signs (i.e. GS HS, GS HS GS, HS GS, and HS) accounts for more than 50% of the data.

Figure 3. Distribution of interpreter behaviors which coincide with text locations where within sentence pauses were removed. (Rendition B)



Among the transliterations, BSP #5 was the most consistent:

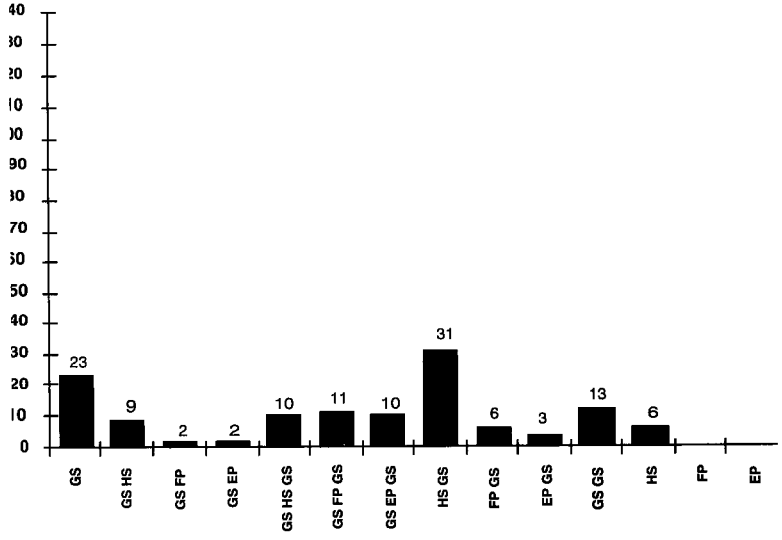
> Guilt, unfortunately is destructive to our relationships, and to ourselves. (BSP #5) We have to learn...

Of the 20 interpreters, 13 demonstrated one of the pause behaviors involving a held sign. The two between sentence pauses that generated the most diversity were:

> ... or arrange to meet you at another time. (BSP #1) Again, your goal is to express...

and
... even though I didn't want company tonight. (BSP #4) Guilt, unfortunately is destructive...

Figure 4. **Distribution of interpreter behaviors which coincide with source message, between sentence pauses. (Rendition A)**



In both instances, the between–sentence pauses are followed by the beginning of a new conceptual development. If written, "Guilt" and "Again" would begin new paragraphs. The source language communicates this through the presentation of a single stressed word at the beginning of a sentence immediately followed by a WSP. An analysis of the interpreter's pause behavior at these two data points, accounts for 75% of the BSP behaviors involving a filled pause (i.e. GS FP, GS FP GS, FP GS, and FP).

The same seven data points were analyzed in the transliteratation of Rendition B. None of these points contained vocal pauses in the source message and the intonational change was greatly reduced. Of the 140 points analyzed, 26 did not contain any of the

coded behaviors. The most frequent behaviors exhibited were single gaze shifts which accounted for 44% of the behaviors. Figure 5 shows the distribution of the 114 coded behaviors.

Between–topic pauses (BTP)

The source message segment selected for analysis contained one between–topics pause:

> Manipulation happens personally and professionally. (BTP#1)
> Let's go back to the idea of preventing...

This particular pause has several unique characteristics. The word immediately preceding the pause, "professionally," shows a change in the vocal pace. The word is spoken slightly slower and more emphatically and is spoken with a steep decline in intonation. The silence here is 2.97 seconds as compared to the WSPs and BSPs which averaged 0.55 and 1.11 seconds, respectively. The first word of the next sentence, "Let's" is spoken with a strong rising intonation, and the words themselves suggest a change of topic, "Let's go back..."

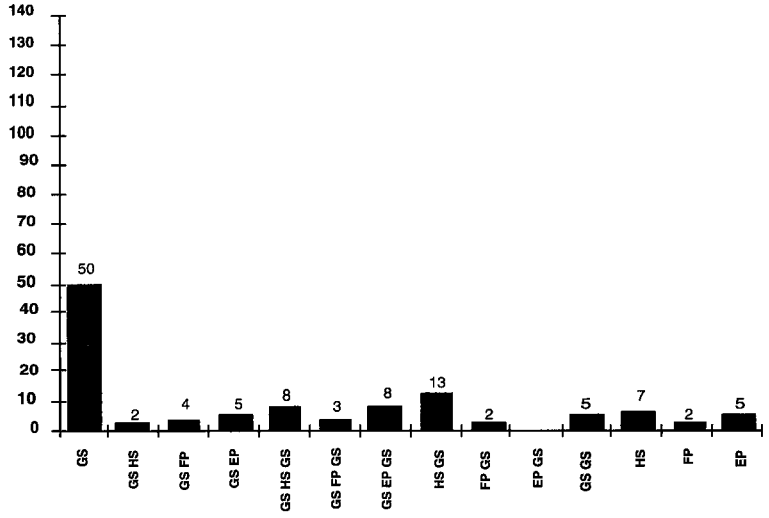
An analysis of the interpreters' pausing behavior shows strong agreement. Of the 20 data points, 70% involved the use of an empty pause (i.e. GS EP = 15%, GS EP GS = 50% and EP GS = 5%). An analysis of the interpreter's behavior at this same point in Rendition B yielded 18 out of 20 transliterations demonstrating a behavior. The most frequent behavior was a single gaze shift.

Discussion

This study has shown that sign language interpreters do rely on source message pauses when creating by transliteration the target message, and tend to show a pause at the same location at which pauses are present in the source message. Further, these auditory pauses are given a visual form; i.e. gaze shifts, held signs, filled pauses, empty pauses or some combination of these behaviors.

With respect to gaze shifts, it was found that they regularly occurred and coincided with pauses in the source message. They appear to be the minimal behavior required to designate a pause and occur alone most often at within–sentence pauses.

Figure 5. Distribution of interpreter behaviors which coincide with text locations where between sentence pauses were removed. (Rendition B)



When occurring in combination, gaze shifts most frequently precede or follow (or both) a held sign, filled pause, or empty pause; however, they were found to occur occasionally in pairs. A gaze shift occurring before a held sign, filled pause, or empty pause appeared to signal the completion of an utterance or semantic unit. If it was then followed by a held sign, filled pause, or empty pause, the gaze remained fixed for the duration of the pause, regardless of the length of the pause. A change in eye gaze after a held sign, filled pause, or empty pause appeared to have a dual function; it served as an indicator that the pause was completed and as an introduction to the next utterance or semantic grouping.

Held signs and held signs in combination were the second most frequently used form to designate a pause in the source message. Furthermore, they were the most frequently used form for showing between sentence–pausing. Held signs serve to indicate boundaries of clauses and sentences. They are a mechanism for grouping together meaningful units (i.e. clauses, phrases, or sentences) and providing overall structure to the message.

Within the transliterated segment of Rendition A, held signs were observed only at clause, phrase, or sentence boundaries and tended to occur in combination with a gaze shift. Held signs occurred most frequently when the pause was preceded and followed by a semantic unit ending with an intonational shift. Thus, held signs were observed to function not only as a boundary marker but also as an indication that more information is coming. In those instances where the source message stopped or paused for a two to three second interval, interpreters tended to utilize an empty pause.

Under normal conditions, (Rendition A) the duration of held signs ranged from 0.33 seconds to 0.95 seconds with the average duration being 0.51 seconds. When A and B were compared, the average duration of held signs was remarkably similar. The production of held signs appears to require a minimum of 0.33 seconds to be recognized as a held sign. The maximum duration was found to be 0.95 seconds. The only time held signs were found to last longer than 0.95 seconds were in the transliteration of Rendition B. In the few instances where held signs were maintained longer than 1 second, the interpreters dropped their hands into their laps and continued the pause using an empty pause. However, none of these pauses occurred at pause locations. They occurred as major breaks in transliteration and were most likely due to confusion or cognitive overload.

Filled pauses occurred infrequently during the transliteration exercises A and B; there was thus not enough data for full analysis of filled pauses, but there is some evidence to suggest that a filled pause may serve to communicate that the message is being received but the interpreter does not yet have enough information to construct a reasonable transliteration.

As discussed earlier, 75% of the filled pauses observed occurred at BSPs #1 and #4.

... or arrange to meet you at another time. (BSP #1) Again, your goal is to express...
and
... even though I didn't want company tonight. (BSP #4) Guilt, unfortunately is destructive...

One possible explanation for this is that the manner of vocal presentation may be a signal to the interpreter that a conceptual change is about to occur. Thus, the interpreter needs to wait for additional information in order to determine where the speaker is headed before the transliteration can commence. The filled pause may be functioning as a "visual filler" until the interpreter has accumulated enough information to present the target message. Other data that support this conclusion are found in the measurement of the duration of filled pauses. Filled pauses ranged from 0.33 to 1.5 seconds, with the average being 0.61. This longer pause duration may provide the interpreter with a longer listening time. In other words, the interpreter producing the filled pause continues to receive information from the source. Once a sufficient amount of information is accumulated, then the transliteration can commence.

Another finding that lends support to the "visual filler" concept is that no interpreter produced an empty pause at BSP #1 or #4. If the interpreter needed more time to listen, then dropping ones hands might appear to be the best choice. However, the continued auditory reception of the message seems to encourage the use of a filled pause. In addition, filled pauses were rarely found during longer stretches of silence. These pauses were much more likely to be shown by the interpreter in the form of an empty pause.

Related to duration, the average duration of a filled pause did not vary between Renditions. As stated earlier, the average duration of a filled pause was 0.61 and 0.63 seconds for A and B respectively. This similarity in duration suggests that the time involved in the production of a filled pause is probably more closely related to the function of a filled pause and less related to the actual time of an auditory pause in the source message.

Empty pauses had the lowest occurrence but the strongest correlation with a particular type of pause, i.e. the between–topics pause. The empty pause appears to function as a way to communicate that the source message has presented the interpreter with a long moment of silence. These longer pauses tend to occur at major topic shifts, which may require the interpreter listen for several seconds before knowing the direction the speaker has

chosen. This longer waiting period is supported by the finding that empty pauses were found to range from 0.5 to 3.2 seconds with an average of 0.73 seconds. Consistent with other findings related to held signs and filled pauses, the average duration of an empty pause was found to be the same regardless of the rendition being transliterated—thus the average supports the idea that the production of an empty pause has a specified time criteria.

Although the accuracy of transliteration was not measured, it was very clear as the analysis progressed, that the overall accuracy of Rendition A far surpassed Rendition B when compared with the source message. However, given the difficulty of Rendition B, the interpreters did remarkably well at providing a fairly intelligible transliteration. While their performance was less fluent, they were still able to decode a large percentage of the source message and reinsert appropriate pausing and intonation into the target message.

Some interpreters were so good at repairing the message that it appeared that the source message was presented in normal speech. This amazing ability to engage in mental gymnastics is clearly prerequisite to the task of interpreting in general and sign language interpreting in particular.

This study has provided valuable information regarding how master interpreters performing transliteration understand and represent the paralinguistic features of source and target message pausing. An important application of this research is the education of student interpreters. Students tend to spend a great deal of time focusing on the semantic and syntax levels of a message, often ignoring its paralinguistic features. When students of interpreting and transliterating are made aware of vocal pauses and their functions in source messages, they tend to analyze better the meaning and structure of the source message. In addition, when students learn how to translate auditory pauses into visual representations, the messages they produce are more cohesive.

Future work in this area should focus on how sign language interpreters utilize pausing when providing an interpretation versus transliteration. It is also important to know how visual pausing, for example, in an signed monologue, would be translated into spoken English by an interpreter. Furthermore, it is impor-

tant to study how other paralinguistic features, such as vocal stress, intonational contours, etc., may affect the transliterating process. Research is needed also on other paralinguistic aspects of speech; e.g. vocal qualities associated with emotional states. A further analysis of how sign language interpreters translate these paralinguistic features will provide a deeper understanding of the transliterating and interpreting processes.

Appendix A

Description: The entire audiotaped monologue is 11 minutes in length. The text was taken from the audiotaped program entitled "Assertiveness Training" (Cocco 1983). The following is a sample of the text used for Rendition A, in which vocal pausing followed the grammatical structure of the script:

> Assertiveness is helpful because it improves our relationships. It allows us to be more honest with people we really care about, and allows us to improve our own family relationships, our on–the–job performance, and our ability to handle guilt, manipulation, and our own anger and criticism that we may find from others. In assertiveness training, we work very hard to make sure we're saying what we mean and to make sure that the other person understands us and understands exactly what we want to say.

The following is a sample of the text used for Rendition B. The marking '| |' indicates where the vocal pauses were inserted:

> assertiveness is helpful because it improves our relationships it allows | | us to be more honest with people we really care about and allows us | | to improve our own family relationships our on–the–job performance and | | our ability to handle guilt manipulation and our own anger and criticism | | that we may find from others in assertiveness training we work very hard | | to make sure we're saying what we mean and to make sure that the other | | person understands us and understands exactly what we want to say most | |

Appendix B

Questionnaire #1

Subject # _____ Rendition _____ 1. Age: ____ 2. Sex: F / M
3. Years of interpreting experience: _____
4. Highest academic degree _____
5. Which RID Certifications do you hold?
_____ CSC_____ IC_____ OIC:C_____ OIC:SV/VS

_____ CT_____ TC_____ OIC:SV

_____ CI_____ IC/TC_____ OIC:VS
6. On a scale of 100, where "0" is nonexistent and "100" is an excellent transliteration, rate your daily transliterating performance.
0 : 10 : 20 : 30 : 40 : 50 : 60 : 70 : 80 : 90 : 100
7. On a scale of 100, where "0" is nonexistent and "100" is an excellent interpretation, rate your interpretation performance of this lecture.
0 : 10 : 20 : 30 : 40 : 50 : 60 : 70 : 80 : 90 : 100
8. On a scale of 100, where "0" is very easy and "100" is extremely difficult, rate how difficult this passage was to interpret.
0 : 10 : 20 : 30 : 40 : 50 : 60 : 70 : 80 : 90 : 100
9. What were the challenging aspects of this lecture?
10. What are the major differences between your performance on this lecture and your average performance?

Questionnaire #2

Subject # _____ Rendition _____
1. On a scale of 100, where "0" is nonexistent and "100" is an excellent transliteration, rate your daily transliterating performance.
0 : 10 : 20 : 30 : 40 : 50 : 60 : 70 : 80 : 90 : 100
2. On a scale of 100, where "0" is nonexistent and "100" is an excellent transliteration, rate your transliteration performance of this lecture.
0 : 10 : 20 : 30 : 40 : 50 : 60 : 70 : 80 : 90 : 100
3. On a scale of 100, where "0" is very easy and "100" is extremely difficult, rate how difficult this passage was to interpret.
0 : 10 : 20 : 30 : 40 : 50 : 60 : 70 : 80 : 90 : 100
4. What were the challenging aspects of this lecture?
5. What are the major differences between your performance on this lecture and your average transliterating performance?
6. Do you think your performance was significantly influenced by the fact that you interpreted this passage one week ago? If yes, in what way?
7. What were the major differences between your performance today and the last time you interpreted this passage?

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