NCIEC
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The Effects of Lag Time on Interpreter Errors

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Abstract

A popular but naive notion that sign language interpreters should strive for perfect temporal synchrony with the source message has persisted for a long time. This study provides evidence that imposing such a constraint or expectation upon interpreters results in inaccurate interpretation and an increase in interpreter errors or miscues. An analysis and count of miscues in actual interpreter performances has been compared with interpreters' lag time (i.e. the time between delivery of the original message and delivery of the interpreted message). The result shows an inverse relationship between the amount of lag time and the number of interpreter errors. This relationship has serious implications for interpreter educational programs, interpreter assessment programs, and programs intended to make consumers aware of interpreting's limitations.

The Interpretation Process

Despite limited research on interpretation of signed languages, and of spoken languages, there have been several attempts to understand interpretation through formulation of models for the interpretation process (e.g. Gerver 1976, Moser 1978, Ingram 1974, Ford 1981, Cokely 1985). While there are differences in the sets of factors and characteristics each model addresses, they all view interpretation as a complex cognitive process. Regardless of which model one accepts, it is clear that the execution and activation of the interpreting process depends upon input that is not controlled by the interpreter; i.e. the source language (SL) message. It is also clear that the accuracy of any interpretation is directly dependent upon the interpreter's comprehension of the original message -- what is not understood cannot be accurately interpreted and what is misunderstood will be misinterpreted.

If the accuracy of an interpretation is related to the interpreter's comprehension, it seems reasonable to ask what the necessary conditions are that will allow accurate comprehension. While it is possible to posit a number of conditions (e.g. familiarity with the subject matter and the speaker), this study will address the question of message processing time, specifically the effects on interpreter errors of lag time (the time between delivery of an original message

and the delivery of the interpreted version of that message).

Database

During the winter of 1983, a national conference was held at the Asilomar Conference Center in Monterey, California. There were approximately 15 presentations during the conference, all of which were interpreted. The data chosen for this study were taken from among the 9 spoken English plenary sessions held during the conference. Each of these sessions was simultaneously interpreted and transliterated for deaf participants. Interpreters were located at stage left (the audience's right), and transliterators were located at stage right. Based on reports from the interpreters, the presence of the transliterators served them as a psychological reminder and impetus to interpret and not transliterate.

Permission was obtained from the speakers, interpreters, and transliterators to videotape 10 of the presentations. VHS videotapes of interpreters were made using a professional quality Sony color camera. A simultaneous audio recording of each speaker was made on each videotape, using a directional microphone. For each presentation the camera focused on the interpreter so that the resulting video image was approximately a three-quarters full body shot. Video cassette work copies were made of each tape and included a digital display of hours, minutes, seconds, and tenths of seconds at the bottom of the picture.

Of the ten interpreters videotaped, four were selected for this study, two with deaf parents (DP) and two with hearing parents (HP). The average age of the four was 33.4 (30 years for DP and 36 years for HP). Both groups have about the same paid interpreting experience (12.5 years for DP, 12.0 years for HP), and there is relatively little difference in the length of time that members of both groups have held certification from the Registry of Interpreters for the Deaf (8.5 DP, 7.5 HP).

Each of these interpreters worked as a member of a team with another interpreter, relieving each other approximately every twenty minutes. All of the presentations they interpreted can be categorized as spoken English expository monologues. In general each hearing speaker-presenter discussed pertinent research, described personal experiences, and offered practical suggestions. In the data for this study there were no audience comments or questions.

A sampling procedure was used to select the videotaped data to be transcribed for this study: the final minute of each five minute segment of tape available for each interpreter was transcribed. This 20 sampling procedure not only avoided biased selection of a portion of each interpreter's performance but also provided a more realistic indication of each interpreter's overall performance. The procedure yielded a total of 8 minutes of data for each interpreter.

After the work copies were completed and the sample segments identified, two native speakers of English transcribed and verified the audio portion of each tape. A transcription form was used that enabled second-by-second synchrony of the transcription with the digital timing display on the image. An experienced deaf native user of ASL transcribed the interpreters' performances, and working with the author, verified those transcriptions. Speakers' utterances and interpreters' performances were independently transcribed, and

only after being verified were they placed on the same transcription form. Conventional orthography was used to transcribe speakers' utterances, and the transcription system described in detail in Baker and Cokely (1980) was used to transcribe interpreters' performance.

Lag Time

Because of the cognitive demands of the interpretation process, interpreters cannot immediately begin interpreting when the speaker begins uttering the source language (SL) message. They must wait until they have heard a sufficient portion of the SL message before beginning to produce the target language (TL) rendition. This period of time between the SL utterance and the TL rendition is the interpreter's lag time or decalage.

Average lag times of 2-3 seconds (Barik 1972) and 10 seconds (Oleron & Nanpon 1965) have been reported, and are largely a function of the structural differences between the SL and the TL. When the structures of the two languages are similar, a shorter lag time may be possible; however, when the structures are significantly different, a longer lag time is required.

Two of the interpreters in this study (one DP, one HP) had average onset lag times of 2 sec., with ranges of 1-5 sec. and 1-4 sec., respectively. The average onset lag times of the other two interpreters were 4 sec. for each, with a range of 1-6 seconds. Figure 1 illustrates the maximum, minimum, and average amount of SL information (calculated as the number of SL words) available to interpreters.
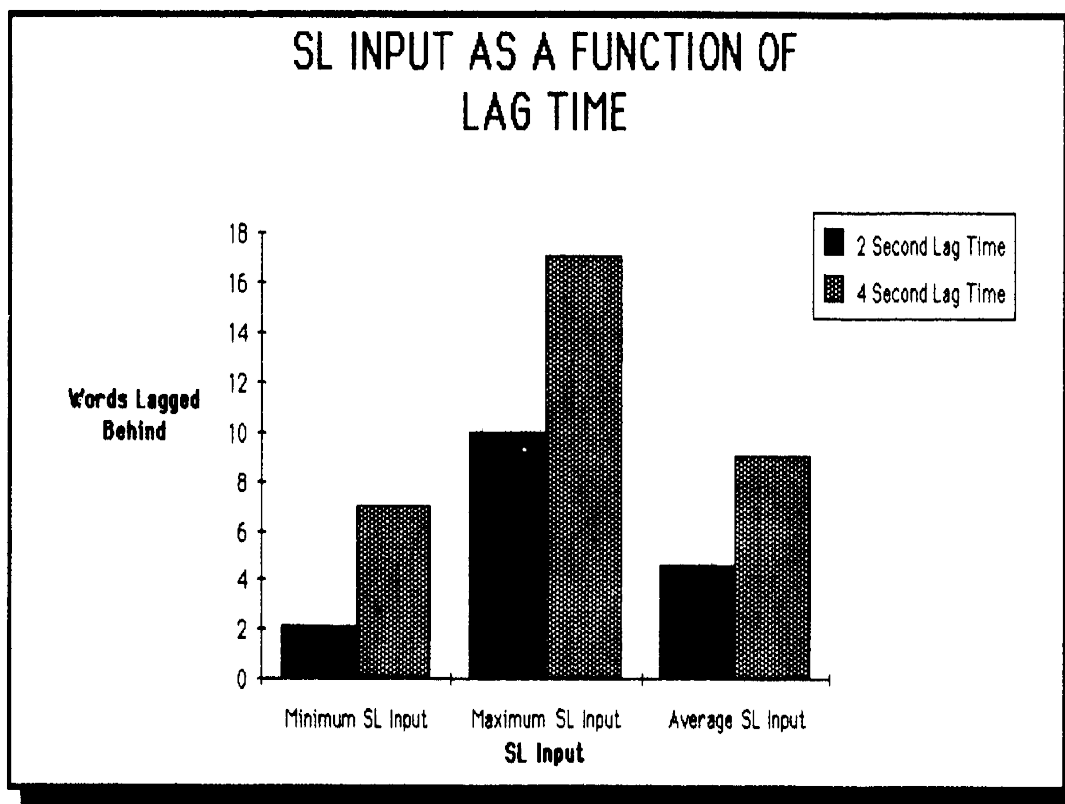
Fig. 1

Given the relationship between comprehension of the SL message and the interpretation's accuracy, it is reasonable to expect that those interpreters who are able to receive more of the SL message before delivering the TL rendition will provide consistently more accurate interpretations. That this is indeed the case can be seen by examining the types and frequency of interpreter miscues.

Interpreter Miscues

For an interpretation to be considered accurate or appropriate, the meaning of the SL message must be determined by the interpreter and conveyed in such a way that the meaning is intelligible in the TL. The very nature of the interpretation process makes it possible to determine the extent to which interpreted text tokens adhere to or deviate from the meaning of their SL counterparts. Those instances in which equivalence is not achieved can be considered miscues, i.e. deviations from the original text. More specifically, a miscue is lack of concordance between the information in a TL interpreted message and the information in the SL message it is supposed to convey. While a detailed discussion of interpreter miscues can be found elsewhere (Cokely 1985), the following types of interpreter miscues are germane to this study. (It should be noted that some of the examples that follow contain more than one miscue;

however, only the miscue type in question is identified.)

1. Omissions

This category refers to instances in which lexically conveyed SL information has been left out of the TL interpretation. While there is no expectation of a one-to-one correspondence between the SL and TL, there is clearly an expectation that the information conveyed by the SL message will be conveyed in the TL interpretation. 1.1 morphological omission: content information clearly conveyed by bound morphemes in the SL message is omitted:

```
SL: "...for the Russian teachers..."
        (body shift to left              )
TL: "...INDEX-rt TEACH AGENT RUSSIA..."

Translation: "...for the Russian teacher..."
Omission: PLURAL
```

1.2 lexical omission: content information that is clearly conveyed by distinct lexical items in the SL is omitted:

```
SL: "...What do I mean by these policy decisions?..."
        nod    (brow squint            )           tl
TL: "...POLICY   MEAN   *WHAT           "WELL      "

Translation: "...Policy means what? Well..."
Omission: "decisions"
```

1.3 cohesive omission: omission of the informational of functional value or both of an item in the SL message that can only be determined by reference to or relation with a preceding item in the SL text:

```
SL: "...more or less matching what the matrix told us we wanted. Then
     we started refining that (the test)..."
                                               t
                    _____
TL: "...(2h) THAT GOAL APPROACH , If-SAME-AS-rt
     (eyes/head rt                                )
     THAT-rt   SCHEDULE   THAT   HONOROFIC-rt , NOW
                                            t
                                       ____
     ALMOST If-SAME-AS-rt, [IHR]  ME , START

     CHANGE ++  R-E-F-I-N-E  CHANGE +++ ..."
```

```
Translation: "...Approaching that goal? It is like the matrix here. Now
       ?    is almost the same as the matrix. Me? I started changing
      and refining..."
Omission: "...then...that..."
```

2. Additions

This category refers to information that appears in the TL message but does not appear in
the original SL message.

> 2.1 nonmanual additions are nonmanual signals co-occurring with manual signs that convey
> information in the TL message different from the intent of the information in the SL
> message.

```
SL: "...an analogy to the simultaneity of listening and speaking in
     simultaneous [interpretation]..."

TL: (2h) 1-CL 'parallel'  (1h)SAME IDEA
             1-----------------------------------
                                        th
         _____
         RECEIVE-THROUGH-EAR-------------- ..."
                          TALK-------------
```

```
Translation: "...a parallel, similar idea to listening carelessly and
       talking at the same time..."
                                          th
         _____
Addition: "RECEIVE-THROUGH-EAR-------------- ..."
```

> 2.2 lexical additions are lexical items in the TL message that add information not in the SL

SL: "...If I was studying French history, the course would be
        taught in French..."
        (eyes up)   nod
TL: "...IDEA ME   STUDYwg ABOUT FRANCE POSS
                 brow raise/nod   (body shift to lf)
        CULTURE "WHOA---",   ME WILL
                     nod
        (2h)TALKwg FRANCE DURING ME TEACH (1h)THAT INDEX-rt "

Translation: "...An idea is that I study about France, its culture umm I
        will speak French while I teach that ? um..."
                 (body shift to lf)
Addition:"...ME WILL   (2h)TALKwg...DURING ME TEACH..."

message.

2.3 cohesive additions are items in the TL message that establish reference to or a relation with preceding TL message units not in the SL message.

3. Substitutions

This category covers instances in which information contained in the SL message has been replaced in the T: message by information at variance with the intent of the SL message.

```
SL: "...The second task is always designed to distract the students'
        attention from the primary task.  An analogy to the simultaneity
        [of listening and talking]..."
     (     body tilt rt)
TL: "...OTHER     WORK    MUST POINT--- OFF-THE-POINT
                               th
        PERSON INTERPRET-AGENT lf-SHIFT-FOCUS-TO-cntr
        _____.       ____intense  nodding
        MUST INDEX-middle finger  THING , BECAUSE WANT

        (2h) 1-CL'parallel' (1h)SAME IDEA..."
          1------------------------------
```

Translation: "...the other task must digress, the interpreter must
carelessly shift attention to the second thing because I want a
parallel, similar idea..."

Addition: "...BECAUSE..."

3.1 expansive substitutions are TL lexical items that expand or extend the range of meaning of the SL message.

SL: "...If I was studying French history..."

                                 nod
TL: "...IDEA ME STUDYwg ABOUT FRANCE POSS CULTURE..."

Translation: "...An idea is that I study about France, its culture..."
Substitution: "...CULTURE..."

3.2 restrictive substitutions are TL lexical items t~ restrict or constrict the range of meaning of the SL message.

SL: "...then we started refining that..."

       t
TL: "...ME, START CHANGE++ R-E-F-I-N-E..."

Translation: "...Me? I started changing and refining ..."

            t
Substitution: "...ME..."

3.3 cohesive substitutions are TL lexical items that alter the grammatical cohesive relations intended or established by the SL message.

3.4 unrelated substitutions are TL lexical items that totally deviate from the SL message and have no immediate SL motivation.

SL: "...but the U.S. [job] market necessitates urgently needs
     interpreters in two languages..."
     (body shift rt   (brow raise
TL: "...SWITCH-TO-rt WORK FOR C-O-M-M-O-N
     _____nod)) (body shift back
     M-A-R-K-E-T THAT-rt PLACE INDEX-arc PEOPLE
)   _____nod
     MUST* SKILL* TWO LANGUAGE+ INTERPRET..."

Translation: "...transfer to ? and work for the Common Market. In
     the Common Market, people definitely must be very skilled at
     interpreting two languages..."
              (brow raise   _____nod)
Substitution: "...C-O-M-M-O-N- M-A-R-K-E-T..."

4. Intrusions

Instances in which the structure of the TL is abandoned and the structure of the SL is adhered to by the interpreter are considered intrusions (of SL into TL).

4.1 lexical intrusions are the "literal" rendering in SL of certain lexical items within an otherwise generally acceptable TL utterance.

SL: "...we [spoken and sign language interpreters] testify with
     one voice..."
TL:"...US-TWO lf-FIT-IN-rt ONE VOICE..."

Translation:"...the two of us can merge one voice..."
Intrusion:"...VOICE..."

4.2 syntactic intrusions are the (almost) total and inappropriate adherence to the syntax of the SL in the production of the TL message, resulting in an inappropriate and unacceptable utterance.

SL: "...so you have an idea what I'm trying to ah get at..."
                                              _____nodding
TL: "...S-O YOU GET IDEA O-F (1h)"WHAT" MY GOAL "WELL..."

Translation: "...so you take possession of an idea of what my goal is
     umm..."
Intrusion: "...S-O YOU GET IDEA O-F..."

5. Anomalies

This category refers to instances in which the TI message is meaningless or confused and which cannot be reasonably accounted for or explained by another miscue type.

5.1 TL utterance anomalies are meaningless in the TL.

SL: "...the matiere courses were taken in the other departments..."

                                      (brow raise

TL: "...SECOND-THING OTHER-inc NEXT LIST-OF-THINGS

)   _____nod_

B-index thumb SHIFT-TO INDEX M-A-T-U-R-E

                                (brow raise

THAT-lf hand INDEX-lf hand   OTHER

'5'--------------------------   INDEX

                        _____th)

P-T-S   5:CL-cntr, 'each to lf'   ..."

Translation: "...the second item the oth- next list of items the first item the
       second item is mature that one there the other pts each careless pts..."
Anomalies:
- "...M-A-T-U-R-E..."
- lack of verb main verb in TL utterance
- lack of referent for '5'------

5.2 Interpretation anomalies are instances in which t] TL message either contains a superfluous TL utterance for which there is no SL message motivation or omits significant portions of the SL message.
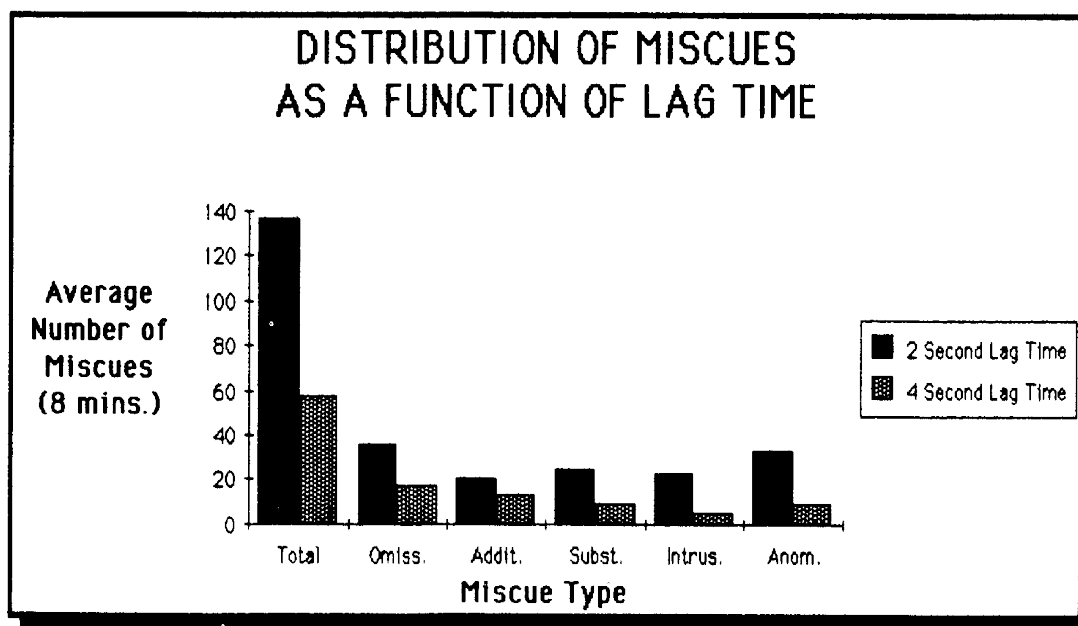
SL: "...looking at curriculum designed in such ways means that I'm
going to address also six content considerations..."

TL: "...THAT MY FEEL $\underline{\text{ABOUT}}$ LIST-OF "WAIT-A-MINUTE"
<p style="text-align:center">nodding</p>

$\overline{\text{IF WE FOLLOW THAT}}$ $\overline{\text{IDEA+ IDEA-EXPAND FOR}}$
<p>nod nodding</p>

$\overline{\text{LIST-OF}}$ INDEX-cntr . WE MUST-inc "WELL" MUST
<p>cond.</p>

FOCUS-ONcntr/rt SIX (2h)IDEA-alt THINK ABOUT
<p>(head down   )</p>

WHAT WILL INCLUDE IN* THAT LIST-OF ME WANT
<p>(body</p>

ME EXPLAIN ABOUT THAT SIX LIST-OF..."
<p>shift rt   )</p>

Translation: "...that is my feeling about the list of items - wait now - if
we follow those ideas and the expanded idea for the list of items
there we mus- well focus on _?_ six ideas think about what will be
included in that list of items that I want to I explain that six list of
items..."

Anomalies: initial and final portions of the TL message.

Miscues & Lag Time

Having detailed the types of miscues, we can now examine the relationship between miscues by type and lag time. Figure 2 presents the overall distribution of major miscue categories. Throughout this discussion, miscue occurrences are presented as an average of each pair. In no instance throughout the data did any of the interpreters deviate from the reported average for the pair by more than 5 miscues. As illustrated in Figure 2, the interpreters with a 2-second lag time had more than twice the total number of miscues of the interpreters with a 4-second lag (who had almost twice as many miscues as those with a 6-second lag). In addition, the number of miscues in each category was greater for the pair with the shorter lag time.

Fig. 2

Lag Time and Omissions

Figure 3 presents the data on omissions. As indicated, lexical omissions are the most frequent type of omission for both pairs. Again it is worth noting that there are more than twice as many total miscues for those interpreters with the shorter lag time and that this ratio holds across all subcategories. However, while frequency information is revealing, it does not necessarily mirror the significance of these subcategories. One might argue that lexical omissions, although infrequent, are less severe than cohesive or morphological omissions. Certainly the possibility that consumers might apply "close" skills (i.e. completion of partial messages) is greater for lexical omissions than for the other subcategories. Additionally, depending upon the nature of the omitted information, the overall meaning of the TL interpretation may be only slightly different from the SL message. This is in no way meant to diminish the importance of lexical omissions, however. It is simply meant to underscore the possibility that consumers will find morphological and cohesive omissions more difficult to repair than lexical omissions. Indeed, while certain instances of lexical omissions may result in meaningless or questionable TL utterances (which presumably would be identified by consumers and dealt with accordingly), morphological and cohesive omissions generally yield utterances that are meaningful and cannot be readily repaired by consumers.
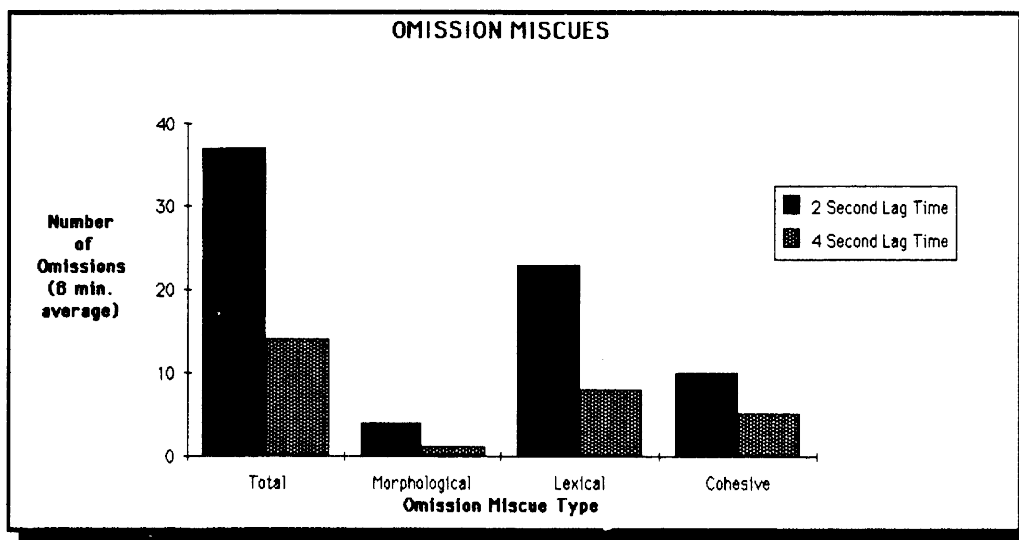
Fig. 3

A naive or uninformed view of simultaneous interpretation might hold that the shorter the lag time between SL message and TL interpretation the less likelihood that the interpreter will omit information.

However, the data presented here run counter to that notion. It would seem that increased lag time enhances overall comprehension of the SL message and allows the interpreter to determine the informational and functional value of morphological and cohesive units as well as lexical items. Conversely, a compressed lag time places the interpreter in a
quasi-shadowing task, in which differences in speech articulation and sign production rates may result in increased omissions, as the interpreter strives to "keep up" with the speaker.

Lag Time and Additions

Figure 4 presents the data on addition miscues. Again, note that there is twice the number of miscues for the pair of interpreters with a 2-second lag time than for those with a 4-second lag time. As with omissions, this may be due to the level of comprehension attained by those interpreters with a longer lag time.

ADDITION MISCUES

Number of Miscues (8 min. average)

- 2 Second Lag Time
- 4 Second Lag Time

Addition Miscue Type: Total, Non-Manual, Lexical, Cohesive
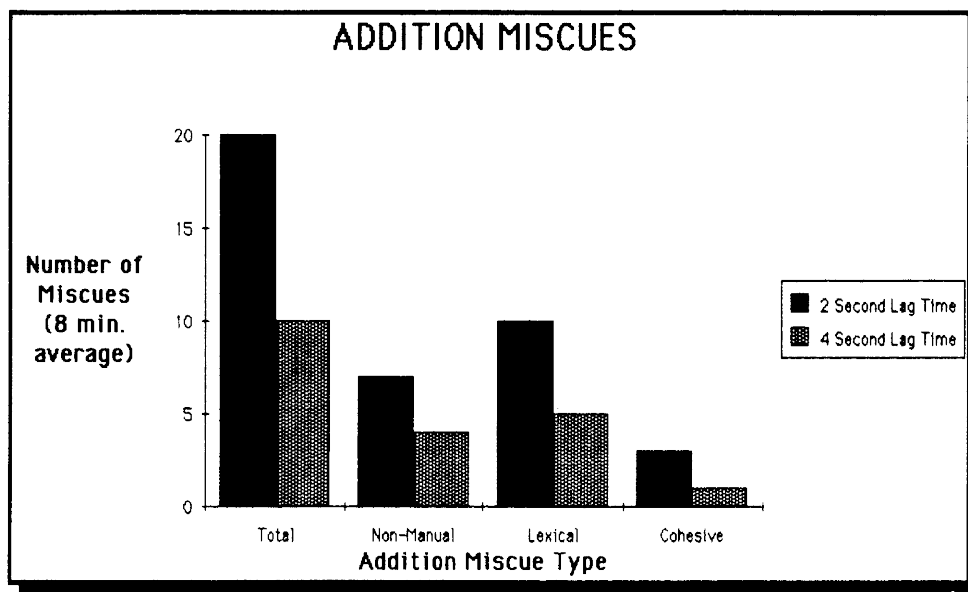
Fig. 4

As with omissions, it is useful to examine additions from the perspective of the consumer's ability to recover the intended SL meaning from a TL message to which information has been added. Clearly, if a lexical addition results in a meaningless TL message, then the consumer is alerted that something has gone awry. However, in order to recover the intended SL meaning, the consumer would have to identify the addition and delete it from the TL message. It is unlikely that consumers would be able to do this consistently and that this would be their first response. Indeed, consumers may respond by assuming that an omission has occurred, in which case they might rely on their "close" skills and perhaps compound the effect of the miscue.

The subcategory of nonmanual additions is particularly interesting. By far the two most frequent added nonmanual behaviors are 'th' and 'mm.' In fact, these two account for 73% of the nonmanual additions. One possible explanation is that there may be certain manual signs and nonmanual behaviors that were erroneously learned (or acquired) by the interpreters, or are perceived by them as single entities. Thus, the production automatically results in the

production of the (assumed "required") nonmanual behavior. Another, less satisfying, explanation is that these behaviors are used by interpreters in order to "look as if" they are using the TL. If this were indeed the motivation of nonmanual additions, then one would expect them to be more frequent than they are. The relatively limited occurrence of nonmanual additions would seem to suggest that some other factor motivates these additions (i.e. the failure to view these nonmanual behaviors as distinct from the manual signs they co-occur with).

Lag Time and Substitutions

    Figure 5 presents the occurrence of substitution miscues. Here it is worth noting that the total number of substitution miscues for those interpreters with a 2-second lag time is more than four times that for those with a 4-second lag time. As with addition miscues, substitution miscues generally offer the consumer very little possibility of (a) recognizing that the TL interpretation differs from the SL message, and (b) recovering or retrieving the intended SL meaning. The primary reason for this is that substitutions do not automatically result in ungrammatical TL utterances nor, save in a few case of unrelated substitutions, a TL utterance that is semantically marked. Thus, lacking syntactic or semantic information to the contrary, the consumer can only accept the TL utterance at "face value."
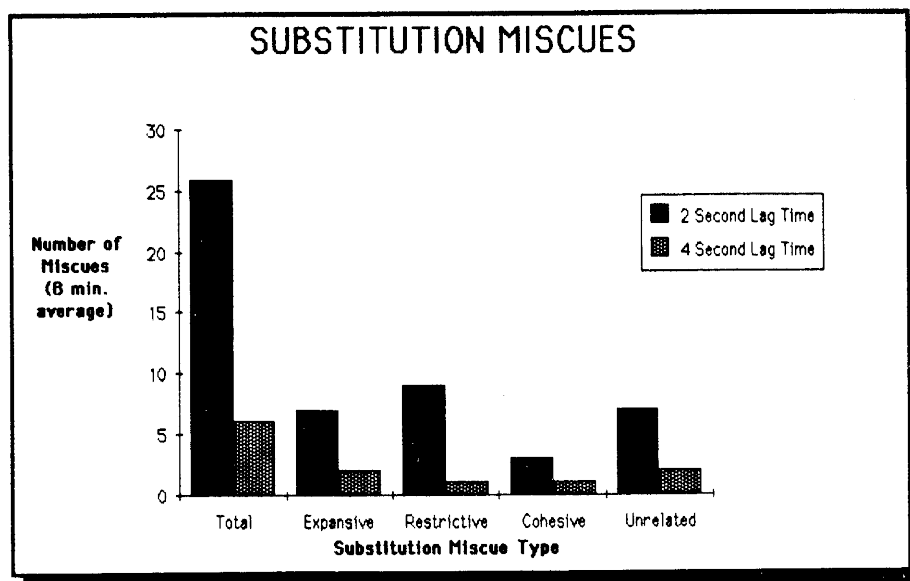

Fig. 5

Clearly not all instances of substitutions are equally serious for the consumer. Expansive and restrictive substitutions, while not rendering the exact equivalent of the SL message, are nevertheless not totally unrelated to the SL meaning. Of the two, restrictive substitutions would seem to be less troublesome, as the TL substitution, although it does not convey as much information as intended in the SL message, does not add information to or overextend the SL intent. In terms of intended meaning, then, restrictive substitution results in parts being conveyed for wholes, while expansive substitutions result in wholes being conveyed for parts. Thus a consumer acting on the basis of a TL message containing an expansive substitution might frequently be in error. On the other hand, a consumer acting on the basis of a TL message containing a restrictive substitution would rarely be in error. (The consumer would not, however, be as "correct" as those receiving the intact SL message.) Intrusions and lag time

Figure 6 provides data on intrusion miscues. That the occurrence of intrusion miscues is five times greater for the pair with the shorter lag time should not be surprising. Lexical intrusions are likely to occur because the interpreter lacks sufficient comprehension of the SL message with which to determine appropriate TL lexical selection; and syntactic intrusions occur because the interpreter is temporally constrained to the syntactic structures of the SL. A longer lag time increases the possibility that the interpreter will accurately comprehend a greater portion of the SL message before determining lexical selection, and it at least makes more possible the production of syntactically appropriate TL utterances -- or at a minimum, more TL-like utterances.
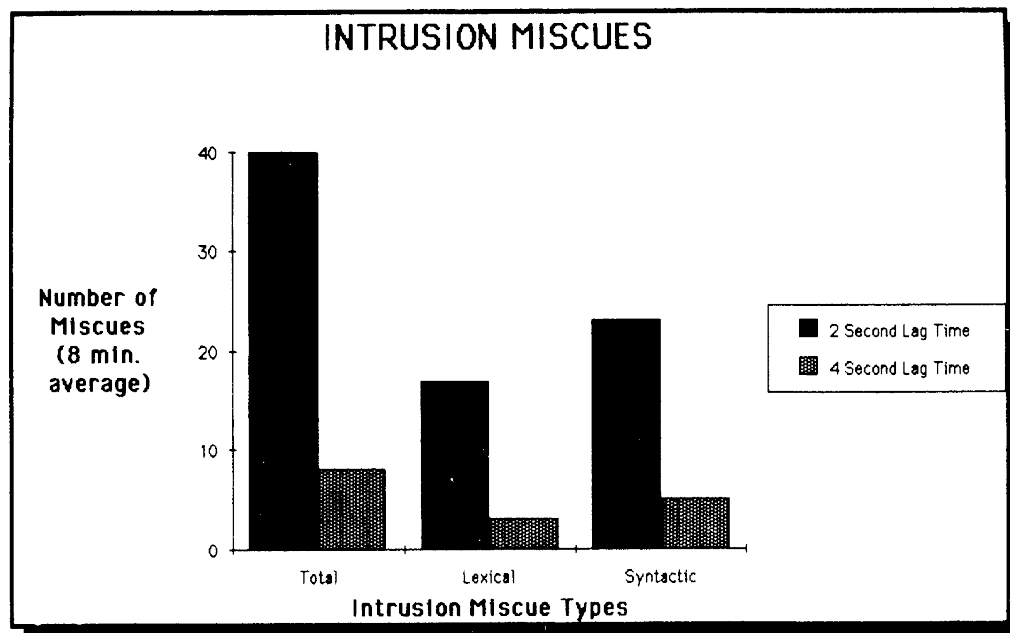

Fig. 6

Syntactic intrusions present several problems to consumers, all of which decrease the likelihood that the SL-based TL utterance will be accurately understood. The obvious difficulty is that accurate comprehension of such utterances is directly related to competence in th SL. The very presence of an interpreter, however, is an indication that at least some of the consumers either lack competence in the SL or prefer not to test their competence by dealing more directly with the SL (as the would do if they watched the transliterator instead of the interpreter). A second problem arises because syntactic intrusions occur rather randomly and intermittently. The result may be a type of cognitive and linguistic dissonance for the consumer that can only be resolved if the consumer is capable of and engages in what can be called retrospective code-switching. However, consumers this engaged are not able to attend fully to subsequent portions of the TL interpretation. The third problem has to do with the cumulative effects of such intrusions (and indeed of miscues in general if perceived by consumers) on the level of confidence consumers have in the interpreter. If miscues of this type erode consumer confidence, then the interpreter's performance will continue to be questioned even when no such miscues are evident.

Anomalies and Lag Time

Figure 7 presents the distribution of anomaly miscues. Again there are four times as many anomaly miscues for the pair of interpreters with the shorter time lag. It is true that TL utterance anomalies might be accounted for by applying several of the preceding miscue categories. While theoretically intriguing, it is more efficient and efficacious to avoid such post facto rationalizations ("first add this, then delete that, then substitute this..."). Not only is such a procedure cumbersome, but there very likely would be several equally plausible routes to the same result. Thus it seems appropriate to treat these miscues as anomalies.

ANOMALY MISCUES

Number of
Miscues
(8 min.
average)

Legend:
- 2 Second Lag Time
- 4 Second Lag Time

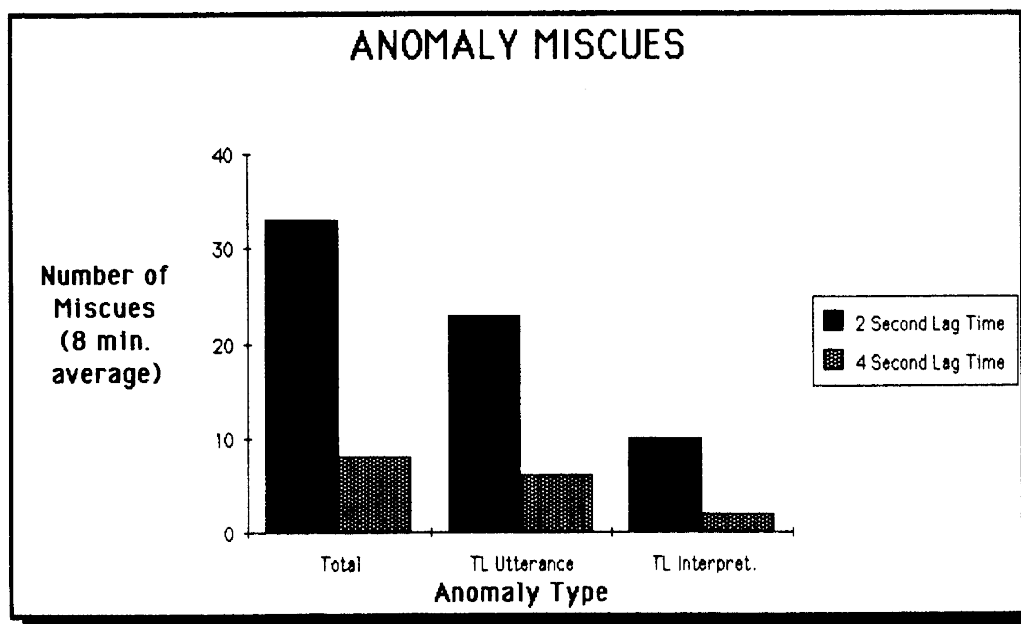Anomaly Type: Total, TL Utterance, TL Interpret.

Fig. 7

As might be expected anomalies inherently present several serious problems for consumers. Those who can identify TL utterance anomalies will likely be unable to determine the exact cause of the meaningless TL utterance and in the Process of trying to render such utterances meaningful, may distort even further their understanding of the original message. Consumers presented with a TL interpretation anomaly will likely be totally unaware of the miscue. Consequently, consumers can only take such utterances as expressing the intent of the original SL message. In both cases the consumer is presented with a formidable challenge in trying to recover the original SL message: in the case of TL utterance anomalies the consumer must extract meaning from a syntactically meaningless utterance in the case of TL interpretation anomalies, the consumer must already know the SL message in order to determine superfluous additions or omissions.

Lexical & Syntactic Level Miscues

In order to examine the full impact and extent of miscues, it will be helpful to re-analyze the miscue types presented above as occurring at either the lexical level or the syntactic level. Such an analysis will not only provide a more accurate understanding of the extent of miscues but will also more clearly illustrates the relationship between lag time and miscue occurrence.

Figure 8 shows the average total number of TL sentences produced by each pair of interpreters in the eight minute sampling Period. This table also shows the number of those sentences that are acceptable (i.e. are syntactically correct in the TL), and the number containing syntactic level miscues. The data reveal that of the total number of TL sentences produced by those interpreters with a 2-second time lag, 40% contain a syntactic level miscue. It is also worth noting that those interpreters with a longer lag time not only produced a

greater total number of TL sentences but also a greater number that were acceptable. An obvious explanation is that those with longer lag time simply had more time in which to analyze incoming SL message units and to formulate acceptable TL expressions for those message units.
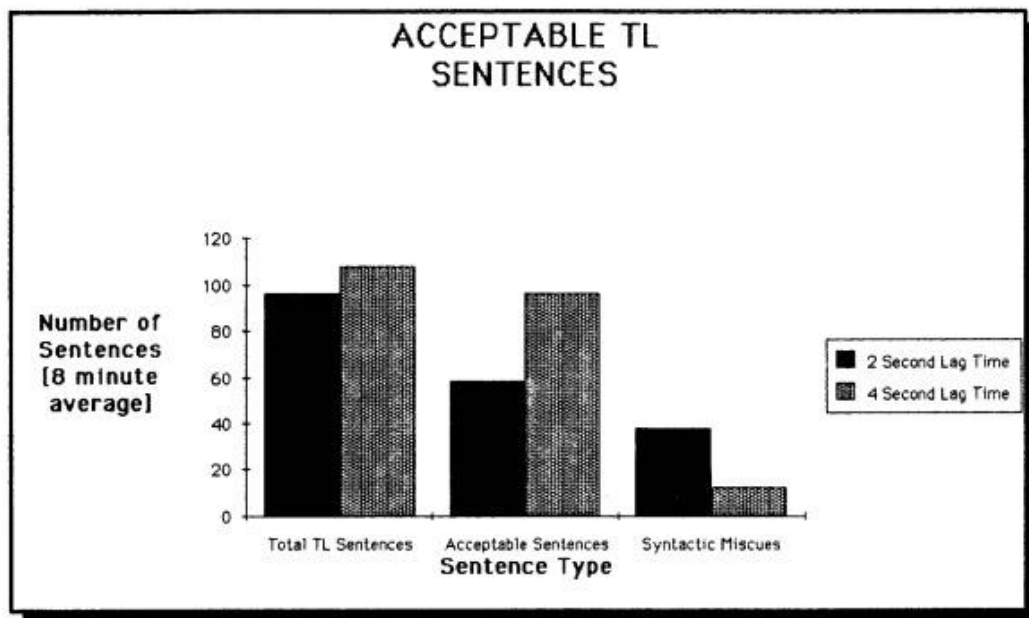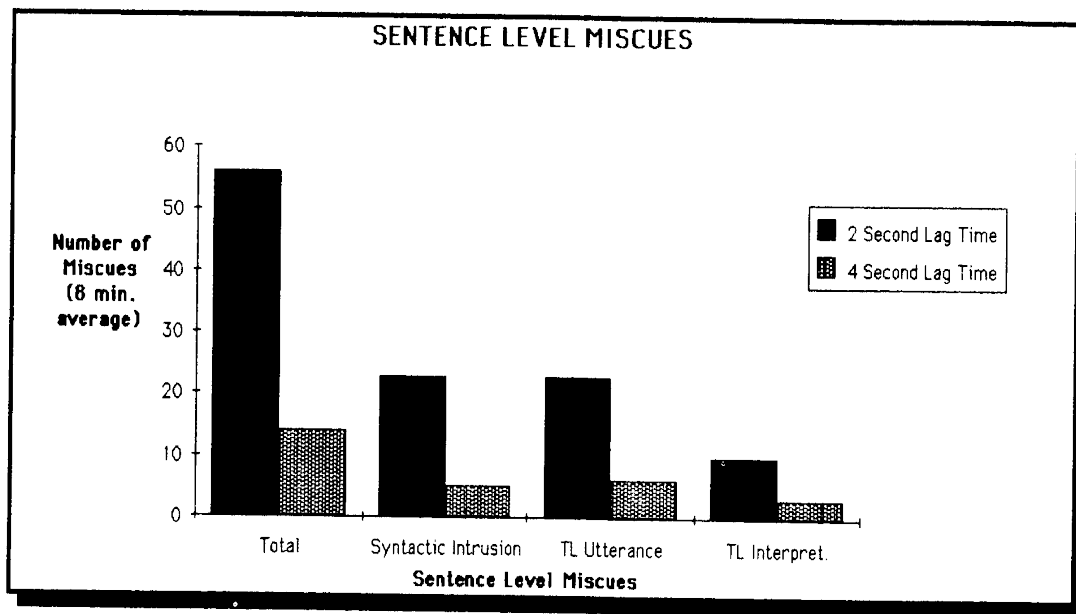
ACCEPTABLE TL SENTENCES

Number of Sentences [8 minute average]

- 2 Second Lag Time
- 4 Second Lag Time

Sentence Type: Total TL Sentences, Acceptable Sentences, Syntactic Miscues

Fig. 8

SENTENCE LEVEL MISCUES

Number of Miscues (8 min. average)

- 2 Second Lag Time
- 4 Second Lag Time

Sentence Level Miscues: Total, Syntactic Intrusion, TL Utterance, TL Interpret.

Fig. 9

As discussed above, miscues at the syntactic level are particularly serious for consumers: recovery is dependent either upon competence in the Source Language or upon prior knowledge of the SL message. Even if one were to argue that consumers possess sufficient competence in the SL to compensate for such miscues, the information in Figure 9 shows that such competence would allow consumers to recover from less than half of all syntactic level miscues. The majority of syntactic miscues for both pairs of interpreters are anomalies (in TL utterance and in TL interpretation).

It is worth noting that those interpreters with a 2-second lag time exhibit four times as many syntactic level miscues as those with a 4-second lag time. In the case of syntactic intrusions, this dramatic difference may be explained by the fact that with a reduced lag time the interpreter is engaged in performing a quasi-shadowing task, necessarily constrained to the syntactic structures of the Source Language.

Syntactic level miscues are not the only obstacle to consumer recovery of intended SL meaning, although they are probably the most severe obstacle with which consumers must contend. Lexical level miscues are also problems for consumers. Although one could argue that consumers might recover the intended meaning of a single lexical miscue in an otherwise appropriate TL utterance, this assumes that the consumers are aware that a miscue has occurred and are aware of the type of miscue. However, since consumers are almost inherently unaware of the occurrence and type of miscue, it is unlikely that the intended SL meanings can be consistently and accurately recovered. This especially true when one considers the frequency with which lexical level miscues occur.

It is true that consumers can more easily recover from certain types of lexical level miscues than from others. Thus, for example, certain lexical omissions might be recoverable from context. But certain types of lexical level miscues are quite resistant to recovery of intended SL meaning e.g. additions or unrelated substitutions are less recoverable because there is generally no indication that they have occurred consumers are less likely to notice them because the resulting TL utterance may be inherently meaningful. Recognition of such "non-recoverable" miscues requires prior knowledge of the SL message, which is generally unavailable to consumers. Figure 10 presents the frequency and types of such "non-recoverable" lexical miscues.

The data in Figure 10 makes it clear that recovery of intended SL meaning from "serious" lexical miscues is a formidable task for consumers. (Of course the cumulative effects of losing intended SL meanings and of the expense of cognitive efforts in the recovery process are not known; further research in this area is needed.) Again it is worth noting that those interpreters with a shorter lag time exhibit almost three times as many non-recoverable lexical miscues as do those with a longer lag time.

When non-recoverable lexical miscues and syntactic level miscues are considered together, the extent of "serious" miscues becomes clear: with 2-second lag time, 80 "serious" miscues amount to one "serious" miscue every 1.2 TL sentences, or one "serious" miscue

every 0.73 of an acceptable TL sentence; with 4-second lag time, 25 "serious" miscues amount to one "serious" miscue every 4.3 TL sentences, or one "serious" miscue for every 3.8 acceptable TL sentences.

Of course these calculations assume that "serious" lexical and syntactic level miscues are equally distributed across all sentences as they are not. Nevertheless, these calculations do provide an indication of the challenge confronting consumers attempting to recover from miscue laden TL sentences and to extract the intended SL meaning from the interpreted utterances. When both "serious" (i.e. non-recoverable) and "non-serious" (recoverable) miscues are thus considered, the full extent of the challenge consumers face becomes clear: with 2-second lag time 137 total miscues amount to one miscue every 0.7 of a TL sentence, or one miscue every 0.4 of an acceptable TL sentence [i.e. more than two miscues per sentence]i with 4-second lag time 58 total miscues amount to one miscue every 1.9 TL sentences, or one miscue every 1.7 acceptable TL sentences.
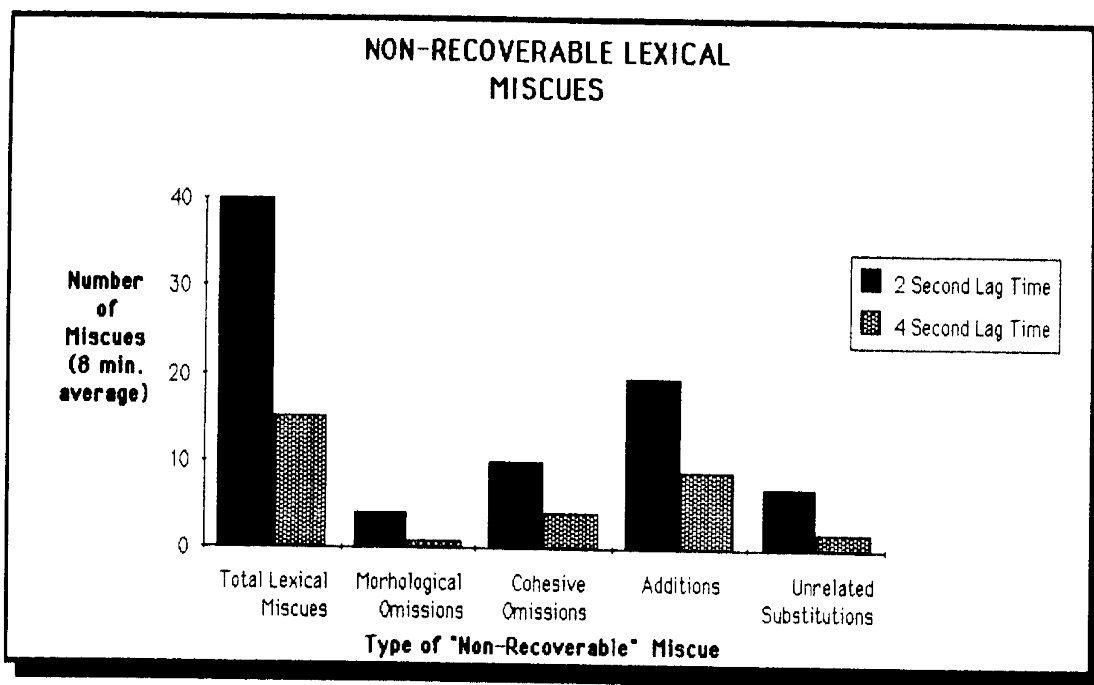

Fig. 10

The basic issue here is not the number of miscues but the apparently inescapable relationship between lag time and miscue occurrence. Given the constraints of simultaneous interpretation, the quantity of textual information available to the interpreter is directly dependent upon lag time, and is a function of the interpreter's ability to maintain a sufficient lag time between the production of the SL message and the production of the interpretation of that message. While it is difficult and perhaps impossible to quantify "sufficient" lag time, it seems clear from the data presented here that the greater the degree of synchrony between the production of the SL message and its interpretation, the greater the likelihood of miscues. Other factors being equal, the evidence is consistent with the notion that increased temporal synchrony necessarily prevents the interpreter from gaining access to that quantity of textual material necessary to render an accurate interpretation.

The data presented here indicate that a greater degree of temporal synchrony seems to increase the likelihood of miscues and, conversely, a lesser degree of synchrony seems to reduce the likelihood of miscues. This can also be demonstrated by examining the performance of one additional interpreter, who exhibited a 6-second lag time. Figure 11 presents the frequency and distribution of miscue types for the pairs of interpreters with an average 2-second and an average 4-second lag time, as well as for the single interpreter with a 6-second lag time.
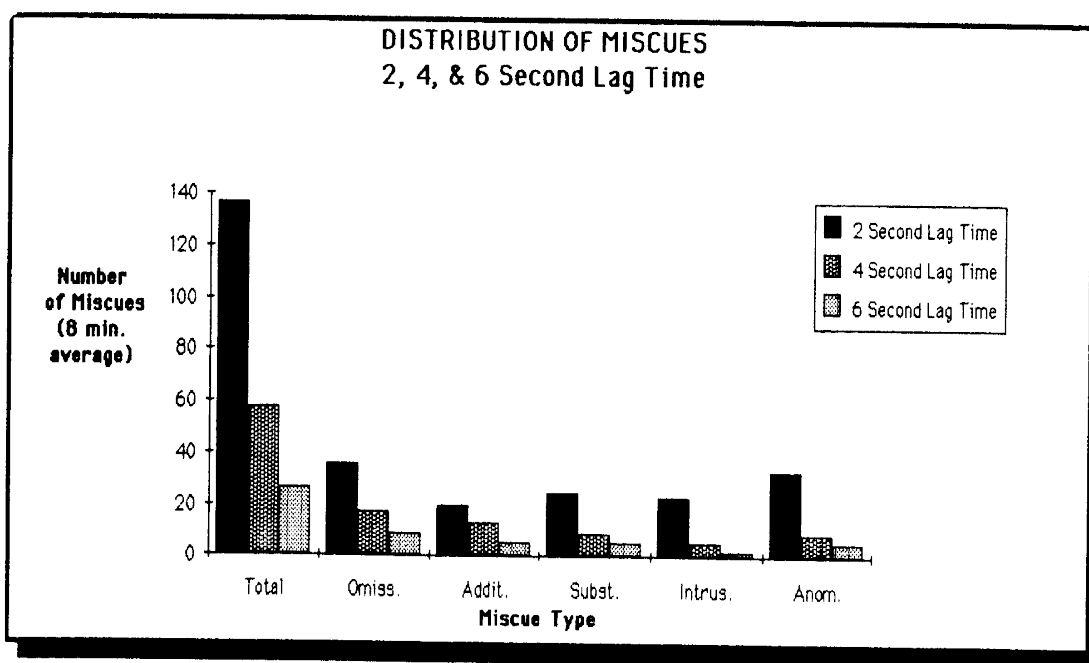

Fig. 11

As the data in Figure 11 indicate, the single interpreter with a 6-second lag time had less than half as many total miscues as the interpreters with a 4-second lag time. The number of miscues in each category decreases as the lag time of the interpreters increases. There is not a single category or subcategory in which this pattern is broken or reversed. The constancy of this pattern seems to indicate that the greater the lag time, the more the interpreter is able to

comprehend the original SL message because of having more of the message with which to work.

This is not to say, however, that there is no upper limit to lag time; interpreters, after all, are only human. It is likely that for some individuals there is lag time threshold beyond which the number of omissions would significantly increase because the threshold is at the upper limits of the individual's short-term working memory.

Summary

The purpose of this study was to examine the relationship between lag time and miscues in interpreted material. The data here were all drawn from simultaneous interpretation of presentations at a professional conference -- arguably the most demanding and difficult setting in which interpretation occurs. (It is quite likely that in other interpreting situations the frequency of the miscues would be different, although the same relationship between lag time and miscues would be found.) These data provide evidence of a definite relationship between the lag time and miscue occurrence: as the degree of temporal synchrony between the SL message and TL interpretation increases, so does the frequency of miscues. The primary reason for this is the quantity of the SL message available to the interpreter. The greater the lag time, the more information available; the more information available, the greater the level of comprehension. Clearly there is a temporal threshold below which insufficient information cannot be available to the interpreter.

This study has certain implications for interpreters and consumers. For interpreters it may mean that in certain situations there is need for an external monitor of performance; the more serious the consequences of interpreter miscues are to the consumer (e.g. a legal setting), the more essential is such external monitoring. This external monitoring can only be provided by another interpreter, because competence in both SL and TL is necessary to identify miscues. For consumers an obvious implication is that certain instances of misunderstanding may be due not to their own cognitive limitations but rather to the skewed TL input that they receive. Another implication for consumers is an understanding that accurate interpretation requires sufficient SL information. Consumers who demand that interpreters "keep up with the speaker" are requiring them to do the very thing that will produce inaccurate interpretation.

Clearly there are a number of important questions unanswered by this study (e.g. the cumulative effects of miscues on consumers' comprehension, the strategies used by interpreters with longer lag time to "chunk" SL information). It is hoped that this study provides a useful point of departure for addressing these and other aspects of interpretation.

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