SHORT-TERM MEMORY AND SIMULTANEOUS INTERPRETATION: AN EXPERIMENTAL STUDY ON VERBATIM RECALL

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This study focuses on the importance of the syntactic structure of an oral text in the cognitive processes underlying simultaneous interpretation.

The experimental paradigm chosen for this study was devised by the American researcher Robert Jarvella at the beginning of the 70's. Jarvella analysed how the syntactic structure of a sentence within a connected discourse is used in processing an oral text. By connected discourse Jarvella means a "coherent, extended linguistic message", consisting of "meaningful sentences" that are "thematically and textually interrelated" (Jarvella, 1979, p. 380).

The experiments carried out by Jarvella centre on immediate recall tasks, aiming at assessing the influence of formal structures on speech processing. The first finding of Jarvella's studies was listeners' tendency to segment the incoming information into chunks, corresponding to the syntactic segmentation into clauses and sentences. According to Jarvella, each chunk is processed independently of the others. He maintains that chunks are processed by short term memory, or working memory, where they are stored for a very short time span, enabling the subject to create an internal representation of the incoming verbal material.

The subjects participating in Jarvella's experiments were asked to listen to prose passages which were interrupted at unexpected intervals. Subjects were then asked to recall literally what had been said before the interruption. The particular task requirements varied across different trials, but the need to recall the section of the text just heard as accurately as possible (verbatim recall) (Jarvella, 1979) was stressed in each experimental phase.

Many of the tests carried out by Jarvella focus on what is known as recency effect, a mnestic phenomenon typical of STM. Owing to recency effect the latest information perceived is recalled more easily than linguistic material heard earlier. By latest information in this context we mean the latest chunk, i.e. the latest syntactic segment heard by the subject.

Jarvella's findings have the merit of demonstrating the importance of syntactic structure in the cognitive processing of ongoing discourse (Jarvella, 1979).

The experimental paradigm designed by Jarvella was later adopted by other researchers in studies on oral discourse processing. The American psycholinguist William I sham obtained particularly interesting results when he applied this paradigm to simultaneous interpretation. In an experiment carried out in 1993
(Isham & Lane, 1993), Isham studied how interpreters process incoming information during simultaneous interpretation.

He assumed the existence of two processing mechanisms, depending on the level of mental representation at which interpreters operate when translating from the source language (SL) into the target language (TL). Interpreters may process the superficial level of the message, i.e. decode only the surface structure of the SL message, which may facilitate the retrieval of information in verbatim recall tasks. Alternatively, interpreters may create a conceptual representation of the meaning of the message, involving a focus on its deep structure. The latter option would imply the process of deverbalization suggested by Seleskovitch, whereby the incoming message is deprived of its syntactic structure and becomes an abstract, extralinguistic representation (Seleskovitch 1976), with predictable negative effects on verbatim recall.

The findings of this study corroborated those of Jarvella’s experiments: subjects tend to process incoming information in chunks, and performance in verbatim recall tasks partly depends on the syntactic structure of the message in SL.

In a second study conducted in 1994, which was also based on Jarvella’s paradigm, Isham obtained interesting results by comparing verbatim recall performance in a group of interpreters as compared to a group of listeners.

The former were asked to translate two passages from English into French (the subjects' mother tongue), whereas the latter were requested merely to listen to the same passages. Following the original paradigm, the input was interrupted at unexpected intervals and the subjects were asked to write down word for word (verbatim recall) - what they remembered having heard before the interruption.

The performance of listeners confirmed the results obtained by Jarvella in his original experiments, whereas the levels of performance produced by interpreters showed such considerable differences that Isham decided to divide them into two groups, Interpreters 1 and Interpreters 2. The former were clearly influenced by the syntactic structure of the message when performing the verbatim recall tasks, whereas the latter seemed to be unaffected by the surface structure of the message.

Isham thus assumed that Interpreters 1 were translating the message in SL by paying particular attention to its form, i.e. they had chosen a form-based approach to simultaneous translation. Interpreters 2, on the other hand, seemed to have focused their attention on the meaning of the message, i.e. they had chosen a meaning-based interpreting strategy.

Isham concluded that interpreters have a double option when approaching simultaneous interpretation, in that they can choose between two different strategies, either form-based or meaning-based. The strategy they adopt influences their verbatim recall performance. Isham pointed out that the two strategies do not differ in terms of effectiveness. There are a certain number of studies (Gran 1989, Bava 1989, Fabbro 1992, Paradis 1994) corroborating the "double option" theory.
Several factors concur in the achievement of a good interpreting performance, ranging from the speed of the speaker's delivery to the technical equipment available to the interpreter (Gerver 1974). Clearly, interpreters choose one of the above-mentioned interpreting strategies according to specific needs. Generally speaking, they tend to prefer a meaning-based approach, while they opt for a form-based strategy on particular occasions, for instance when translating lists of names, numbers or the like (Isham 1994). Isham assumes that interpreters show a greater tendency to choose a meaning-based strategy when working between languages that have completely different grammatical structures. However, no study has proved yet that interpreters are fully aware of the interpreting strategy they adopt. That is why this particular aspect of simultaneous interpretation has also been investigated in the present study.

The Experiment

The experimental paradigm designed by Jarvela in his original study was adopted for this study. It is based on verbatim recall as a way of assessing the amount and quality of syntactic information that interpreters retain immediately after simultaneous interpretation.

The experimental procedure was basically the same as the one used by Isham in 1994 in order to analyse the level of interpreters' cognitive processing of incoming information. Unlike Isham's procedure, however, in our study the subjects were instructed consciously to adopt a specific approach to simultaneous interpreting.

Subjects were asked to translate two passages of narrative prose (1500 words each) simultaneously from English into Italian. These passages, recorded on tapes, were interrupted by a tone at unexpected intervals. On hearing the tone, the subjects were asked to stop translating and recall what they had heard before the interruption, writing the passage down, word for word (verbatim recall), on a sheet of paper. When the subject stated that she could not remember anything else, the passage resumed from the point where it had been interrupted and the simultaneous interpretation started again until the next tone came.

Subjects were asked to interpret one of the two passages by focusing mainly on its formal structure (form-based strategy) and the other passage by focusing on the meaning of the message (meaning-based strategy).

Subjects

Thirteen advanced student interpreters, all female, attending the School of Modern Languages for Interpreters and Translators (SSLMIT) at the University of Trieste served as subjects. They were all Italian native speakers with English as their first foreign language. All of them had been practicing simultaneous interpretation for an average of four years. Their ages ranged from 23 to 31
(average age = 27). Participation was voluntary. The results of 12 subjects have been included in the statistical analysis.

Materials and Procedure

The two passages created by Jarvella for his original study were used in this experiment. One passage dealt with a trade union protest in the United States (Protest within the ranks of the United Steelworkers), the other with accusations of espionage against a federal official (Accusations of espionage against William Taylor). The two passages, taken from American magazines, had been modified by Jarvella, who had introduced ad hoc test items.

Each test item was 20 words in length, and consisted of three clauses, of 7, 6 and 7 words respectively, grouped in two sentences. Following the terminology adopted by Isham, the three clauses will be defined as context clause, critical clause and last clause. There were 8 matched pairs of test items defining two different versions of each passage. Across each matched pair, the critical and last clauses were identical, while the context clause varied between the pairs. The two items forming one pair varied in the way the three clauses were grouped in two sentences, that is, in the syntactic boundaries between the clauses. In one of the two items the critical clause and the context clause formed a single sentence, that is, the critical clause was followed by a fullstop (sentence boundary). In the other item of the same pair the critical clause formed a single sentence with the last clause, that is the critical clause was preceded by a fullstop (clause boundary).

Ex.

sentence boundary
(context critical). (last)
And its timeliness was something about which Rarick and others were thoroughly convinced. Steelworkers were ready to join a rebellion.

clause boundary
(context). (critical last)
The time was right for this step. Rarick and others were thoroughly convinced / steelworkers were ready to join a rebellion.

Each version of each passage contained 4 clause boundary test items, 4 sentence boundary test items and 4 dummy items. The latter were aimed at preventing subjects from identifying a pattern in the test items.

Passage version (clause boundary- sentence boundary), interpreting strategy (form-based - meaning-based) and the order of presentation of the passages were thoroughly counterbalanced across the subjects.

Each of the four texts was taped on a separate cassette, read by a native American speaker at a rate of 130 words per minute.
All tests were run individually. The subjects sat at a writing table with a pen and a ream of white sheets in front of them, numbered from 1 to 28 (one sheet for each test item in the two passages and 4 more sheets to prevent the subjects from predicting the number of tests they were to take).

The passages were heard through professional Sony Stereo MDR V400 headphones connected to a Sony Stereo TC-D3 tape recorder transmitting the original passages. Through a Realistic 33-1063 pin microphone the interpreters' output was recorded on a Sony TCS 430 tape recorder connected to the MDR V400 Sony Stereo so that the original text and the interpreters' translation were recorded at the same time.

The examiner would first fill in the subject's sheet. Then the Hand Preference Test by Briggs and Nebes was given in order to assess whether the subject was right-handed, left-handed or ambidextrous, by asking simple questions (e.g. "Which hand do you use to unscrew a bottle cap?").

Then written general instructions on the experimental procedure were given. Instructions drew attention to the importance of verbatim recall, asking subjects to write down word for word what they remembered having heard before the interruption. It was made clear to the subjects that they could leave out some words they did not remember, as long as the very last word before the interruption was there. A brief trial followed to assess whether the subject had correctly understood the procedure.

The examiner would then give some oral explanation on the text's content. Only then would the examiner present the subject with specific written instructions concerning the interpreting strategy she was required to follow in translating the forthcoming passage. According to the order envisaged by the randomization chart, the subject was either asked to translate the first text focusing on the form (form-based strategy) or on the meaning (meaning-based strategy). Subjects did not know in advance that they would be given different instructions to interpret the second text.

Then the practical experiment would begin. Subjects performed a simultaneous interpretation of the text and stopped when they heard the tone, whereupon the examiner would switch the tape recorder off and subjects were given all the time they needed to write what they remembered on the first sheet of paper. When subjects thought that there was nothing further they could recall, they turned the sheet over on the writing table and the recorder was restarted.

Between the two passages subjects were given two minutes to rest before the procedure was repeated with the second text.

Sessions with each candidate lasted approximately one hour.

Results

The number of words correctly recalled within each test item was tallied. Particular attention was paid to the words within the critical clause (Fig.1). All the words belonging to the critical clause that had been correctly recalled by the
subjects were tallied, independently of the order in which they had been reported. If the word reported by the subjects differed by a single morpheme from the one in the original text yet maintained the same meaning, it was considered correct.

Ex.
original word: house; reported word: houses = correct
original word: house; reported word: housing = incorrect

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<th>Subjects</th>
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<td>x</td>
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Fig. 1: FB = form-based; MB = meaning-based; cb = clause boundary; sb = sentence boundary; x = average values

The chart reports the number of words within the critical clause correctly recalled by the subjects (each critical clause consisted of 6 words and there were 4 critical clauses in each version of the passage, the total being 24 words).

The words of the critical clause correctly recalled by each subject were processed by means of a double analysis of variance (ANOVA): strategy of interpretation and syntactic structure (strategy of interpretation = 2 = form-based and meaning-based; syntactic structure = 2 = clause boundary and sentence boundary).

In general, all the subjects recalled more words when adopting a form-based strategy (average 6.91 words out of 24 = 28.75%) than a meaning-based strategy (average 5.64 words out of 24 = 23.58%). This difference was not statistically significant.

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<td>28.75 %</td>
<td>23.58 %</td>
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Fig. 2: Percentage of correctly recalled words across the two interpreting strategies.
With reference to the syntactic structure of test items, subjects obtained better results in verbatim recall tests with a clause boundary structure (average 7.12 words out of 24 = 29.66%) in comparison with the sentence boundary structure (average 5.43 words out of 24 = 22.70%). This difference was not statistically significant.

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<td>%</td>
<td>29.66%</td>
<td>22.70%</td>
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Fig.3: Percentage of correctly recalled words in the two syntactic structures.

The number of words recalled by the subjects when translating a clause boundary structure with a form-based strategy was higher (average 7.50 words out of 24 = 31.25%) than the number of words recalled when the structure was sentence boundary and the strategy was meaning-based (average 4.53 words out of 24 = 18.87%). The interaction between syntactic structure and interpreting strategy was not statistically significant.

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<td>cb</td>
<td>31.25%</td>
<td>sb</td>
<td>28.12%</td>
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<td>26.37%</td>
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Fig.4: Percentage of correctly recalled words across the two different interpreting strategies and in the two different syntactic structures.

Discussion

The results of this study were not statistically significant. This is probably due to the small number of subjects analysed in comparison with the variables taken into consideration.

Verbatim recall performances turned out to be better when the subjects were asked to follow a form-based strategy, that is a strategy centred on the formal, surface structure of the message. When a meaning-based interpreting strategy was adopted, the results were not equally good.

These findings, reflecting those obtained by Isham in 1994, suggest that linguistic material is more easily recalled when attention is focused on the syntactic structure of the message.

Moreover, these results corroborate those obtained by Jarvella, in that they demonstrate the influence of the syntactic structure of a message on the subjects' ability to retain information. Verbatim recall of the critical clause is better when this clause is syntactically connected with the last clause.
It ought also to be noted that the difference in verbatim recall performance between the two interpreting strategies is more evident when there is a clause boundary structure.

The conclusion ensuing therefrom is that more concentration on the meaning of the message leads to a more rapid decay of the memory trace of the formal structure. When a form-based interpreting strategy is supplemented by a clause boundary structure, i.e. a structure more favourable to the recall of the critical clause, verbatim recall performance is considerably higher.

Conclusions

Verbatim recall of the last clause was not statistically analysed. The general trend was however clear. Subjects could remember more words within the last clause than within the context or the critical clause. This trend, corresponding to the findings obtained by Jarvelle and Isham, can be explained as a consequence of the phenomenon called recency effect, whereby the latest chunks of information perceived are easier to recall than those perceived earlier.

Verbatim recall of the critical clause turned out to be generally better when the critical clause formed a single sentence with the last clause (clause boundary). It can be assumed, therefore, that the critical clause, when belonging to the same syntactic unit as the last clause, is involved in the recency effect. This ought to be seen as a direct consequence of the segmentation of incoming connected discourse on the part of listeners, or, in this case, interpreters. Once again the parallel with the results obtained by Jarvelle is easily drawn. According to what he had found in his studies, he stated that "the tighter the linguistic relation between consecutive segments of discourse, the more likely it is that they will both be able to be immediately remembered" (Jarvelle 1979).

That is exactly what happens to critical and last clauses when they are embedded in a clause boundary structure.

The results of this study can also be interpreted as evidence of the influence exerted by the syntactic structure of the message on verbatim recall performance. In fact, critical clauses remained lexically and semantically identical across matched pairs of test items and only varied in terms of syntactic structure. The consequences on verbatim recall of such structural differences is worth further investigation.

As regards different interpreting strategies, results were generally better when subjects were asked to adopt a form-based strategy. This outcome tallies with the trend that emerged in the study by Isham: Interpreters 1, i.e. those who supposedly adopted a form-based interpreting strategy, achieved better results in verbatim recall tasks than Interpreters 2, who followed a meaning-based strategy. It can thus be assumed that a form-based interpreting strategy, focusing mainly on the surface structure of the message, enables the creation of a mental representation of this structure, thus facilitating verbatim recall. This conclusion
supports Isham's hypothesis whereby interpreting strategies influence interpreters' verbatim recall ability.

The best results in verbatim recall tasks were obtained when the form-based strategy was supplemented by a clause boundary syntactic structure. Once again, there is a correspondence with the results obtained by Isham: more attention to the form of the message (form-based strategy) and a syntactic structure particularly favourable to verbatim recall of the critical clause (clause boundary structure) result in the best performance in immediate verbatim recall tasks.

Finally, it is pointed out that the difference in verbatim recall performance due to the adoption of specific interpreting strategies (either form- or meaning-based) tends to support the hypothesis of a conscious approach on the part of interpreters. Subjects seem to have followed the instructions they had been given regarding the strategy to be adopted during the test. Thus, experimental evidence seems to confirm the feasibility and advisability of training interpreting students consciously to adopt different strategies according to text requirements.

Bearing in mind the complexity of the issue and the need to involve a more statistically significant number of subjects, this study may be a starting point for further research into the influence of syntactic structures in simultaneous interpretation, as well as into the role played by memory in this highly complex cognitive task.

References


