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7 Identifying the Unit of Analysis in Translation: Some Uses of Think-Aloud Protocol Data

PAMELA GERLOFF

"The problem" of interlingual translation has long been recognized. For centuries, the difficulty of rendering a portion of text written in one language into its precisely equivalent expression in another has been publicly acknowledged and deplored. In the thirteenth century, Dante poetically observed, "Nothing which is harmonized by the bond of the Muses can be changed from its own to another language without destroying all its sweetness" (Morgan, 1959). More recently, in our own era, Belloc (1930) flatly declared: "One should abandon the effort to translate the untranslatable".

Yet despite this long-standing interest in the problematic nature of translation, and a now vast body of literature on the subject, we know surprisingly little about what people actually *do* moment by moment when they translate. What kind of cognitive processing operations do people engage in when they translate a text from one language to another? What commonalities in processing exist across translators? Are individual differences identifiable? Is the use of particular text processing strategies related to quality of the final translation? What size units do people work with when translating a written text? Do they work in words, in clauses, in sentences, or in larger discourse chunks?

Such questions, yet to be answered, loom large. Thus far, the literature on translation has dealt with wide-ranging and important issues, including, for example, *questions of definition*: what is translation and how might it be characterized? (cf. Levy, 1967; Steiner, 1975; Lörcher,

1986); *prescriptive issues*, regarding how translation should be done and the skills and characteristics required of translators (e.g. Postgate, 1972; Weber, 1984); *issues of evaluation and training*: what constitutes "good" translation? Can good translation be taught? (e.g. Wilss, 1976; Carroll, 1977; House, 1977; Tirkkonen-Condit, 1986); and *descriptive attempts* to explicate the process of translation and/or identify the characteristics of language which make translation possible (e.g. Savory, 1957; Walmsley, 1970; Seleskovitch, 1976; Folkart, 1984).

In recent years, the view of translation as linguistic science has led to the creation of formal models of the translation process (e.g. Quine, 1960; Catford, 1965; Katz, 1978; Keenan, 1978) and to more practical considerations of theoretical application. Work in the development of machine translation (cf. Hutchins, 1984) and efforts at contrastive analysis of languages, performed with the intention of assisting the professional translator in his work (e.g. Vinay & Darbelnet, 1958), exemplify this interest in the intersection of linguistic theory with practice.

Nonetheless, despite this large body of varied and informative literature, our ability to understand translation *processing, per se*, remains negligible. To be sure, much of the limitation of our knowledge about translation derives simply from a restricted research methodology, both in the specialized domain of translation research and in the more general study of language processing. Until recently, regardless of the approach taken or the methodology used, translation and language researchers have generally relied for their data upon external measures of internal phenomena or upon second person observation of language outcomes. They have therefore *inferred* the underlying processes producing a given language outcome. With specific regard to translation, Steiner (1975: 273) alluded to the problem of an inadequate investigative methodology when he wrote:

"... In the overwhelming majority of cases, the material for study is a finished product. We have in front of us an original text and one or more putative translations. Our analysis and judgement work from outside, they come after the fact. We know next to nothing of the genetic process which has gone into the translator's practice, of the prescriptive or purely empirical principles, devices, routines which have controlled his choice of this equivalent rather than that, of one stylistic level in preference to another, of word 'x' before 'y'. We cannot dissect, or only rarely...."

Because of the lack of available information about actual translation processes, it has been difficult to develop a viable theory of translation.

Consequently, "translation theory... remains a phantasm; there is at present no systematic way of talking about the transition from one... message to another" (Frawley, 1984: 159). In the words of Wilss (1982), "stagnation in theory has made it necessary to expand the methodological perspective" (ibid. 14).

Some steps toward an expanded methodology are beginning to be taken; as evidenced recently, for example, by Krings (1986), Lörcher (1986), and by a number of contributions to this volume. Their work, using think-aloud protocols to examine *translation processing as it occurs* clearly demonstrates that by expanding our methodology in such a way as to allow a focus on *process*, we can obtain very rich and useful data about on-line translation processing. Much more of this work, however, needs to be done.

Purposes and Intent

My intent in this chapter is to present some of the results of a pilot study which explored the use of think-aloud protocols for identifying and analysing processes of translation. The primary focus of the pilot work was methodological, with emphasis on development of methods for data analysis.

During piloting, language processing data in the form of concurrent think-aloud protocols were collected during participants' performance of a written translation task. A think-aloud protocol is a moment-by-moment description which an individual gives of his or her own thoughts and behaviours during the performance of a particular task. A translation task was chosen because of the need for process data in translation research; and because the act of translation provides an ideal "window" on to both comprehension and production components of language use — both of which, historically, have captured the interest of language researchers (cf. Clark & Clark, 1977). Anyone translating a text is obliged both to understand what is written (the comprehension component to the process) and to subsequently reproduce it into their own words (the production component). Since it is these two complementary phenomena which underlie all language activity, native or foreign, written or spoken, what we learn from translation protocol research should help us to unravel elusive questions about the nature of the cognitive operations that lie behind comprehension and production, and the relationships that exist between these two processes.

Specific purposes of the pilot work were to:

- identify the kinds of questions and issues which may be addressed through the use of think-aloud protocol data as applied to a translation task;
- develop a system for coding the data which would be usable in a larger study of translation, examining differences in the text processing operations of professional translators, bilingual speakers; and second language learners.

Design

The pilot study collected data from six participants: five native-English-speaking students studying French at the intermediate college level; and one competent bilingual speaker of French, whose native language was also English. Each participant was individually presented the French text and asked to translate it into English. They were instructed to "say aloud" everything they were doing and thinking while translating. All protocols were tape-recorded and later transcribed verbatim. (See Appendix for source text, sample participant translations, and sample protocol excerpts.)

To provide some indication of translation quality, each participant's translation was given an overall ranking, relative to the others in the study. Criteria for ranking were the overall degree of accuracy and completeness of the translation. According to the ratings, "Anna" produced the "least good" translation, "Bruce" the "best of the student translations", and "Fran" the "best overall translation".

This study differs from most other translation protocol research in the following ways:

- participants received no prior training in producing concurrent protocols. This was in order to determine whether significant differences existed in individuals' capacities to verbalize their thoughts while translating, and because I thought that prior training might cause participants to look more alike in their processing. The larger study does, however, provide for prior training;
- no dictionary use was allowed, on the assumption that the absence of a dictionary would elicit more of the participants' available text processing strategies, thus maximizing the number of operations identifiable for coding;
- except for the competent bilingual, included for purposes of comparison, participants were not particularly advanced in their knowledge

of the second language, having undergone no more than the equivalent of two years' study, taught at the pace of a U.S. college level course.

Data Coding Systems

Two coding systems were, in fact, developed from the pilot work: one for identifying the unit of analysis individuals used when translating; the other for identifying their problem-solving strategies and behaviours. For a full analysis of the participants' text processing operations, both codings should be used together, since they are designed to be complementary (cf. Gerloff, 1984, 1986). When used in complementary fashion, they illuminate considerably more aspects of language processing than either is able to separately. In this chapter, however, I discuss the Unit of Analysis coding only — showing the kinds of data analyses and comparisons which it may be used for; and offering some preliminary findings of the study.

Usefulness

Historically, one area of language research which has received considerable attention is the effort to identify units of planning and execution in language processing. By combining experimental data with observations of naturalistic phenomena (e.g. hesitations, pauses, and slips of the tongue), researchers have acquired valuable information regarding global and local levels of planning and execution, "fluent" and "hesitant" phases of speech production, chunking patterns, and the like (for example, Butterworth, 1980; Clark & Clark, 1977; Fromkin, 1973; Garrett, 1975; Goldman-Eisler, 1968). However, the relationship between written translation processing and the processing of other types of discourse is not well explored. We know very little, for example, about the extent to which processes of comprehension and production, as they occur in translation, resemble comprehension and production processes in other discourse activities — be they in the native, second, or foreign language. Might those processes, as evidenced in translation, vary, for example, according to such factors as language fluency, training in translation, or number of languages mastered?

One way to begin to assess the resemblance of written translation processing to the processing of other kinds of discourse is to examine the size of the linguistic units which people work with when they translate.

By examining units of text analysis, we can begin to identify the various levels of planning and execution that people use when translating; allowing us to subsequently progress to more specific questions. For example: are these units of analysis consonant with what researchers already know about the comprehension and production units used to process other types of language tasks? Do trained translators work with larger chunks of discourse than do untrained translators? To what extent do good versus poor translators work in syntactic or semantically meaningful units? Do editing styles vary predictably according to competence in the foreign language; or perhaps, according to translating skill? Which language do translators most commonly work in — the target or source language? Under what conditions is each most likely to be used?

Such questions, of course, carry theoretical implications not only for translation theory, but also for theories of language comprehension and production, second language acquisition, and bilingualism as well. In a more practical vein, as more is learned from this kind of research, understanding the units of analysis used in translation may enable us to know better how and what to teach in order to help learners develop their translation competence; and it may increase our understanding of the role that translation may play in foreign language learning.

Unit of Analysis Coding

It was with these kinds of issues in mind that the Unit of Analysis coding was developed. As shown in Table 1, the coding identifies seven levels of analysis: analysis carried out at the level of the syllable or morpheme; at the word-, phrase-, clause-, sentence- and discourse-levels; and a separate "group unit" coding for any unit which could not be identified as representing a complete and coherent syntactic unit. Theoretically, group units may be of any length. Empirically, they ranged from two to 15 words.

All units at all levels were coded according to language used; that is, as having been carried out in either French (the source language) or English (the target language). Since participants spoke aloud all portions of the text which they were reading, analysing, or reproducing into the target language, it is assumed that the coding results in a reasonably accurate representation of the units with which subjects were actually working.¹

TABLE 1 *Unit of analysis coding showing the criteria used for coding participants' units of text analysis.*

Level 1 — morphemic or syllabic analysis (M)

Breakdown or expansion of a word into syllables or morpheme units, e.g. *re, reportent, porter, or reporter*; or treating *ne* and *pas* as separate units;

Level 2 — word unit analysis (W)

Treatment of a word as a complete unit. Articles with their associated nouns are coded as one unit, e.g. *Les Américains, Américains, mauvaise, and est* would each be coded as single word-units

Level 3 — phrase unit analysis (P)

Processing of a group of words constituting a grammatical phrase, e.g. noun phrase, verb phrase, adjectival phrase, prepositional phrase... Examples: *ne la reportent pas sur les autres, sur les autres, ne la reportent pas, que les Français, vivent mieux.*

Level 4 — clause unit analysis (C)

Processing of words in units containing a subject and verb alone; or subject and verb, plus complements. Examples: *s'ils sont de mauvaise humeur, Les Américains ne la reportent pas, Les Américains ne la reportent pas sur les autres.*

Level 5 — sentence unit analysis (S)

Processing a complete sentence as an entire unit, without breaking it down into smaller units of analysis, e.g. *Les Américains, s'ils sont de mauvaise humeur ne la reportent pas sur les autres.*

Level 6 — discourse level analysis (D)

Clearly processing two or more sentences together, either by referring back to something read previously in the text while decoding another unit; by skipping ahead to another sentence or paragraph in order to decode the unit being processed; or by reading two or more sentences consecutively, without significant pausing. Examples: A subject says "*Ils ont des formules de courtoisie. Oh. Back there I put forms, which is wrong. It must be they have formulas of courtesy*"; or "*Ils ont des formules de courtoisie. I better go on and see what they say. En France, il n'est pas inhabituel qu'un marchand soit désagréable avec ses clients*"; or "*Ils ont plus de formules de courtoisie. En France, il n'est pas inhabituel qu'un marchand soit désagréable avec ses clients*".

Level 7 — group level analysis (G)

Breakdown of text portions into clusters of words which cannot be identified as constituting a complete and coherent syntactic unit. Examples: *humeur ne la reportent, vivent mieux en s'ils sont de mauvaise humeur, ne la.*

Data Coding

The units of analysis may be coded directly from the protocols (as shown in the protocol excerpts in the Appendix). However, by writing out the units as shown in Table 2, participants' characteristic patterns of analysis may be compared more quickly and easily.

From this display, showing three of the participants' processing of the first sentence of the source text, differences across individuals are immediately apparent.

Anna both begins and continues her processing in English. She starts with a clause-unit, then moves directly on to the full sentence. She does not stop for further analysis or immediate editing; and she never returns later for an edit check. In contrast, Bruce does considerably more processing, alternating back and forth from French- to English-language analysis. He begins with moderate sized clause-units, then moves to smaller group- and phrase-units, alternately expanding and reducing the size of the unit of analysis throughout. In this way, he builds up gradually to a translation of the whole sentence. Although most of his analysis is done at the phrase-unit level, he also engages in word-, clause-, group-, and sentence-level analysis; and, later on, in discourse-level analysis. His later editing tends to be done in larger chunks, except for those difficult areas of text which require small-unit work for comprehension. Also characteristic of Bruce is the way he frequently retraces and repeats portions of each previously analysed unit. This creates an accordion-like effect, as he makes numerous short backtrackings and expansions which move him in a somewhat repetitious and circuitous route — but which nonetheless afford a steady progression through the text.

Unlike Bruce, Fran begins with larger units — in this case, complete sentences, processed in French, not English. She then breaks these down into smaller units, working largely in English. Unlike the students in the study, this competent bilingual expends her efforts at analysis not primarily for comprehension purposes, but in the service of high-level "production" goals, that is, for determining the best way to express the original source text in English. Most of her processing is, therefore, done in English; and most of it occurs during her second time through the text, after she has already scanned the source text to find out what it says, and before she reads through the entire text again for final editing. Fran is the only participant in this study who proceeded through the text more than twice.

TABLE 2 *Unit of analysis coding, showing Anna, Bruce, and Fran's units of analysis, while working with the first sentence of the text.*

		<i>French text: Les Américains vivent mieux en société que les Français.</i>
Anna:	1st time:	The Americans live better (Clause/English) The American society lives better than the French (Sentence/English)
		<hr/>
Bruce:	1st time:	Des Américains vivent mieux en société (Clause/French) they have a better (Group/English) a better society (Phrase/English) en société (Phrase/French) standard of living (Phrase/English) que les Français. (Phrase/French)
	2nd time:	Américains (Word/French) Americans live better in society (Clause/English) live better in society than French (Phrase/English) I mean the French (Word/English) they live better in society than the French (Sentence/English)
	3rd time:	Americans live better (Clause/English) vivent mieux en société que les Français (Phrase/French) in society (Phrase/English)
		<hr/>
Fran:	1st time:	Les Américains vivent mieux en société que les Français (Sentence/French) Les Américains vivent mieux en société que les Français (Sentence/French) Americans live better (Clause/English) en société (Phrase/French) socially (Word/English) sociable (Word/English) than the French (Phrase/English)
	2nd time:	Americans live better in society (Clause/English) live better (Phrase/English) en société (Phrase/French) live better in (Group/English) it's not in society (Phrase/English) in high society (Phrase/English) in company (Phrase/English) in company (Phrase/English) in company (Phrase/English) live better in company (Phrase/English) live better in company (Phrase/English) act better (Phrase/English) act better in company than the French people do (Phrase/English) Americans act better than the French do (Sentence/English)
	3rd time:	Americans act better in company than the French do (Sentence/English)

Alternate Display Modes

An immediate visual representation of these various patterns of analysis may be obtained by displaying the individuals' movement patterns in diagram fashion, as shown in Figures 1 and 2.

This form of display affords us an immediate impressionistic view of an individual's total amount of processing activity, the language in which it is carried out, and his or her general patterns of movement through the text; it shows, as well, which text portions elicited changes or increases in processing activity, thus giving some indication of the effect of text on the participants' units of analysis.

Figure 1 shows what we have seen before: Anna's progression through the text in a fairly continuous line of forward movement, with few backtracks, and very little editing throughout. She processes almost entirely in English, with French-language analysis occurring only when she has difficulty translating a specific unit.

Figure 2 reveals the pattern already noted in Bruce: he progresses steadily through the text, but with relatively short and frequent backtracks in the process. Although most of his analysis is done in English, he alternates between the two available languages, resorting to repetition of French-language units when a text portion proves particularly difficult to comprehend.

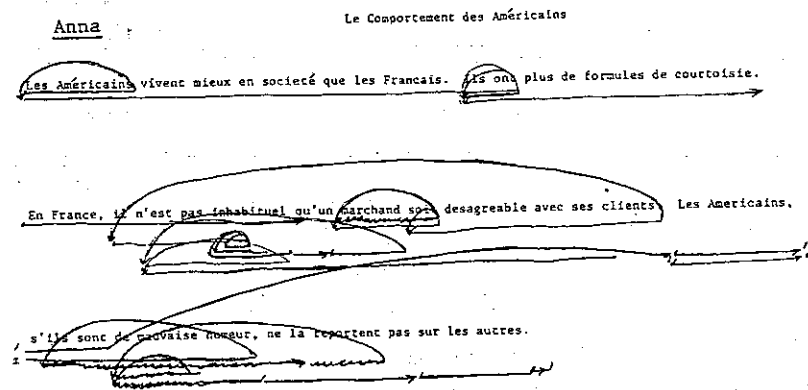


FIGURE 1 Diagram of Anna's units of analysis, showing her pattern of movement through this portion of the text. — = English language processing, ~~~~~ = French language processing.

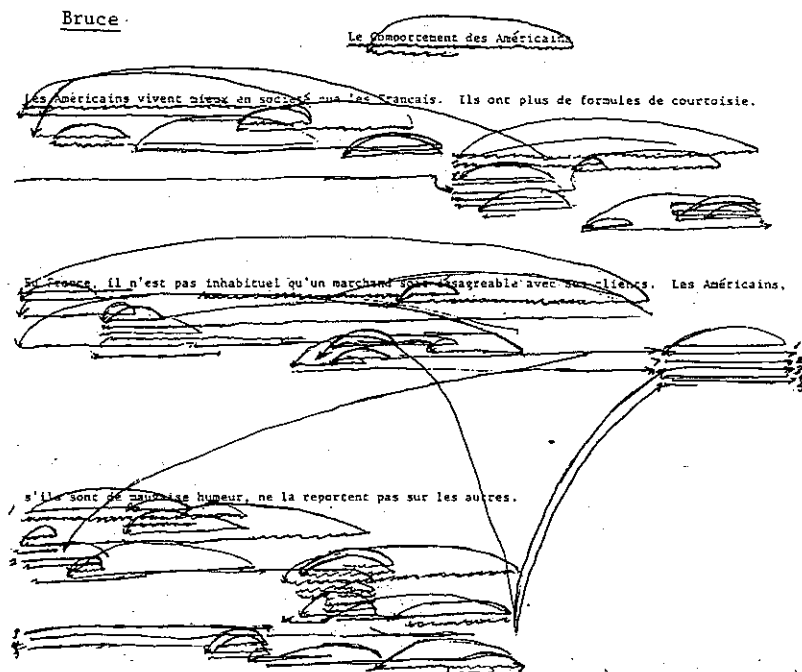


FIGURE 2 Diagram of Bruce's units of analysis, showing his pattern of movement through this portion of the text.

Figures 3 and 4 illustrate individual variation in the participants' patterns of analysis during repeated times through the text. By separating subjects' patterns of analysis into first, second, and subsequent times through the text, we see that Fran's first time through closely resembles Anna's "combined" pattern, as shown previously in Figure 1. (In fact, Anna proceeded through the entire text only once.)

In contrast, Figure 4, showing Fran's second time through the text, more closely resembles Bruce's "combined" diagram, in terms of the total amount of processing activity and the frequency of skips forward and backward in the text. The other student subjects in this study revealed movement patterns similar to either Anna or Bruce, showing little deviation from these two overall patterns; only the bilingual seemed to combine both patterns of movement.

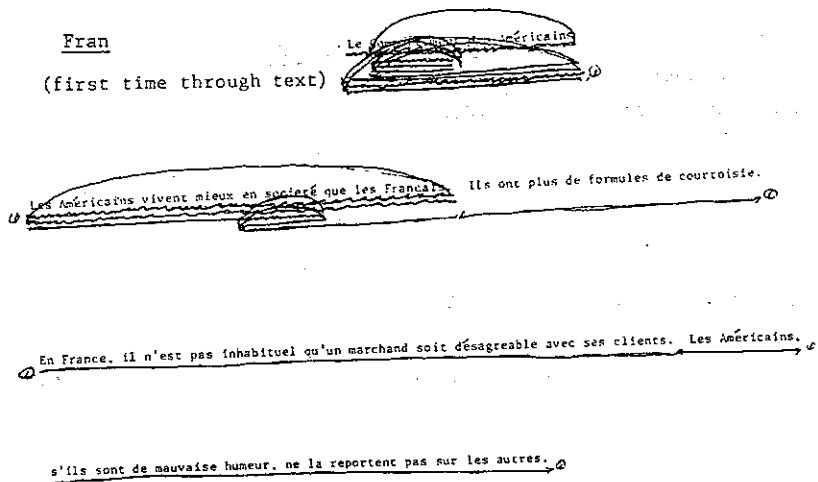


FIGURE 3 Diagram of Fran's units of analysis, showing her pattern of movement during her first time through this portion of the text.

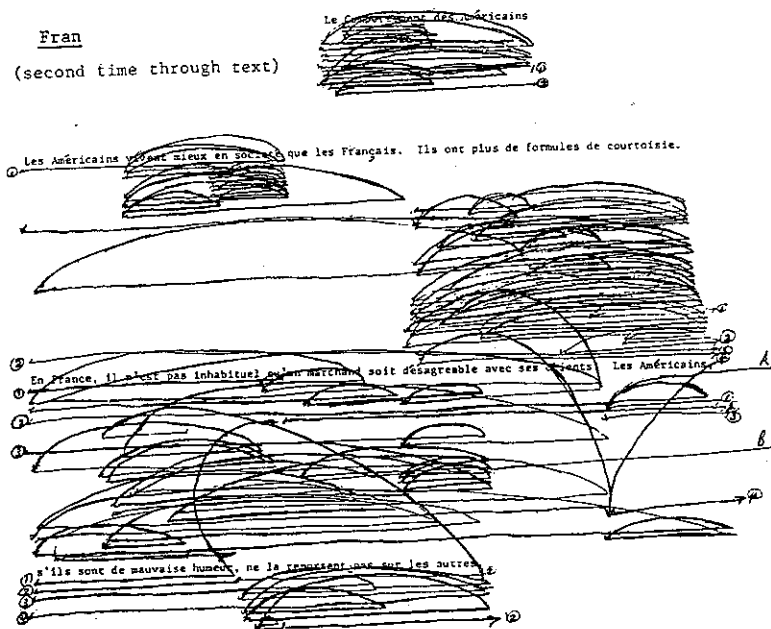


FIGURE 4 Diagram of Fran's pattern of movement during her second time through this portion of the text.

Numerical Displays

For more specific information about the amount of processing at each level of analysis, numerical profiles may be constructed. Table 3 shows the percentage of activity done by each of these three participants at the various unit levels. Noteworthy here is the high percentage of processing by all participants at the clause-, phrase-, and word-unit levels, indicating a strong preference for naturally occurring syntactic units, corresponding to what are commonly called "sentence constituents". Also of interest is the high percentage of sentence- and discourse-level analysis done by Fran, the bilingual, as compared with the student participants. Note, as well, Anna's high reliance on much smaller, morphemic and syllabic analysis (21% of her activity was done at this level, as compared with Bruce and Fran, who focused on this unit level only 2 % and 0% of the time, respectively.)

A surprising finding of this study was the relative frequency of analysis which occurred at the group-unit level. Although most of the participants' total activity in fact occurred in complete syntactic units, approximately 10% on the average occurred in syntactically incomplete clusters. In Bruce's case, a full 14% of his activity occurred at this "nonsyntactic" group-unit level. This seems a high percentage, given the fact that the group units represent neither syntactically nor semantically

TABLE 3 Percentage of participants' total processing at each unit of analysis level.

Anna	Bruce	Fran
CLAUSE...27% (20)	WORD30% (95)	PHRASE...33% (68)
PHRASE...22% (16)	PHRASE...25% (78)	WORD19% (40)
MORPHEME21% (15)	CLAUSE...23% (72)	SENTENCE.....18% (38)
WORD18% (13)	GROUP....14% (44)	CLAUSE...14% (29)
SENTENCE 7% (5)	DISCOURSE...3% (10)	GROUP...10% (21)
GROUP..... 4% (3)	MORPHEME2% (7)	DISCOURSE...6% (12)
DISCOURSE...1% (1)	SENTENCE 2% (6)	MORPHEME0% (0)

complete units, nor do they represent what would be considered to be natural comprehension or production units (cf. Clark & Clark, 1977).

Additionally, this high percentage of work in nonsyntactic fragments seemed to be connected to another finding: in the other coding system developed for the study — the coding for problem solving strategies and behaviours — a separate category was included for what was called “text repetition strategies” (Gerloff, 1985). This category consisted primarily of such verbal behaviours as repetitions and retracings of text portions. From the protocols, these activities appeared to be strategic devices used to solve particular problems comprehending the original text or producing the translation (i.e. they did *not* appear to be a kind of mindless repetition or stalling behaviour intended, for example, to keep the experimenter from asking what participants were doing during a silence).

As seen in Table 4, participants varied in the degree to which they engaged in these kinds of text repetition strategies; and they differed in the extent to which their analysis focused on the nonsyntactic group level units. *Higher levels of text repetition activity were associated with higher levels of group-unit processing.* Thus, a significant portion of the apparently strategic repetition of text segments seemed to be done not in whole syntactic units, but in nonsyntactic constituent fragments.

An additional finding was that over half (56%) of all group-unit work occurred in units containing only two or three words, with the remaining 44% distributed among units four to 15 words in length (Figure 5).

Moreover, individuals who evidenced *more* text repetition as a problem-solving strategy tended to repeat text portions in the smaller two-to-three-word group units; whereas those who used this strategy *less* frequently tended to produce fewer but larger group units. Thus, *not only was more*

TABLE 4 *Increases in problem solving strategies of text repetition associated with increases in the percentage of text processing activity at the group unit level.*

Participant	Text Repetition Strategies	Group Unit Analysis
Anna	24%	4%
E	27%	8%
C	35%	11%
Fran	37%	10%
D	45%	13%
Bruce	61%	14%

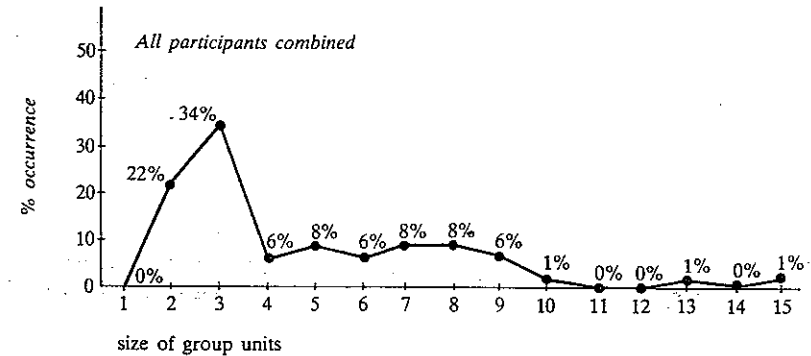


FIGURE 5 *Percentage of group unit processing done by all participants combined, at each of the group unit sizes (2-word, 3-word units, etc.)*

text repetition activity associated with more group unit processing, but it was associated as well with smaller sized group units. These associations suggest that repetition of small group units in partial constituents may be a strategic device used to hold the text in active memory while higher level problem solving is going on; the predominance of group units occurring in two-to-three-word clusters may simply reflect some sort of production or articulatory constraint. This hypothesis is consistent with a model of working memory proposed by Baddeley and various associates (cf. Baddeley, Scott, Drynan & Smith, 1969; Baddeley & Patterson, 1971; Baddeley & Hitch, 1974; Baddeley, Thomson & Buchanan, 1975). The model postulates the existence of an “articulatory rehearsal loop” which helps keep information accessible in active memory. Essentially, it suggests that by pumping information into the working memory’s central processing mechanism, by means of verbal articulation, a person can hold information alive in working memory (Potter, 1985). As long as the pumped-in information does not exceed the memory capacity of the “phonemic response buffer” — a component of the system which is “able to store a limited amount of speech-like material in the appropriate serial order” (Baddeley & Hitch, 1974: 77) — little demand is placed on the system’s “central executive” component, leaving that mechanism free to handle other storage and processing tasks. The capacity of the phonemic buffer appears to be limited to approximately two to three words (Baddeley, Thomson & Buchanan, 1975) — exactly the size of most of the group units observed in this study. This hypothesis provides a reasonable explanation for the relatively common occurrence in the protocols of group-unit processing in two-to-three-word groupings, as associated with the use of problem

solving strategies of text repetition. Such an analysis demonstrates, as well, some of the provocative interconnections which may be made by combining the Unit of Analysis coding with its companion coding for Text Processing Strategies and Behaviours.

Stability and Variability in Patterns of Analysis

Numerical figures also provide information about the stability and variability of individual participants' patterns of analysis during repeated times through the text. Figure 6 shows that a full 76% of Bruce's total text processing activity occurred during his first time through the text. This is in sharp contrast to Fran, who did most (56%) of her activity during her *second* time through. It appears that the bilingual subject used her first and last times through the text to scan the source text for its meaning, and to check over her translation during her final editing.

This same pattern of activity at a more specific level is in evidence in Figures 7 and 8, showing the percentage of processing carried out at various individual levels of analysis, during repeated times through the

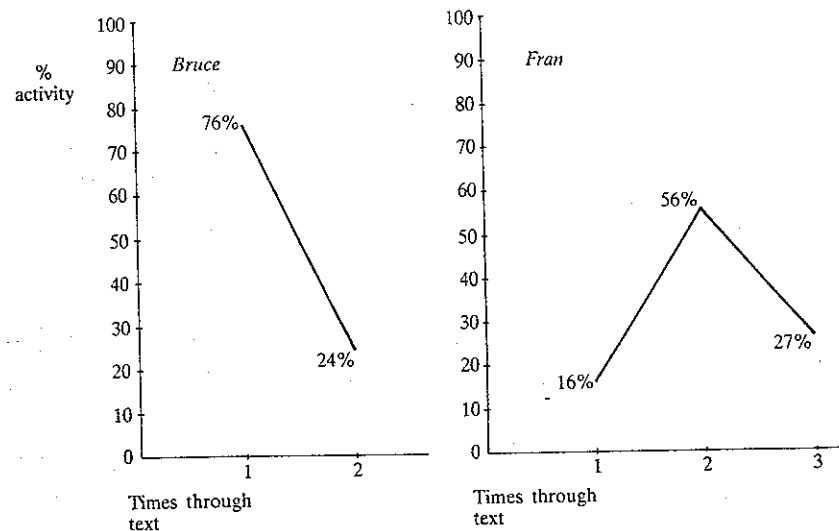


FIGURE 6 Percentage of Bruce's and Fran's total processing activity occurring during each new time through the text.

text. Fran's word-, phrase-, sentence- and group-level analysis changed significantly from one time to another; whereas her analysis at the morpheme-, clause-, and discourse-levels remained relatively stable from one time to the next.

The drop in processing at the word- and sentence-unit levels during her second time through the text (the time when most of her processing

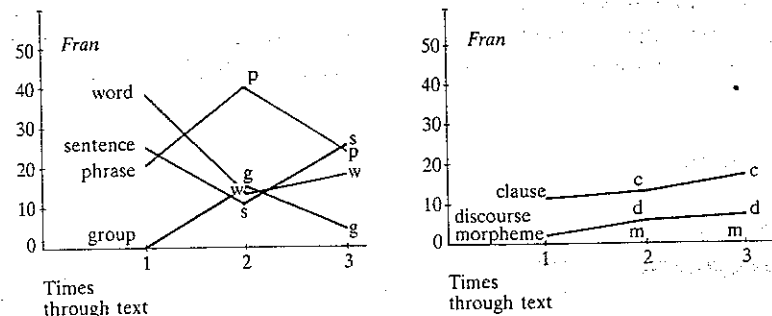


FIGURE 7 The dramatic changes in Fran's processing activity during repeated times through the text occurred at the word-, phrase-, group-, and sentence-levels of analysis (left graph). Clause-, discourse-, and morphemic/syllabic-level analysis remained relatively constant all three times through the text (right graph).

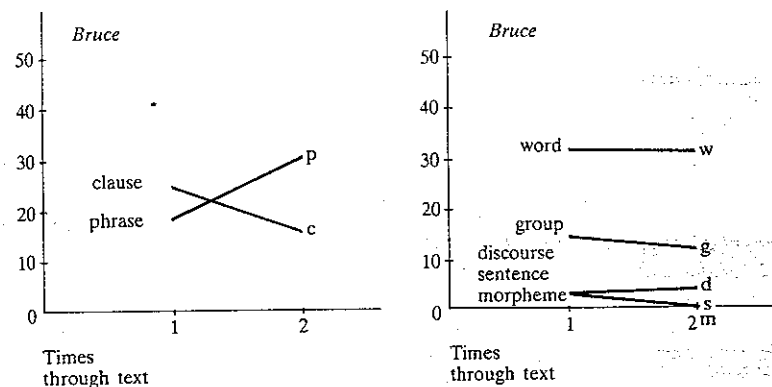


FIGURE 8 The dramatic changes in Bruce's processing activity during repeated times through the text occurred at the clause- and phrase-levels of analysis (left graph). Word-, group-, discourse-, sentence-, and morphemic/syllabic-level analysis remained relatively constant both times through the text (right graph).

activity actually occurred), accompanied by a dramatic rise in her level of phrase- and group-unit processing, reflects the fact that, for Fran, problems in translation were generally dealt with at the phrase level, accompanied by a great deal of repetition of nonsyntactic group units.

In contrast, Bruce's processing activity remained relatively stable across most unit levels during both his first and second times through the text. The only dramatic changes were a sharp increase in phrase-unit analysis during his second time through the text, accompanied by a significant drop in clause-unit processing. Since Bruce, like Fran, used his second time through the text to work on particularly problematic portions, here again, phrase-unit processing is associated with problem resolution.

Predominant Language of Analysis

Although all participants' processing occurred primarily in English, the target language, the *ratio* of English- to French- language processing did vary from person to person. The bilingual participant carried out a much higher proportion (90%) of her processing in English, with the students' ratio of English- to French-language processing more closely approximating a 50/50 proportion. This difference undoubtedly reflects the students' need to comprehend the source text and the bilingual's concern not with comprehending the source text but with crafting the best possible rendition of it into English.

Conclusion

From the applications of the Unit of Analysis coding presented above, it is clear that think-aloud protocols are a rich source of data, providing information about the actual cognitive processes which people go through when producing a translation. The data thus obtained provide a wealth of new information, while at the same time affording a kind of "corroborating evidence" which may serve to support, contradict, or inform other findings of language research. The initial findings of this study, for example, appear to be consonant with psycholinguistic research identifying units of comprehension and production in other types of spoken and written discourse. This is seen in the participants' strong preference for working with sentence constituent units at the phrase and clause levels, as well as the fact that they clearly used several levels of analysis, sometimes even at the same time.

The study suggests, as well, that clearly identifiable differences may exist between good and poor translators, as well as among less competent speakers and learners, in such areas as preferred language of analysis, size of units dealt with, editing styles, and characteristic patterns of movement through the text. In the larger study, we should be able to determine to what degree such differences may be associated with level of skill in the language, degree of training in translation, or with the number of languages a person has mastered. The knowledge acquired from this inquiry promises to move us toward a better theoretical understanding of translation, as it provides information which might well be given practical application in the fields of language learning and translator training. Certainly this method of data collection and analysis does not provide all we need to know. However, this coupling of an introspective data collection technique with a translation task does provide a good methodological start toward identifying what have, in the past, been rather elusive issues in language and translation research.

Notes to Chapter 7

1. Unfortunately, in this pilot study, accurate records were not kept as to when subjects' verbalizations represented their processing of the source text, their reading of their own translations of it, or other verbalizations made while they were writing out their translations. In the larger study, a video camera is being used to facilitate a more detailed analysis of these various stages of the translation process.

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Appendix

A: Source text and participant translations

French language source text

Le Comportement des Américains

Les Américains vivent mieux en société que les Français. Ils ont plus de formules de courtoisie. En France, il n'est pas inhabituel qu'un marchand soit désagréable avec ses clients. Les Américains, s'ils sont de mauvaise humeur, ne la reportent pas sur les autres.

En revanche, il semble y avoir des contradictions dans le comportement des Américains. Ils ont les formules de courtoisie mais mettent les pieds sur la table — ce qui choque les Français.

Un exemple de différence de comportement entre Américains et Français a frappé Colette. Elle raconte qu'à une "party", les gens sont arrivés en smoking. Tous ces gens élégants se sont tout de suite mis à éplucher le maïs. En France, dit-elle, on serait venu en jeans, mais personne n'aurait aidé à préparer la nourriture.

from "Le Comportement des Américains"
by Marie Galanti, in *Le Journal Français d'Amérique*, septembre 1982

English translation as rendered by Fran, a bilingual speaker

Polite Behaviour of Americans

Americans act better in company than the French do. Courtesy is more a matter of course. In France, it is not unusual for a merchant to be unpleasant to his clients. If an American is out of sorts, he does not burden other people with it.

On the other hand, there seem to be contradictions in the polite behavior of Americans. They take courtesy for granted, but they put their feet on the table — a shocking sight to the French.

Colette was struck by one particular example of the differences. She describes a party at which everyone arrived in formal attire; and then, elegant as they were, they set about husking corn. In France, she says, people would have come in jeans, but no one would have helped prepare the food.

English translation as rendered by Anna, a student

The American society lives better than the French. There are more formulas of courtesy. A merchant isn't usually disagreeable with his clients. If Americans have a bad sense of humour _____ on the other.

In reflection it seems that there are contradictions in the behavior (manners) of Americans. There are formulas/rules of courtesy but putting feet on the table — this would shock the French.

An example of the difference of behavior between Americans and French hit Colette. She encountered this at a party when people were smoking. All the elegant people _____. In France, she said, one can come in jeans, but no one helps to prepare the meal.

English translation as rendered by Bruce, a student

Deportement of Americans

Americans live better in society than the French. They have more courtesy. In France it is not unusual for a shopkeeper to be disagreeable w/ his customers. Americans, if they are in bad humour, they will not take it out on their customers.

In reflection, it seems there are some contradictions in the deportment of Americans. They have courtesy, but put their feet on the table — this shocks the French.

An example of difference between the deportement of Americans and French struck Colette. She recalls that at a party the people arrived while the meal was being prepared. All these elegant people quickly put themselves husking corn. In France, she says, people would come in jeans, but no one would help prepare the meal.

B: Protocol excerpt

I = Interviewer

... denotes pauses

??? denotes inaudible utterance

Bruce

B: Le Comportement des Américains (laughs). Maybe I'll find out what the title is... comportement...oh...des Américains...vivent mieux en société...like...uh...en société...standard of living, I guess... I've seen that word before... que les Franç... O.K...uhm... Américains... Americans...live (writes)...better...society...

I: Now what are you doing?

B: I'm tryin' to figure out...it doesn't really make sense... live better... (laugh) ...in society than French... I mean the French... it kinda means oh well, maybe let me just go on farther...and see... ils ont plus de form...de...courtesy Oh. This is the harder one, right? (laughs) Ils ont plus...de for... formules...de...courts... they have more... they have more...of...oh...huh...yeah, so it must be they live better in society. That's what it says... ??? than the French... controversial statement... uh...they have...de...they have greater, they have more... have more... I was wondering uh...maniere...for...have courtesy, courtesy...courtesy?... form...no...uh... don't laugh if I'm way off... In France... in France... boy I wish I could just look there... (referring to vocabulary list on side of page folded over).

I: There are hardly any words there anyway (laughing)

B: Oh, sure (laughs)... They uh... inhabituel...qu'un marchand...dés...soit désagréable avec ses clients... uhm... In France there is... they...have...they...are not inhabitual...

I: Now what are you doing?

B: qu'un... I'm just trying...that one...merchant...is disagreeable, is...disagreeable...with his clients... it is not...it is not unusual... that a merchant...is disagreeable...In France...oh, I see what they're saying! ...In France...see...they there...now these make a little more sense.

I: Oh.

B: I hope (laughs) Let's see... unusual...see, that's a little, that's what I'm using now...that...a...merchant...shop...disagreeable...it is not unusual for... a shopkeeper...to be...disagreeable...

Anna

A: The Americans live...better...the American society...lives better than the French... (writing)... There were...uhm... there are...more...formulas...of...courtesy...

- I: Now what are you doing?
- A: Tryin' to figure out what...inhabituél means...uhm...tryin' to use context clues.....
- I: Like what?
- A: Marchand is a ...merchant...is...is disagreeable with his clients...uhm...
- I: What are you thinking about...while you're doing this?
- A: Uhm...I'm thinking...maybe it has to do with habit but.....
- I: Now what? ... Just keep saying out loud what you're doing...as if you were thinking it to yourself and I weren't even here. I only have to be here so I can keep prompting you. (both laugh)
- A: O.K....uhm...hab...habit...inhabit...tryin' to...maybe...the habit but this doesn't really make sense..... uhm...guess it's not.....a merchant doesn't usually, isn't usually..... disagreeable with his clients.....
- I: So what did you put for that one?
- A: A merchant isn't usually disagreeable with his clients.

Fran

(first time through text)

- F: O.K.! Le Comportement des Américains. Comportement is a word I always have trouble with. Comportement seems to be more ??? It's also...uhm...it's a technical word, translated as uh...behavior...Americans. The way Americans behave, le comportement des Américains...The way Americans conduct themselves. For now. Until I see what I say. Les Américains vivent mieux en société que les Français I'm supposed to write that down now, right? or...shall I write now? or write whenever I want to?
- I: Whatever you want to do.
- F: O.K. Les Américains vivent mieux en société que les Français.. Americans live better...en société... socially...sociably...than the French. They have...more...formulas...of courtesy... In France, it is not unaccustomed... for a merchant to disagree with his clients....

8 The Use of Introspective Data in Translation

HANS P. KRINGS

Rationale

The object of my investigation was an inquiry into the structure of the translation process in advanced German learners of French as a foreign language. Although a vast bulk of literature exists on the problems of translating in general (sometimes referred to as the "science of translation" or "translatology") and on problems pertaining to the role of translation in foreign language teaching in particular, scarcely a mention has been made of the actual process whereby the final translation is obtained. It was not until very recently that several investigators independent of one another developed the idea of analysing the translation process by means of thinking-aloud data (see Gerloff, this volume, Chapter 7; Hölscher & Möhle, this volume, Chapter 6; Dechert & Sandrock, in press; Lörcher, 1986). The starting points for these investigations were similar. There seemed to be a shared belief among the investigators that nothing much can be said about the relationship between foreign language learning and translation until there is at least some knowledge of the cognitive processes taking place in the heads of learners while translating.

There are several good reasons why such knowledge is assumed to be of importance for a theory of foreign language learning and teaching and for a theory of translation:

1. The role of translation in foreign language teaching has always been a matter of controversy. It seems that the value attached to translation as a teaching device has so far been determined largely by "ideological" preconceptions (based on simplistic theories of the role of the mother tongue in foreign language learning) rather than by empirically substantiated knowledge about the effect that