Consecutive vs. Simultaneous: Which is more accurate?

Daniel Gile
Université Lumière Lyon 2

The relative accuracy of simultaneous vs. consecutive interpreting with respect to specific difficulties (false starts, incomplete sentences, unimportant modifiers, elements without direct "equivalents" in the target language, digressions) predicted by the Effort Models was partially assessed by a comparison of simultaneous and consecutive renderings of the same English speech into French by 10 interpreters in each mode. As predicted, consecutive was found superior in incomplete sentences, and simultaneous was superior as regards digressions and unimportant modifiers. With respect to overall accuracy, simultaneous was clearly superior to consecutive in this study, but methodological considerations call for caution when generalizing.

1. Introduction

In the common wisdom shared by the interpreting community, a number of ideas seem reasonable enough, but deserve closer scrutiny. One of them states that consecutive interpreting is more accurate and faithful than simultaneous interpreting (see, for instance, Van Hoof, 1962:36; Longley, 1968:10; Weber, 1989:162). Indeed, in the consecutive mode, interpreters have the possibility of listening to and assimilating the linguistically completed expression of ideas or sequences of ideas before starting to produce their own speech, whereas in simultaneous, they cannot afford to lag behind the speaker and therefore must often start their rendition into the target language on the basis of a shorter, not fully digested source-speech segment. This makes them more vulnerable to false starts, and to clumsy and ambiguous sentences by the speaker. On the other hand, in informal conversations between interpreters, one often hears that certain speeches are too fast for consecutive, but "feasible" in

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simultaneous, which suggests that at least in some cases, simultaneous may be more accurate than consecutive. The following is a small-scale study which looks more closely at this issue, both in theoretical and in empirical terms.

2. Potential error triggers in simultaneous and consecutive

This theoretical section compares simultaneous and consecutive in terms of cognitive load and the resulting likelihood of errors on the basis of the Effort Models, a set of Models which look at interpreting as a cognitive management problem, first developed for didactic purposes in the early 80s, and taken further since. A descrip-tion of an early theoretical foundation of the Models can be found in Mizuno (2000). The details of this foundation have become obsolete in view of advances in cognitive psychology, but the dynamic principles, in particular the idea of a limitation in attentional resources and of management principles as explained below, seem to remain unchallenged and actually be endorsed by cognitive psychologists (see, for example, De Bot, 2000; De Groot, 2000). For a more up-to-date version of the Models, see Gile (1999b).

The Effort Models pool together the operations of simultaneous interpreting into a Listening and Analysis Effort LA (required for comprehension of the source-language speech), a Production Effort P (which corresponds to the production of the target-language speech), and a short-term Memory Effort M, all three of which require processing capacity. In consecutive interpreting, there are two phases. The first, during which the interpreter listens and takes notes, is similar to simultaneous with the proviso that the Production Effort is devoted to producing notes, not a target speech. During the second phase, the interpreter is no longer paced by the speaker, but produces the target speech, and his/her Efforts are a Note-Reading Effort, a long-term Memory Effort for reconstructing the speech, and a target-speech Production Effort. The Models also postulate that in simultaneous and during the first phase of consecutive, interpreters work close to their maximum capacity (the *tightrope hypothesis*), meaning that any increase in processing capacity requirements linked to source-speech features and any error in the way they manage available capacity (for instance by devoting too much capacity to Production and leaving too little for the Listening and Analysis Effort) is likely to lead to saturation-based errors. This *tightrope hypothesis* was tested for simultaneous interpreting in a recent study (Gile, 1999b). In this study, when interpreting the same text, subjects tended to make errors and omissions in different speech segments rather than in the same, and when interpreting the same speech a second time, some subjects made errors which they

had not made during their initial interpretation; both results are in line with the hypothesis that cognitive saturation and cognitive management problems are involved rather than the translation difficulty of specific segments.

While the Effort Models are holistic (as opposed to other information-processing models as described in Mizuno, 2000), they can help generate testable hypotheses (see for instance Dawrant, 1996, on the effect of word-order difference in Chinese-into-English interpretation, and Mazza, 2000, on the processing of numbers). One line of reasoning starts with the *tightrope hypothesis*: assuming that interpreters are (if only subconsciously) aware that their processing capacity is stretched to the limit, they are likely to adopt on-line strategies which reduce cognitive load and may lead to some loss of information. Such loss of information may also occur preferentially in either consecutive or simultaneous interpreting for reasons independent of the interpreter's strategies. In particular, the following hypotheses about problem triggers in the context of the cognitive load in simultaneous vs. consecutive interpreting can be listed.

2.1 Problems hypothesized to occur in simultaneous more than in consecutive interpreting

1. Interpreters may wish to reduce the EVS (Ear-Voice Span, i.e. the lag in their target-speech production behind the speaker) so as to avoid overloading their working memory. This is likely to generate problems when the speaker makes false starts, as they may tend to start to translate them before having time to analyze them through and identify them as false starts. More generally, problems are likely to be more numerous in simultaneous than in consecutive when sentences are difficult to anticipate (for instance when working from German or Japanese): in consecutive, there is no need to start reformulating before the source-language statement is fully processed.

2. Interpreters are more likely to leave out a word or expression with no immediate target-language equivalent or with equivalents requiring the construction of multi-word structures, for fear of missing a more important source-speech segment (see the principle of least interference in the chapter on strategies in Gile, 1995a). In the Japanese-into-English combination, they are more likely to leave out large numbers (above 10,000) and dates (when the speaker uses the Japanese calendar), because the required transformation (from *man* and *oku* units to the Western system in the case of numbers, and from *showa*, *heisei*, etc. to the Western systems in the case of dates) also puts a heavy load on their attentional resources

(see Mazza, 2000, for a recent empirical study quantifying the difficulty in interpreting numbers). In consecutive, there should be no such problem, because they can take down the information, and only do the interlingual processing during the second stage, when the cognitive load is far smaller (Gile, 1995a).

3. They are likely to miss partially or completely multi-word names requiring word-order changes, because such changes impose a heavy load on working memory and take time, thus increasing the subsequent processing capacity load for produc-tion. In consecutive, interpreters can take down the names in the order of the source language and take care of word-order changes during the reformulation phase. On the other hand, in consecutive, writing multi-word names causes longer lag behind the speaker which interpreters may want to avoid because these might lead to memory overload. They may therefore decide to give priority to neighboring segments, and note only partially, or not at all, multi-word names, which could lead to an error and omission rate similar to, or even higher than, in simultaneous. The difference "in favor" of consecutive may therefore be found in multi-word names which can be easily abbreviated in notes, for instance those made up of components such as "Association," "International," "Organization," etc. More generally, the word-order effect (found in Dawrant, 1996, though not in Setton, 1999, in which the design was probably too loose to detect anything but very strong effects) is likely to be associated with more errors and omissions in simultaneous than in consecutive.

4. Interpreters are more likely to leave out or interpret incorrectly incomplete or ambiguous segments in the beginning of sentences. In consecutive, the context will disambiguate them before the interpreter has to reformulate them.

5. Generally, language differences and cultural differences requiring much decision-making should lead to more errors and omissions in simultaneous than in consecutive, where the added cognitive load associated with the decision-making in the production of the target-language speech only occurs during the second phase of interpreting, and thus does not contribute to saturation during the Listening and Analysis phase. Such language differences include decisions on the appropriate level of politeness or formality, on the identity of the subject of a verb, on the distinction between a probability and a future tense, on the gender of a person (*san* vs. *Mr*. or *Mrs*.), on the relative social status of a person referred to, to take but a few examples from the Japanese-English combination.

2.2 Problems hypothesized to occur in consecutive more than in simultaneous interpreting

6. In consecutive interpreting, just as in simultaneous and for similar reasons (Gile, 1995a), interpreters may also wish to reduce the lag behind the speaker, but the effect on errors and omissions may be different. In particular, they may decide not to note some speech elements which they view as unimportant but which take a long time to note (writing without abbreviating is often 5 to 10 times longer than articu-lating the same words), such as relatively unimportant modifiers and digressions (comments made and information given outside the speaker's main line of reasoning). If they are not noted, there is a higher risk that they will be omitted during the reformulation phase. Note that in simultaneous, such unimportant speech elements can be reformulated at the speed of vocal articulation, so that their saturation-generating role may be less significant than in consecutive, hence a possibly weaker tendency to leave them out.

7. In consecutive, enumerations may be rendered more incorrectly than in simultaneous because of the time lag associated with the slowness of writing (as compared to speaking), which will tend to overload working memory.

The hypotheses explained above predict that consecutive will be more accurate in some cases, and simultaneous in others. Without further quantitative indications, they do not predict an "overall" better accuracy in consecutive or in simultaneous. It is therefore tempting not only to test these hypotheses, but also to check whether there is such an "overall" superiority of consecutive over simultaneous.

3. General methodological issues

Testing these hypotheses in a naturalistic setting is made difficult by two factors. The first is variability, in particular as regards the interpreters' cognitive skills, personality and personal "style" (inter alia as regards EVS preferences, resistance to stress, working memory capacity, willingness to take risks by anticipating, preferred vocabulary and syntax). An interesting discussion regarding the variability of "personal style" can be found in Shlesinger (2000); more specific indications of variability in fidelity and in basic vocabulary (where it was surprisingly large) were found in Lamberger-Felber (1998). Another methodological difficulty is variability in the informational density of the sentences around the potentially problematic segments: if a false start, a word with no obvious target-language equivalent or another problem trigger is followed by a segment with low informational density, the interpreter is no longer under heavy cognitive load and the trigger loses its distur-bance potential. A significant effect may nevertheless be found in large samples, where large-scale random effects even out such variations. However, it is a

well known fact, often mentioned in the literature, that access to interpreters for experiments is difficult. On the other hand, constructing speeches for laboratory experiments with a strict control of relevant variable entails a risk of jeopardizing ecological validity. It therefore makes sense to start with preliminary explorations of authentic speeches, to see whether some effects are salient enough to be detected in spite of the variability, and then check whether the less obvious effects can be detected in experimental settings. The experiment described below is such a preliminary exploration using an authentic speech, in this case an extract from a press conference with the (then) newly appointed President of Kodak, George Fisher (the speech is presented in Table 1 as segmented for the purposes of the experiment, as well as in the appendix, for the convenience of readers).

The source speech, as well as all the target speeches obtained in the simultaneous mode, are taken from another study which tested the tightrope hypothesis (Gile, 1999b). This is one way of obtaining a relatively large sample (20 professional interpreters) at a relatively low added "cost": no new speech was required, and only 10 new interpreters had to be enlisted for a total sample of 20 participants. Another advantage of this approach is the possibility of using a speech which has already been found adequate for the relevant experimental use: some speeches may be too "easy" insofar as they do not generate enough problems to serve as material for inferencing, while others may be too difficult for the interpreters to perform adequately, and still others may be problematic in respect of the identification of errors (when ideas and bits of information are not easy to identify and segment into discrete units for the purpose of assessing the correctness of their rendering into the target language). The Kodak speech (the author thanks Kodak again for permission to use the speech for research purposes) was found adequate for the purposes of identifying errors in Gile (1999b) and was therefore used again here with some confidence.

4. The experiment: method

The sample is composed of 20 professional interpreters, all of whom had been working for more than 5 years on the Parisian market and had French and English as their A and B languages (not necessarily in that order). All were enlisted for the study in the workplace, during the first half of a simultaneous interpreting working day, after they had time to "warm up" with one or two turns of interpreting in the booth in their "normal" assignment. They were told they would have to interpret from English into French in the simultaneous mode (for the study reported in Gile,

1999b, 10 subjects) or in the consecutive mode (for this study, 10 other subjects) the answer of Kodak's new CEO to a journalist's question during a press conference held when his appointment to this position was announced. They were also told the French translation of one difficult technical term, *silver halide* (*halogénure d'argent* in French). Both in consecutive and in simultaneous, the speech (1 minute and 40 seconds) was interpreted in one stretch. The experiment was carried out in interpretation booths: the source speech was played on a portable cassette player and heard by subjects through a standard headset. The interpreter's target speech was recorded on a portable cassette recorder and transcribed.

The source speech was analyzed and nine potential problem triggers (false starts, modifiers, digressions, lexical units with no obvious equivalent) were identified. Note that not all the potential problem trigger types identified by the Effort Models (see above and Gile, 1995a) were found in the speech. The transcripts of the target speeches were then scrutinized for signs of errors and omissions in the segments containing these problem triggers, and the number of such errors and omissions in consecutive vs. simultaneous were counted (Table 1).

For the purpose of assessing the "overall" superiority of consecutive vs. simul-taneous or vice-versa in terms of accuracy, the speech was segmented as shown in Table 2 into 28 segments. The segments were determined subjectively, on the basis of what I considered either complete translation units, or problematic units (see the discussion further down). For each segment, each corresponding target-language rendition was rated (by myself first, and then by two other raters -- see below) as faithful (and allocated +1 point), erroneous (-1 point), or difficult to classify (0). For each segment, the sum of values for all 10 interpreters who worked in consecutive was compared to the sum of values for all 10 interpreters who worked in simulta-neous. The scores in simultaneous and in consecutive for each segment were compared, and the number of segments for which the score was higher for simulta-neous was compared with the number of segments for which the score was higher in consecutive as a metric for overall "fidelity"of consecutive vs. simultaneous. Sensitivity analysis was carried out by checking whether the overall superiority was still observed when only differences of at least 5 points between the scores for simultaneous and consecutive were taken into account (see Table 2).

Even though I did not have any (conscious) expectations regarding the superiority of consecutive over simultaneous or vice-versa, I checked for possible experimenter bias by asking two other professional interpreters (Assessors B and C) who had not taken part in the experiment to carry out the same rating procedure on

the transcripts (after all signs that could have identified target speech segments as produced in the consecutive or the simultaneous mode had been removed). In view of the strong convergence of results as shown in Table 2, I did not replicate the procedure with more assessors.

Note that fidelity assessment was essentially conducted on an informational basis. Assessors were instructed not to take linguistic correctness or elegance into account, the reason being high variability in the assessment of linguistic norm-compliance, especially in transcripts of spontaneous speech (see Gile, 1985 and 1999a).

5. Results

5.1 Examination of individual hypotheses

The 9 segments in Table 1 were singled out in advance for comparison (on the basis of the transcripts only, with a single assessor -- I found the procedure reliable enough because of the focused nature of the assessment). Other segments were considered, for instance ". . . visual memories, or visual images" (Segment No. 14 in Table 2) and ". . . to communicate them, to distribute them" (Segment No. 22 in Table 2) as false starts, but they were not included because it was not clear whether they were genuine false starts or cases where the speaker formulated his ideas in one way and then decided to add an alternative formulation.

In the case of false starts (Segments No. 1 and No. 5 in Table 1), the question was whether interpreters would fall into the trap of starting their sentence with the false start formulation. In the case of the incomplete segment (Segment No. 2 in Table 1), the question was whether it would be interpreted erroneously or incompletely. In the case of the unimportant modifiers (Segments No. 3 and No. 8 in Table 1), the segments that were difficult to translate (No. 6, No. 7 and No. 9 in Table 1), and the digression (No. 4 in Table 1), the question was whether the information would be left out. The number of occurrences of all these types of errors and omissions are indicated in the two rightmost columns of Table 1 for the simultaneous and consecutive mode respectively.

It turns out that a very marked difference (10 "problems" in simultaneous vs. none in consecutive) is found in favor of consecutive with respect to the incomplete sentence, suggesting that in this case, the context made it possible for consecutive interpreters to complete the analysis, while time pressure prevented simultaneous interpreters from doing the same. No other strong differences in favor of consecutive is seen in the table.

On the other hand, in the digression and the two unimportant modifiers, there

are differences of 4 or 5 in favor of simultaneous, which strengthens hypothesis 6 as explained in Section 2 (unfortunately, the interpreters' notes, taken during consecu-tive, were not available to investigate further what was noted and how).

5.2 Overall fidelity

As regards the overall agreement of simultaneous vs. consecutive renditions with the 28 individual segments, Table 2 summarizes the results: simultaneous interpre-ting clearly emerges as the most "accurate" mode. When counting the number of points for simultaneous vs. consecutive for each segment, all three assessors found many more simultaneous renderings more faithful than consecutive renderings: 21 to 6 for Assessor A, 17 to 9 for Assessor B, and 17 to 8 for Assessor C. By way of a sensitivity analysis, calculations were also made only taking into account differences of 5 points or more (the maximum theoretical difference for each segment would be 20, if all simultaneous renderings were assessed as correct and all consecutive renderings as incorrect or vice-versa). With this more conservative criterion, simultaneous was also found more accurate than consecutive: 14 to 3 for Assessor A, 12 to 2 for Assessor B, and to 11 to 1 for Assessor C (see the bottom line of Table 2).

6. Discussion and conclusion

At first sight, the data seem to demonstrate that in the case of the particular speech studied and its interpretation, the simultaneous mode is more "accurate" than the consecutive mode. However, the findings need to be considered with caution:

a) The assessment was done on transcripts, not on a sound track, which might affect general judgments regarding fidelity (as shown in Gile, 1999a).

b) The procedure whereby small segments are assessed in relative isolation may produce a different perception of accuracy from that resulting from the assessment of the whole speech on a continuous mode.

c) The very way that the segmentation was done, on the basis of difficulties encountered, gives salience to local information discrepancies which might well have been undetected in the middle of larger segments (see Gile, 1995b) and led to different assessments of consecutive vs. simultaneous.

Nevertheless, the results seem to suggest that the general claim that "consecutive is more accurate than simultaneous" deserves to be seriously challenged. Certain differences in the accuracy of simultaneous vs. consecutive can probably be predicted and tested on the basis of both cognitive load and technical considerations

(in particular information density on the one hand, and note-taking on the other) as was done in this study. However, while this procedure may yield satisfactory results with respect to specific types of problem triggers, it remains to be seen whether it can result in any meaningful results in holistic terms, in view of the high variability and lack of reliability of individual assessments.

Finally, it may be worth recalling that in this exploratory study, only a few problem triggers were studied. Beyond replications to confirm or challenge the results obtained here, it might be interesting to extend the study to look more closely at other factors such as mentioned in Section 2, including intercultural and linguistic factors. If the hypotheses are confirmed, this could mean that in some language combinations, consecutive may tend to be more accurate than simultaneous, while in others, the relation would be the other way around.

Daniel Gile AIIC Conference Interpreter and Professor at Universite Lyon 2. Dr. Gile is the founder and the main node of the IRN (International Research Network, a.k.a. Information Network on Conference Interpreting Research) which was set up in 1990 for the purpose of facilitating the circulation of information on conference interpreting research. The Online IRN Bulletin is available at: <http://ourworld.compuserve.com/homepages/DGile>. Contact the author at: <DGile@compuserve.com>.

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Table 1

Problem Triggers and Their Effects in Simultaneous and in Consecutive

No.	Segment in the source speech	Type	Number of errors and omissions in simultaneous	Number of errors and omissions in consecutive
1	I'm sure my	False start	3	1
2	I don't know *these* people yet	Incomplete	10	0
3	Well *enough*	Modifier	2	7
4	Let's concentrate on that	Digression	5	9
5	*For the not*, for the foreseeable future	False start	0	0
6	Cost-effective	Difficult to translate	7	7
7	Highest resolution	Difficult to translate	7	5

8	*Perhaps* totally different	Modifier	5	9
9	Killers	Difficult to translate	7	5

Table 2

Overall Fidelity Assessments for Each Segment

No.	Segment in the source speech	Assessor A	Assessor B	Assessor C
1	I'm sure my	C (+2)	S (+1)	C (+1)
2	I don't even know these people yet	C (+9)	S (+8)	C (+3)
3	But I know scientists and engineers well enough to know	S (+5)	S (+2)	S (+2)
4	That they wouldn't be happy if I pre-announced products	S (+2)	S (+6)	S (+5)
5	But since I don't know all about what the product are	S (+3)	C (+2)	C (+2)
6	I can speak loosely, I guess	S (+9)	S (+8)	S (+3)
7	I think when you look at the imaging side of Kodak	C (+6)	--	C (+2)
8	Let's concentrate on that	S (+6)	S (+6)	S (+6)
9	And recognize that for the not, the foreseeable future	S (+11)	S (+8)	S (+10)
10	As far as capture goes	S (+2)	S (+6)	-
11	That the silver halide capture media is probably… that one could ask for	S (+8)	C (+4)	C (+2)
12	The most cost-effective	C (+4)	C (+1)	-
13	Highest resolution	S (+5)	C (+5)	C (+5)
14	Means of capturing visual memories, or visual images	--	S (+5)	S (+3)
15	So to me, you want to put that in the context of being a very effective way of getting the information to begin with	S (+6)	S (+2)	S (+1)
16	Then you've got to talk about how you get that information into a digital form	S (+4)	S (+6)	--
17	To use over information networks	S (+4)	C (+1)	S (+5)
18	I think you can think of a whole array of possibilities	S (+9)	S (+6)	S (+6)
19	Once you start thinking in a broader context	S (+13)	S (+7)	S (+15)
20	Of Kodak's imaging business really being	--	C (+2)	S (+1)
21	To preserve visual memories	C (+1)	C (+2)	S (+6)
22	And to communicate them, to distribute them	S (+8)	C (+1)	S (+9)
23	In perhaps ways that are totally different than what people envisage today	S (+6)	S (+7)	S (+10)
24	Then I'll let your imagination run off with you	S (+7)	S (+6)	S (+9)
25	Cause mine sure does with me. I laid awake the last two nights thinking about those possibilities	S (+9)	--	C (+4)
26	And they're really exciting	S (+9)	S (+2)	S (+6)
27	But ninety percent of my ideas may never work	S (+1)	C (+6)	S (+4)

28	But there's ten percent that will be killers	C (+6)	S (+4)	C (+3)
	Total: overall	S:21 / C:6	S:17 / C:9	S:17 / C:8
	Total: difference > 4	S:14 / C:3	S:12 / C:2	S:11 / C:1

Note : In the right-most columns, "S (+*n*)" means that simultaneous was found to be more faithful than consecutive by *n* points, and "C (+*n*)" that consecutive was found to be more faithful than simultaneous by *n* points as regards the relevant segment. A cell with a double-hyphen indicates there was no difference in points between simultaneous and consecutive. The penultimate line indicates the number of segments for which simultaneous was found superior to consecutive vs. the number of segments for which consecutive was found superior to simultaneous. The ultimate line indicates the same, when only differences of 5 points and above were considered.

APPENDIX: Source Speech

Question: You suggested that through Kodak you can manipulate technology and fit in with this information revolution. Can you be more specific about the kind of products that Kodak will eventually be able to produce ?

Answer: I'm sure my... I don't even know these people yet but I know scientists and engineers well enough to know that they would not be very happy if I pre-announced products, but since I don't know all about what the products are, I can speak loosely I guess. I think when you look at the imaging side of Kodak, let's concentrate on that, and recognize that for the not, for the foreseeable future, as far as capture goes, that the silver halide capture media is probably the most cost-effective, highest resolution means of capturing visual memories, or visual images, that one could ask for. So to me, you want to put that in the context of being a very effective way of getting the information to begin with, then you've got to talk about how you get that information into a digital form to use over information networks, I think you can begin to think of a whole array of possibilities. Once you start thinking in a broader context of Kodak's imaging business really being to preserve visual memories, and to communicate them, and to distribute them, in perhaps ways that are totally different than people envision today, than I'll let your imagination run off with you, cause mine sure does with me. I laid awake the last two nights thinking about those possibilities, and they're really exciting but ninety percent of my ideas may never work, but there's ten percent that will be killers.