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Processing factors of pre- and postposed adverbial clauses

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Adverbial clauses occur either before or after the main clause with which they are associated.* This paper seeks to determine the factors that motivate pre- and postposing of adverbial clauses in complex sentences. The analysis that I will present is based on frequency counts of initial and final adverbial clauses in English and German. For each language I have chosen four sources of spoken and written discourses: a novel, a linguistic textbook, newspaper articles, and doctor-patient conversations. TABLE 1 to 3 show the results of my text-counts from English. Four semantic types of adverbial clauses have been distinguished: (i) conditional clauses introduced by the conjunction 'if', (ii) concessive clauses introduced by 'although', (iii) temporal clauses that are realized by a variety of conjunctions, and (iv) causal clause subsuming 'because', 'since', 'as' and 'so that' clauses.

conditional		concessive		temporal		causal	
pre.	post.	pre.	post.	pre.	post.	pre.	post.
if	129 52	although	29 14	when	52 65	because	8 59
				while	4 6	since	8 6
				as	22 10	as	1 2
				until	3 10	so that	-- 18
				before	6 10		
				after	9 8		
				since	3 2		
				once	5 --		
Total: 129 52		Total: 29 14		Total: 104 111		Total: 17 85	

TABLE 1 *English*

	conditionals	concessives	temporals	causals
preposed	129	29	104	17
postposed	52	14	111	85
Total	181	43	215	102

TABLE 2 *English total numbers*

	conditionals	concessives	temporals	causals
preposed	71.3%	67%	48.3%	16.6%
postposed	28.7%	33%	51.6%	83.3%
Total	100%	100%	100%	100%

TABLE 3 *English percentage*

The figures in TABLE 3 show that the percentage of pre- and postposed adverbial clauses varies tremendously with the semantic type of adverbial clause. Conditionals and concessives mostly precede the main clause: 71% of all conditional and 67% of all concessive clauses occur sentence-initially. Temporal clauses are equally common in both positions. And causal clauses are predominantly used after the main clause.¹

TABLE 4 to 6 show my text-counts from German. The distributional patterns are basically the same, except that the percentage of initial concessive clauses is somewhat lower in my German data. I assume that in a larger corpus this difference would disappear. Given that conditional, temporal, and causal clauses basically show the same distributional pattern in English and German it seems to be unlikely that concessive clauses behave in a radically different way in these two languages.

conditional			concessive			temporal			causal		
	<i>pre.</i>	<i>post.</i>		<i>pre.</i>	<i>post.</i>		<i>pre.</i>	<i>post.</i>		<i>pre.</i>	<i>post.</i>
wenn	75	65	obwohl	14	12	wenn	11	21	weil	7	77
V-first	71	--				als	37	29	als	26	7
falls	6	--				während	16	14	so daß	--	24
						bevor	9	4			
						nachdem	8	4			
						bis	--	10			
						seit	1	3			
Total:	152	65	Total:	14	12	Total:	82	85	Total:	33	108

TABLE 4 *German*

	conditionals	concessives	temporals	causals
preposed	152	14	82	33
postposed	65	12	85	108
Total	217	26	167	141

TABLE 5 *German total numbers*

	conditionals	concessives	temporals	causals
preposed	70%	53.8%	49%	23.4%
postposed	30%	46.1%	51%	76.5%
Total	100%	100%	100%	100%

TABLE 6 *German percentage*

Previous studies on adverbial clauses suggest that the order of main and subordinate clauses is mainly determined by discourse factors. One of the first studies of adverbial clauses in discourse pragmatic terms is Haiman's analysis of conditional clauses (Haiman 1978). Haiman's analysis shows that initial conditional

clauses provide a thematic ground for the interpretation of the following discourse. Later studies by Chafe (1984), Thompson (1985), Thompson & Longacre (1985), Ramsay (1987), Givón (1990) and others seem to suggest that Haiman's central hypothesis does not only hold for conditionals, but characterizes all different types of adverbial clauses when they precede the main clause.

I would agree that initial adverbial clauses fulfill an important task with respect to topic continuity and discourse coherence; but this does not explain why certain semantic types of adverbial clauses are more often preposed than others. Even if preposing of the adverbial clause were exclusively determined by the topic-comment structure of complex sentences, one would still have to explain why conditional clauses, for instance, are more often topical (and thus preposed) than concessive, temporal, and causal clauses. That is, in order to account for the distributional variation shown in TABLE 1 to 3 one has appeal to factors that are unique to each individual type of adverbial clause.

In this paper, I concentrate on adverbial clauses that predominantly precede the main clause: conditionals and concessives. I show that preposing of conditional and concessive clauses is largely determined by processing factors. I argue that conditional and concessive clauses in final position can cause a process of reinterpretation, and that preposing of the adverbial clause is used as a strategy to forestall this procedure.

The processing factors that I will describe in this paper differ from those that John Hawkins suggests in his recent work on sentence processing and constituent order (Hawkins 1994). Hawkins' "performance theory" is concerned with processing principles that govern syntactic parsing, whereas the present investigation concentrates on processing factors that are essential to a semantic interpretation. Although the approach in this paper is rather distinct from Hawkins' perspective, this study does not intend to question Hawkins' important findings. On the contrary, Hawkins' parsing principles are highly compatible with the current approach and seem to supplement the results of this study. I will come back to Hawkins' theory at the end of this paper; I begin my analysis now with conditional clauses.

1. Conditional clauses

Conditional clauses express a contrast between two contradictory possibilities; one is directly verbalized in the propositional content, the other is merely implicit.² Consider the example in (1):

- (1) *Dann wird man in ein paar Wochen den Wert kontrollieren. Und wenn der*
 then will one in a few weeks the value check. and if it
dann gut ist, dann kann man es dabei lassen, und sonst wird man über
 then good is, then can one it with-it leave, and otherwise will one about
ein Medikament nachdenken müssen.
 a medication consider must
 'The level will be checked in a few weeks. If it is okay, nothing else has to
 be done; otherwise medication must be considered.'

The sentence in (1) is taken from a doctor-patient conversation. The patient is consulting the doctor because of a high cholesterol level. The doctor has suggested decreasing the cholesterol level by a particular diet. He knows that this treatment is not always successful, and therefore he has to consider two contradictory

possibilities for future therapy. One of these possibilities is expressed in the proposition of the conditional clause: 'Und wenn der dann gut ist,...' The contradictory possibility ('Und wenn der dann nicht gut ist,...') is implicit. The implicit case is part of the conventional meaning of a conditional sentence that one might characterize as a *conventional implicature*.³

The opposition between the propositional content and its implicature provides a particular frame for the associated main clause that gives rise to a non-factual (i.e. hypothetical) interpretation. The main clause of example (1) comprises two propositions combined by 'und sonst' ('and otherwise'). The first part of the main clause is semantically linked to the preceding proposition of the adverbial clause. The second part of the main clause takes the implicated alternative as its starting point. FIGURE 1 shows the relation between the different parts of this sentence.

FIGURE 1

In this example, the conditional frame, that is, the disjunction between the propositional content and the conventional implicature, is established before the speaker verbalizes the information expressed in the main clause. With this arrangement the addressee is directly guided to a non-factual interpretation of the main clause that follows. Compare this example with the sentence in (2) where the conditional clause follows the main clause.

- (2) *Dann wird man in ein paar Wochen den Wert kontrollieren. Man kann es then will one in a few weeks the value check. one can it dabei lassen, wenn der gut ist, und sonst wird man über ein Medikament with-it leave, if it good is, and otherwise will one about a medication nachdenken müssen. consider must*
 'The level will be checked in a few weeks. Nothing has to be done, if it is okay, and otherwise medication must be considered.'

In example (2) the conditional frame is verbalized after the apodosis. Thus, the main clause is first interpreted as being factual; but the following 'wenn' clause

forces the addressee to revise his or her initial interpretation. A reinterpretation is a risky, inefficient and confusing procedure, and therefore it is mostly avoided. So, my hypothesis is that preposing of the conditional clause is used as a strategy to forestall a reinterpretation procedure.

FIGURE 2

In order to test my hypothesis, I have designed an experiment in which the effect of final conditional clauses is compared with the effect of final causal and temporal clauses on the preceding main clause. 35 undergraduate students of the University at Buffalo participated in this experiment. Each subject was shown a sentence like the one in (a):

(a) *Bill called and said he will come and visit us.*

All subjects had to answer the question in (b):

(b) *What will Bill do?*

This question was asked in order to determine how the subjects interpreted the sentence in (a). All 35 subjects basically gave the same answer: "Bill will come and visit us", "Come and visit", or something like that. In the next step a temporal, a causal, and a conditional clause were added in turn, and the subjects were asked if they could maintain the answer that they had given in response to question (b).

(c') *Bill called and said he will come and visit us, when he gets a week off.*

(c'') *Bill called and said he will come and visit us, because he gets a week off.*

(c''') *Bill called and said he will come and visit us, if he gets a week off.*

In the case of final temporal and causal clauses, all subjects thought they could maintain their previous interpretation. In the case of final conditional clauses the response was very different: all 35 subjects indicated that they had to revise their previous answer. Two subjects even suggested replacing the auxiliary 'will' by 'would' in the main clause in order to avoid any confusion when the 'if' clause was added. This experiment seems to confirm my hypothesis: final conditional clauses have a major effect on the interpretation of a preceding main clause, while final

temporal and causal clauses just add further information to the preceding proposition.

Given that processing factors motivate the use of conditional clauses in sentence-initial position, how do we account for the conditional clauses that follow the main clause? About 30% of all conditional clauses in my data occur sentence-finally. My analysis shows that postposing of conditional clauses is motivated by particular discourse factors. Two types of final conditional clauses must be distinguished. First, conditional clauses that are *announced* in the preceding main clause. Announced conditional clauses express *new information*, for which the preceding main clause provides a thematic ground. In written discourse, final conditional clauses can be announced by a correlative, as in example (3), or by a scalar particle, as in example (4). In spoken discourse, the intonation of the main clause is used as an indication for a following 'if' clause.

- (3) *Es macht dann Beschwerden, wenn man sich dessen selbst gar nicht bewußt ist.*
aware is
'It causes (then) discomfort, if you are not aware of it.'
- (4) *The sentence can **only** be assigned the right truth conditions, or alternatively be given the correct semantic representation, if the grammatical significance of 'and' in this sentential context... is taken into account before the semantics.*

Example (5) shows a final conditional clause that is not announced in the preceding main clause. Unannounced conditional clauses do not provide new information; rather they function as a *reminder*. Consider the example in (5) which is taken from another doctor-patient conversation. Earlier in the discourse the patient argued that he is no longer able to work at his job because of a heart disease from which he suffered a few years ago. He therefore asked the doctor for his medical records so as to apply for a job-retraining program offered by his health insurance company. After examining the patient the doctor concluded that the heart disease is no longer a threat and that the patient is able to do his current job. In this connection he says:

- (5) *Fragen Sie mich nicht nach einer Bescheinigung. Denn sonst müßte ich Ihnen ask you me not for a medical documentation. because otherwise must I you jetzt bescheinigen, daß kein Herzklappenfehler mehr besteht, daß Sie now certify, that no valvular heart disease any longer exists, that you körperlich in guter Verfassung sind, und so weiter, und das hilft Ihnen nix, physically in good shape are, and so on, and that helps you not, wenn Sie ne Bescheinigung erreichen wollen.*
if you a medical documentation achieve want
'Don't ask me for medical documentation, because I would have to certify that there is no longer a valvular disease, that you are in good physical shape, and so on, and that doesn't help you, if you want medical documentation.'

The doctor uses the final 'wenn' clause in order to remind the patient of information that was previously introduced into the discourse: the patient told the doctor that he wanted medical documentation of his cardiac disease. The final 'wenn' clause

reactivates this information in order to confirm the intended conditional interpretation of the preceding main clause.

Example (6) and (7) show complex sentences with final temporal and causal clauses. In both examples the adverbial clause is neither announced nor does it function as a reminder.

- (6) *Mr. Milosevic imposed the trade embargo on his former protégés in Bosnia last month, after the Bosnian Serbs rejected the contact group's peace plan.*
- (7) *And... I'm gettin' a little nuts a'ready. I's... I haven' been doin' too much school work, because -- here this has to be done, here that has to be done, and... I really -- I'm getting tired.*

The temporal clause in (6) is taken from a newspaper article that is concerned with the war in Bosnia. The temporal clause follows the main clause without any announcement, and it does not just reactivate a background assumption; rather it adds information to the central line of this article. The causal clause in (7) is taken from a spoken discourse. A comma indicates that main and adverbial clause belong to separate intonation units. The 'because' clause is unbound and resembles a coordinate main clause that expands on the central topic of this conversation. So, the examples in (6) and (7) show that temporal and causal clauses in final position are used with other discourse functions than final conditional clauses.

2. Concessive clauses

Like conditional clauses, concessive clauses predominantly precede the main clause. Furthermore, like conditional clauses, the interpretation of concessive clauses involves a conventional implicature, and preposing of the subordinate clause is motivated by processing factors. Consider, for instance, the example in (8). The sentence is taken from a chapter of a historical book about the city of Buffalo. The chapter describes the assassination of President McKinley at the Pan American Exposition in Buffalo in 1901. Immediately after the president was shot the police arrested several people, among them Emma Goldman, an alleged anarchist:

- (8) *Although they were convinced of her innocence and refused to comply with the district attorney's request, the Chicago police detained Goldman for fifteen days...*

The situation expressed in this sentence contrasts with the situation that is normally expected: normally we would expect that the police dismiss a detainee if they considered this person to be innocent. The normal situation is conventionally implicated. If we represent the proposition of the concessive clause by x and the main clause proposition by y , we can state the relationship between the propositional content and the implicature as in FIGURE 3.

although x , y
 (conventionally) implicates:
 normally if x , $\sim y$ (or: normally if y , $\sim x$)

FIGURE 3

The abnormal character of the situation expressed in a concessive sentence is indicated by the concessive conjunction at the beginning of the adverbial clause. If the concessive clause is preposed, as in example (8), the addressee recognizes that the information of the following proposition deviates from the standard case before he or she interprets the sentence. If the concessive clause is postposed, as in example (9), the addressee does not realize that the main clause is part of a deviant situation before the concessive clause follows. Thus the addressee will assume the standard situation, and based on this assumption he or she will make certain inferences.

- (9) *The Chicago police detained Goldman for fifteen days, although they were convinced of her innocence and refused to comply with the district attorney's request.*

In example (9), the sentence-initial main clause *invites the inference* that the police had good reason to detain Goldman for so many days. The addressee is led to this inference because it is part of our cultural belief that the police act fairly and responsibly. The following concessive clause indicates, however, that this inference does not hold in this instance. The situation stated in sentence (9) deviates from the standard case: the police were convinced of Goldman's innocence, but they still kept her in prison. The final concessive clause induces the addressee to abandon the previous inference which is part of his or her initial interpretation of the preceding main clause. Like final conditional clauses, final concessive clauses may cause a reinterpretation, and therefore postposing of concessive clauses is mostly avoided.

Thus far I have basically given the same arguments for conditionals and concessives in order to account for their distributional behavior. There is, however, a significant difference between final conditionals and final concessives. A final conditional clause affects the propositional meaning of the preceding main clause: it turns a factual proposition into hypothetical information. Final concessive clauses do not affect the propositional meaning; rather they change an invited inference of the preceding main clause. The effect of final concessive clauses is less significant than the effect of final conditional clauses, and that might explain why conditional clauses are more often preposed than concessives. In FIGURE 4 I have stated the particular reinterpretation effect that arises from final conditionals and final concessives:

<i>Conditionals:</i>	p (p is factual), if q.
Effect of 'if q':	p is reinterpreted as being non-factual
<i>Concessives:</i>	p (invites the inference 'if p ~q'), although q.
Effect of 'although q':	p remains intact, but ~q must be abandoned

FIGURE 4

3. Temporal and causal clauses

Temporal and causal clauses mostly follow the main clause. In this section I argue that the dominant use of temporal and causal clauses after the main clause follows from a certain parsing principle that Hawkins postulates in his recent work that I have mentioned in the introduction. According to Hawkins, syntactic parsing is guided by a principle (*Early Immediate Constituent EIC*) that prefers those orders

of words and phrasal constituents that allow for a rapid access to all immediate constituents (ICs) of a mother node (M), once the first IC has been recognized as a daughter of M. This principle predicts that complex sentences with final adverbial clauses are easier to parse (and thus preferred) than complex sentences in which the adverbial clause precedes the main clause. In complex sentences with initial adverbial clauses the parser recognizes the S-node that dominates both the main (IC₂) and the subordinate clause (IC₁) when it encounters the sentence-initial conjunction, but the entire adverbial clause has to be parsed until the main clause (i.e. IC₂) is accessed. That is, the parser creates both the mother node of the adverbial clause (S') and the mother node of the complex sentence (S) once it encounters the sentence-initial conjunction; but the entire adverbial clause (IC₁) must be parsed until the first constituent of the main clause (IC₂) is accessed:

FIGURE 5

In complex sentences with final adverbial clauses the parser does not recognize that the main clause pertains to a complex sentence until it encounters the following adverbial clause, and once the adverbial clause has been encountered the mother node of the adverbial clause (S') is immediately attached to the simultaneously created S-node that dominates the entire sentence.

FIGURE 6

In other words: complex sentences with initial adverbial clauses require keeping the entire subordinate clause in the short term memory until the main clause is accessed, while complex sentences with final adverbial clauses simply add the subordinate clause to the structure that has been created by parsing the preceding main clause.

Hawkins' parsing principle (i.e. the EIC) accounts for the prevalent use of temporal and causal clauses after the main clause. It conflicts, however, with the

distributional behavior of conditionals and concessives that tend to precede the main clause. Conditional and concessive clauses violate the EIC so frequently because preposing of conditional and concessive clauses is motivated by particular processing factors that have to do with their semantic interpretation. Semantic and syntactic processing principles are obviously in conflict in these clauses, and in this situation of *competing motivation* it is the semantic factor that usually overrides the order that is preferred for syntactic parsing.

We still have to account for those temporal and causal clauses that precede the main clause. A closer look at complex sentences with preposed temporal and causal clauses suggests that initial occurrence is motivated by discourse factors. Temporal clauses are used to organize the temporal structure of narratives and other genres with a temporal contour. Initial temporal clauses frequently resume information from the preceding discourse; they establish a temporal reference point for the information that is expressed in the following main clause. Example (10) shows a typical case: the initial 'when' clause resumes information that has been mentioned in previous sentences; the temporal clause is used to provide a thematic ground for the proposition that follows.

- (10) *The presidential train was greeted by a twenty-one gun salute. In his eagerness to honor this most popular president the cannoneer, a Coast Guard officer and veteran of McKinley's Civil War regiment, had placed the cannon so close to the railroad tracks that when the salvo began the presidential car shook violently.*

Unlike temporal clauses, causal clauses are not typical background clauses. Only 20% of all causal clauses in my data precede the main clause (while almost 50% of all temporal clauses occur sentence-initially). The dominant use of causal clauses after the main clause is due to their communicative function: causal clauses are frequently used with their own illocution (Lakoff 1987); they tend to be less integrated into a complex sentence than other adverbial clauses. Consider, for instance, the 'because' clause in (11):

- (11) *And... I'm gettin' a little nuts already. I's...I haven't been doin' too much school work, because -- here this has to be done, here that has to be done, and...I really -- I'm getting tired.*

Context and propositional content of this sentence suggest that the 'because' clause was planned after or while the speaker performed the preceding speech act. That is, the causal clause is "asserted 'post dictum'" (Altenberg 1980, 57), it adds new information in reaction to the preceding proposition. Causal clauses often resemble a coordinate main clause, and like a coordinate main clause they tend to follow the clause to which they are semantically related.

It is interesting to note in this connection, that in colloquial German 'weil' clauses (i.e. causal adverbial clauses) are frequently realized with main clause constituent order. In German subordinate clauses the finite verb occurs sentence-finally; but when a causal 'weil' clause follows the main clause the finite verb is frequently second as in a main clause. Main clause constituent order is restricted to 'weil' clauses in final position; it does not occur in initial 'weil' clauses or in other pre- or postposed adverbial clauses.⁴ The use of main clause order in final 'weil' clauses indicates their independence of the related main clause (Gaumann 1983).

Processing factors like those that I have described for conditional and concessive clauses are completely irrelevant to the position of temporal and causal clauses. Unlike the latter, the conventional meaning of temporal and causal clauses does not involve a conventional implicature. That does not mean that complex sentences with temporal and causal clauses could not involve a reinterpretation. Consider, for instance, the sentence in (12):

- (12) *The Pope will come to the US next year, because he wants to see Disney World.*

Given our knowledge about the Pope and the Catholic church we would assume that the Pope will come to America in order to support the Catholic community in this country. This is an invited inference of the main clause in (12). The following 'because' clause indicates, however, that this inference is not valid: the Pope will not come to the US in order to support the Catholic church, but rather because he wants to see Disney World. The causal clause forces the addressee to revise an invited inference of the previous main clause; but this revision is due to the propositional content of the adverbial clause; it is not caused by the conventional meaning of causal clauses. In final conditional and concessive clauses the reinterpretation of the preceding main clause is triggered by the conditional or concessive marker. Conditionals and concessives are associated with a conventional implicature, and this implicature is relevant to the interpretation of the associated main clause. In other words, causal and temporal clauses cause a reinterpretation just in the case where the propositional content contradicts a previous inference. Conditional and concessive clauses, in contrast, give rise to a reinterpretation because they are associated with a conventional implicature that is crucial for the interpretation of the entire sentence.

4. Conclusion

In this paper, I have argued that preposing of conditional and concessive clauses is motivated by semantic processing factors. Final conditional and final concessive clauses may cause a reinterpretation of the preceding main clause. One way to avoid such a reinterpretation is to place the adverbial clause before the main clause. Preposing of conditional and concessive clauses is, thus, a strategy to forestall a reinterpretation procedure. Postposing of conditional and concessive clauses is motivated by particular discourse factors: final conditionals and final concessives are either announced in the preceding main clause and provide new information or they function as a reminder.

The distributional behavior of temporal and causal clauses is due to other factors. I have argued that the prevalent use of temporal and causal clauses in final position is motivated by a certain parsing principle (Hawkins' EIC), and that temporal and causal clauses precede the main clause when a preposed adverbial clause enhances discourse coherence. Final occurrence is especially common with causal clauses, because causal clauses often resemble a coordinate main clause that generally follows the clause to which it is related.

NOTES

*I would like to thank Jean Pierre Koenig for his comments on an earlier draft of this paper. All remaining errors are, of course, mine.

¹Previous studies show similar text-counts; see Altenberg (1980), Quirk et. al. (1985), Thompson (1985), Ramsay (1987).

²My understanding of conditional clauses is based on the analysis of conditionals in Lehmann (1974). Following Lehmann, I assume that conditional clauses generally express a disjunction and that they convey hypothetical (or counterfactual) information. It is important to note that the notion of conditional clause is independent of the presence or absence of a particular marker. The English conjunction 'if', which is normally used in conditional clauses, may occur in clauses that convey factual information (as some people have argued). If this is correct, one has to re-consider the common categorization of 'if' as a conditional marker, but this does not require to re-define the notion of conditional clause.

³The implicit alternative is triggered by the conditional conjunction; it does not simply arise from the context, so that it cannot be a *conversational implicature*.

⁴There is one exception: final concessive clauses can also occur with main clause order.

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