Competing motivations for the ordering of main and adverbial clauses*

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Abstract

This article examines the ordering distribution of main and adverbial clauses. Using corpus data from spoken and written English, it is shown that the positioning of finite adverbial clauses vis-à-vis the main clause varies with their meaning or function: conditional clauses tend to precede the main clause, temporal clauses are common in both initial and final position, and causal clauses usually follow the main clause. The article argues that the positional patterns of adverbial clauses are motivated by competing functional and cognitive forces. Specifically, it is shown that final occurrence of adverbial clauses is motivated by processing, while initial occurrence results from semantic and discourse pragmatic forces that may override the processing motivation.

1. Introduction

Competing motivations play an important role in functional explanations of linguistic structure. For instance, it has been repeatedly argued that morphological structures are determined by two conflicting forces, economy and explicitness. Economy reflects the speaker's interest in producing linguistic units with minimal effort, which fosters the use of short expressions, whereas explicitness reflects the hearer's interest in receiving clear and unambiguous expressions, which requires extensive linguistic coding (cf. Haiman 1983; Dressler et al. 1987). Similar explanations have been proposed in the domain of syntax and phonology (cf. DuBois 1987; Dryer 1997; Haspelmath 1999; Hayes 1999; Bybee 2001; see also the related works in functionally-based optimality theory: Aissen 1999; Bresnan and Aissen 2002). Following this line of thinking, the current article argues that the positioning of finite adverbial clauses is determined by competing motivations. In particular it is shown that the ordering of

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main and adverbial clauses reflects the effect of functional and cognitive forces that are in conflict with each other.

Finite adverbial clauses are subordinate clauses marked by conjunctions such as *when*, *because*, and *if*. As can be seen in examples (1) to (3), in English, as well as many other languages (cf. Diessel 2001), finite adverbial clauses may precede or follow the semantically associated (main) clause.

(1) a. *When* we arrived in Berlin it was dark.
    b. It was dark *when* we arrived in Berlin.
(2) a. *Because* he didn't sleep much Peter is tired.
    b. Peter is tired *because* he didn't sleep much.
(3) a. *If* it doesn't rain we'll go to the party.
    b. We'll go to the party *if* it doesn't rain.

In the literature, constituent order is commonly explained in terms of two general factors. Some studies argue that the ordering of linguistic elements is primarily determined by information structure. Specifically, it has been claimed that given information tends to precede new information because new information needs to be grounded in information that is already in the hearer's knowledge store (Firbas 1966; Prince 1980; Birner and Ward 1998). Other studies suggest that the ordering of linguistic elements is primarily determined by processing. The most elaborate proposal of this approach is presented in Hawkins (1990, 1994, 1998), who contends that information structure is only relevant to constituent order if two alternative orders are equally difficult to process. Considering both factors, Wasow (2002) recently argued that both information structure and processing are relevant to constituent order. More precisely, he showed that the ordering of postverbal elements in English is affected by a variety of factors involving syntax, semantics, pragmatics, and lexicon (see also Wasow 1997a; Arnold et al. 2000).

Taking a similar approach as Wasow, the current article argues that the positioning of finite adverbial clauses is affected by multiple forces that are in conflict with each other. Specifically, it is shown that the ordering of main and adverbial clauses is determined by the interaction between processing, discourse pragmatics, and semantics. The analysis concentrates on adverbial clauses in English; however, at the end of the article we will take a look at the positioning of adverbial clauses in other languages, providing a test for the analysis proposed on the data from English. The English data show that the positioning of finite adverbial clauses varies with their meaning or function: conditional clauses precede the main clause more often than temporal clauses, which in turn are more frequently preposed to the main clause than causal clauses. It is argued

that final occurrence of adverbial clauses is motivated by processing, but that nonetheless certain semantic types of adverbial clauses often precede the main clause because of semantic and discourse pragmatic forces that favor the use of initial occurrence and may override the processing motivation.

2. Data

English has a variety of adverbial clauses, which, on formal grounds, may be divided into three basic types: (i) finite adverbial clauses (see example [4]), (ii) nonfinite adverbial clauses (which comprise participial and infinitival constructions) (see example [5]), and (iii) verbless adverbial clauses (see example [6]) (cf. Kortmann 1991; Biber et al. 1999: 826).

(4) *When* Dan comes home, he goes straight to the fridge.
(5) *After* scoring over my calmness in this graphic way he nodded wisely.
(6) Back in his room, Jeff turned on the TV and tried to forget the whole thing.

This study concentrates on finite adverbial clauses, which are by far the most frequent type: in conversations, they account for about 90 percent of all adverbial clauses in English (cf. Biber et al. 1999).[1]

The data come from three sources: conversational discourse, fiction, and scientific writing. The conversational data are taken from fifteen speakers of the Santa Barbara corpus, which comprises transcripts of colloquial American English; the speech of the fifteen speakers includes 388 sentences containing an initial or final adverbial clause. The fictional data are taken from fifteen short stories written by American and British authors; together they include 878 adverbial clauses. The scientific writings are taken from the journal *Cognition*; they comprise fifteen articles including 768 adverbial clauses. Table 1 provides a summary of the data.

Table 1. *Summary of the data*

Genre	Source	Number of speakers/authors	Total number of adverbial clauses
Conversation	Santa Barbara Corpus	15	388
Fiction	Short stories by British and American authors	15	878
Scientific writing	Academic articles from the journal *Cognition*	15	768

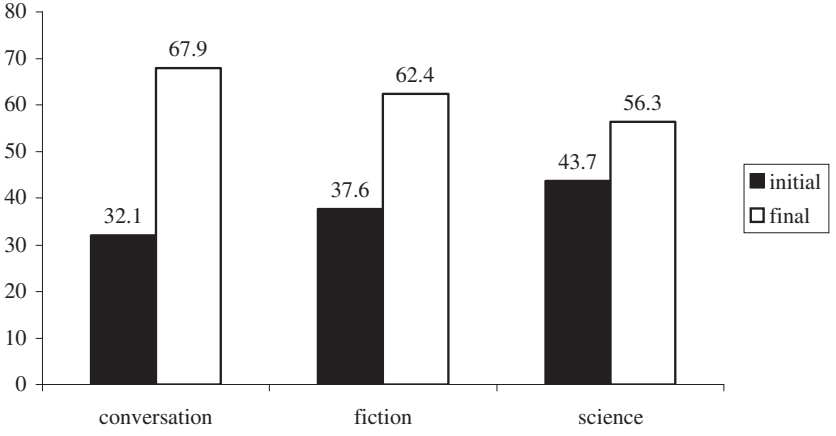


Figure 1. *Mean proportions of initial and final adverbial clauses*

The numbers in Table 1 are based on adverbial clauses marked by the following conjunctions: *if*, *because*, *when*, *while*, *before*, *after*, *since*, *once*, *until*, *as*, *as soon as*, and *as long as*. In addition to these conjunctions, the data include adverbial clauses marked by *(al)though*, *unless*, and *so that*, which are excluded from the analysis because *(al)though* and *unless* only occur in the written data (notably in the scientific articles) and because *so that* only appears in final adverbial clauses. Also disregarded are adverbial clauses that interrupt the main clause (e.g. *My favorite word, when I was twelve, was paradox*), isolated adverbial clauses that do not occur with a related main clause (e.g. A: *But if you give them rewards* ... B: *Well I gave them, I gave them sticker* ...), and adverbial clauses that specify the meaning of a temporal or locational expression (e.g. *At half-past four, when the court rose, a new development had occurred*).

Overall, there are 2034 finite adverbial clauses in the data. The great majority of them follow the main clause: 782 adverbial clauses occur sentence-initially and 1252 adverbial clauses occur sentence-finally. Figure 1 shows the mean proportions of initial and final adverbial clauses in the three data sources.

As can be seen in Figure 1, in all three corpora, final adverbial clauses are more frequent than initial adverbial clauses. The largest proportion of initial adverbial clauses is found in the scientific articles, where an average of 43.7 percent of all adverbial clauses precede the main clause. In the conversational data and in the short stories, adverbial clauses precede the main clause less frequently, but overall the differences in the positioning of adverbial clauses are relatively small between the three

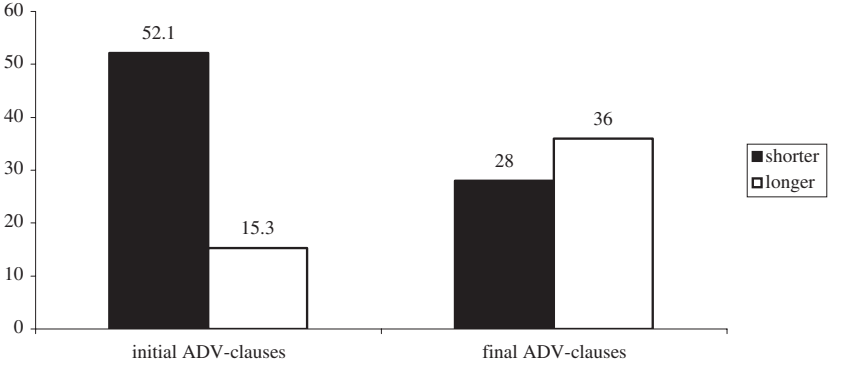


Figure 2. *Relative length of initial and final adverbial clauses in the short stories*

data sources. A repeated-measures ANOVA performed on the proportions of initial adverbial clauses in the three corpora reveals only a trend ($F(2, 42) = 2.550$; $p > .090$).

A preliminary analysis of the data suggested that initial adverbial clauses are shorter than final adverbial clauses. In order to test this hypothesis, I counted the words of all adverbial clauses in the short stories and grouped them into three classes: (i) adverbial clauses that are at least four words shorter than the main clause, (ii) adverbial clauses that are at least four words longer than the main clause, and (iii) adverbial clauses that are roughly of the same length as the main clause (i.e. $+/-3$ words). Figure 2 shows the mean proportions of initial and final adverbial clauses that are shorter or longer than the main clause; adverbial clauses that are roughly of the same length as the main clause are disregarded.

As can be seen in Figure 2, if the adverbial clause precedes the main clause (i.e. initial ADV-clauses) an average of 52.1 percent of all adverbial clauses are shorter than the main clause and only an average of 15.3 percent are longer. If, on the other hand, the adverbial clause follows the main clause (i.e. final ADV-clauses), an average of 28.0 percent of all adverbial clauses are shorter and an average of 36.0 percent are longer than the main clause. A paired *t*-test reveals that while the initial adverbial clauses are significantly shorter than the main clause ($t(14) = 8.859$, $p < .001$), the final adverbial clauses are basically of the same length ($t(14) = 1.679$, $p > .115$). Moreover, while the final adverbial clauses include an average of 10.2 words per clause, the initial adverbial clauses contain an average of only 7.7 words per clause, that is, on average the final adverbial clauses are about 2.5 words longer than the initial adverbial clauses; the difference is highly significant ($t(14) = 5.643$, $p < .001$). Both the relative difference in length between main and adverbial clauses

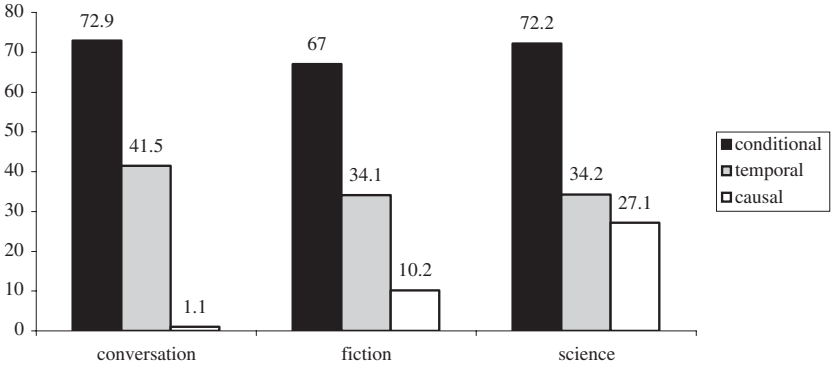


Figure 3. *Mean proportions of initial conditional, temporal, and causal clauses*

and the absolute difference in length between initial and final adverbial clauses suggest that length (or weight) plays an important role in the positioning of adverbial clauses.

If we look at the positional patterns of adverbial clauses more closely, we find that different semantic types of adverbial clauses tend to different degrees to either precede or follow the main clause. For the purpose of this study, I divided the adverbial clauses included in the corpus into three major semantic classes: (i) conditional clauses marked by *if* (see example [7]), (ii) temporal clauses marked by *when*, *while*, *after*, *before*, *once*, *until*, *since*, *as*, *as soon as*, and *as long as* (see examples [8]–[17]), and (iii) causal clauses marked by *because*, *since*, and *as* (examples [18]–[20]).

(7) *If* we are careful, we can use ''top-down'' as an innocent illusion.
(8) *When* you get back here, we have dry hooves.
(9) Dahmer rubbed the top of the skull *while* he stared into my eyes.
(10) *After* the cops took a quick look around, well, Dahmer was history.
(11) But *before* I left my resolution softened.
(12) And then *once* I got into it, gee, I wanna take the second half of it.
(13) I never knew this *until* I took this class.
(14) It had certainly changed in the short hour *since* I had come out.
(15) My heart beat a little *as* I began to walk down it.
(16) He was anxious to tell his story, *as long as* he was well-paid.
(17) *As soon as* I had done it, it struck me as a puerile thing to do.
(18) But you still have to clean off that table, *cause* it's grody.
(19) He would kill hum *since* I could not get hold of him.
(20) *As* I am very tall, my head touched the lintel.

Overall, the data include 506 conditional clauses, 1032 temporal clauses, and 496 causal clauses. Figure 3 shows the mean proportions of

conditional, temporal, and causal clauses that precede the main clause in the three corpora.

As can be seen in Figure 3, conditional clauses precede the main clause more often than temporal clauses, which in turn are more frequently preposed to the main clause than causal clauses (though the difference between temporal and causal clauses is relatively small in the scientific articles). Similar proportions of initial and final conditional, temporal, and causal clauses were reported in Altenberg (1984), Quirk et al. (1985: 1107), Ford and Thompson (1986), Ramsay (1987), Ford (1993), Biber et al. (1999), and Diessel (1996, 2001).

A Friedman test performed on the proportions of initial conditional, temporal, and causal clauses in each of the three corpora reveals significant differences between them (conversations $\chi^2 = 21.65$; $p < .001$; short stories $\chi^2 = 26.53$; $p < .001$; scientific writing $\chi^2 = 20.44$; $p < .001$), suggesting that the positional patterns of adverbial clauses are crucially determined by their meanings. Pair-wise comparisons showed that the proportions of initial conditional and initial temporal clauses are significantly different in all three corpora (conversations $Z = 2.897$, $p < .002$; short stories $Z = 3.408$, $p < .001$; scientific writing $Z = 3.351$, $p < .001$). However, the proportions of initial temporal and initial causal clauses are only different in the conversations ($Z = 3.111$, $p < .003$) and short stories ($Z = 3.010$, $p < .003$); in the scientific articles, the positional patterns of temporal and causal clauses are not significantly different ($Z = 1.250$, $p > .211$) (cf. Biber et al. 1999: 833).

In what follows, I propose an analysis that explains the positional patterns of adverbial clauses in terms of competing motivations (cf. DuBois 1987; Dryer 1997; Wasow 2002). Specifically, I argue that the positioning of conditional, temporal, and causal clauses is motivated by competing forces from three sources: processing, discourse pragmatics, and semantics. I discuss the three forces in turn, beginning with processing.

3. Analysis

3.1. *Processing forces*

The processing analysis I propose is based on Hawkins' "performance theory of order and constituency" (cf. Hawkins 1990, 1992, 1994, 1998, 2000). Hawkins' principal idea is that words and phrases are arranged in such a way that "linear ordering is subservient to constituent-structure recognition" (Hawkins 1994: 423). Constituent structures are recognized based on specific elements in the parse string, which Hawkins calls

"mother node constructing categories" (MNCCs). A MNCC is an element that allows the parser to construct the mother node of a phrase. For instance, a preposition is the MNCC of a prepositional phrase because it indicates that the structure currently processed is a PP.

Hawkins' central parsing principle is called "early immediate constituents" (EIC). According to this principle, the human parser prefers those orders of words and phrases that have a short "constituent recognition domain," which Hawkins (1992) defines as follows:

> The constituent recognition domain of a phrasal mother node M is the ordered set of words in a parse string that must be parsed in order to recognize all ICs [immediate constituents] of M, proceeding from the word that constructs the first IC on the left, to the word that constructs the last IC on the right, and including all intervening words. (Hawkins 1992: 198)

Note that the ICs can only be constructed if the parser has recognized the mother node M of the entire phrase. Without knowing M, it is often impossible to determine the status of the ICs. For instance, the initial constituent of a sentence such as *Watching TV* ... cannot be interpreted as a specific IC until the parser has recognized the mother node of the phrase: if the sentence continues with a verb (e.g. *Watching TV makes me tired*), the initial constituent is interpreted as some kind of NP; but if the sentence continues with a (pro)noun (e.g. *Watching TV, he fell asleep*), the initial phrase is interpreted as a nonfinite adverbial clause. This suggests that the recognition domain should be defined more precisely as the ordered set of words that must be processed in order to recognize (or access) all ICs of a phrase once the parser has recognized the mother node M of the phrase.

The EIC predicts that structures with a short recognition domain carry a lower processing load than structures with a long recognition domain. Consider, for instance, the following example.

(21) He [played$_{V}$ [with a friend]$_{PP}$]$_{VP}$

IC-to-word ratio: 2/2 = 1

The verb phrase *played with his friend* consists of two ICs: V and PP. V is constructed by the verb *played*, which also allows the parser to recognize M (i.e. the VP node), and PP is constructed by the adposition *with*. In order to recognize M and the two ICs of M, the parser has to scan a recognition domain of only two words, *played* and *with*, which serve as the MNCCs of the two ICs in this phrase. Note that the PP node (i.e. the second IC) can be constructed without processing the NP *a friend* because PP is sufficiently determined by the preposition *with*. In other words, the

two ICs of VP can be recognized on the basis of a proper subset of words dominated by VP.

Hawkins argues that processing complexity can be measured by dividing the number of ICs by the number of words that have to be processed in order to recognize all ICs of a phrase.[2] He shows that the higher the IC-to-word ratio, the less difficult a structure is to parse. The IC-to-word ratio of the VP in (21) is 1 (2 ICs divided by 2 words yields 1), which is the highest possible score. In other words, the structure in (21) carries the lowest possible processing load and is therefore optimal for parsing. Compare the structure in (21) with the schematic example in (22), in which the adposition occurs at the end of the phrase.

(22) He [played$_{V}$ [a friend with]$_{PP}$]$_{VP}$

IC-to-word ratio: 2/4 = 0.5

In this case, the parser has to scan a recognition domain of four words in order to construct both ICs of VP. The structure thus carries a much higher processing load than the structure in (21), which is reflected in the lower IC-to-word ratio. This explains, according to Hawkins (1994), why postpositional phrases are extremely rare in VO languages like English.

Complex sentences are constructions consisting of two clausal ICs, the main clause and the subordinate clause. They are dominated by a mother node S that is constructed by the subordinate conjunction, which indicates that the structure currently processed consists of two clauses: an adverbial clause and a main clause. In other words, the subordinate conjunction allows the parser to recognize the mother node of the entire phrase (i.e. the S node dominating the complex sentence). The mother node of the adverbial clause is also constructed by the subordinate conjunction, but the main clause does not have a specific MNCC: in contrast to the adverbial clause, the main clause does not include a specific linguistic element that indicates its role within the biclausal construction.[3]

If the adverbial clause precedes the main clause, as in (23), the parser immediately recognizes that the sentence is biclausal. That is, as soon as the parser encounters the sentence-initial conjunction, it recognizes the mother node of the complex sentence, but then the entire adverbial clause has to be processed, and kept in working memory, until the main clause — that is, the second IC — can be accessed.

(23)
[[*When* Peter came home]$_{SUB}$ [Mary was working in the garden]$_{MAIN}$]$_{S}$

IC-to-word ratio: 2/5 = 0.4[4]

If, on the other hand, the adverbial clause follows the main clause, as in (24), it is not immediately clear that the sentence consists of two clauses. In this case, the parser is not able to construct the mother node S dominating the entire sentence until it encounters the subordinate conjunction, which organizes the complex sentence after the main clause has been processed. In other words, if the adverbial clause follows the main clause, the parser recognizes the mother node S when it has immediate access to both ICs: main and adverbial clauses can be attached to S (i.e. the mother node of the complex sentence) as soon as this node is constructed. The recognition domain is therefore much shorter if the adverbial clause follows the main clause and thus, we can conclude, complex sentences are easier to process, and therefore more highly preferred, if the adverbial clause follows the main clause.

(24)

[[Mary was working in the garden]$_{\text{MAIN}}$ [*when* Peter came home]$_{\text{SUB}}$]$_{\text{S}}$

IC-to-word ratio: 2/1 = 1

Note that this analysis explains why initial adverbial clauses tend to be shorter than final adverbial clauses (cf. Section 2): the shorter an initial adverbial clause, the shorter the recognition domain and the easier the complex sentence is to parse. Since the length of final adverbial clauses does not affect the recognition domain, there is no particular processing pressure to keep them short, and thus they tend to be longer than initial adverbial clauses.

Hawkins processing theory accounts for constituent order primarily from the hearer's perspective: linguistic elements are arranged in such orders that the hearer can rapidly identify the immediate constituents of a phrase. Wasow (1997b) argued that this account is psychologically implausible because it disregards the speaker's point of view. In fact, according to Wasow, constituent order is primarily determined by utterance planning. He contends that speakers tend to arrange constituents in orders that do not require an early commitment to a specific syntactic structure, which would involve an extensive amount of utterance planning (see also Arnold et al. 2000; Wasow 2002). If we follow Wasow's argument, we might interpret the preference for final adverbial clauses as follows. If the adverbial clause precedes the main clause, the speaker must have a comprehensive utterance plan because an initial adverbial clause involves the speaker's commitment to produce a structure consisting of at least two clauses. If, on the other hand, the adverbial clause follows the main clause, the complex sentence can be constructed successively, that is, one clause at a time, because the link between main and adverbial

clauses is only established after the main clause has been constructed. In other words, complex sentences including final adverbial clauses require a later commitment to produce a biclausal structure, which reduces the amount of utterance planning. Thus, final adverbial clauses seem to be preferred from both the hearer's and the speaker's perspectives.[5]

While processing (or utterance planning) provides a straightforward account for the use of final adverbial clauses, it does not explain why adverbial clauses often precede the main clause. If the ordering of main and adverbial clauses were only determined by processing, one would expect that adverbial clauses always follow the main clause, but, as we have seen, certain semantic types of adverbial clauses — notably conditional clauses and, to a lesser degree, temporal clauses — frequently precede the main clause. This suggests that processing (or utterance planning) cannot be the sole determinant for the positioning of adverbial clauses. In what follows, I argue that initial occurrence of adverbial clauses is motivated by semantic and discourse pragmatic forces that favor the use of initial occurrence and may override the parsing/planning preference for final occurrence.

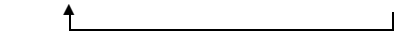
3.2. *Discourse pragmatic forces*

Initial and final adverbial clauses serve different discourse pragmatic functions. As argued by Chafe (1984), Thompson (1987), Givón (1990), Ford (1993) and many others, initial adverbial clauses are commonly used to organize the information flow in the ongoing discourse; they function to provide a thematic ground or orientation for subsequent clauses.[6] Consider for instance example (25), which is taken from a text that describes the assassination of President McKinley at the world trade exhibition in Buffalo, New York, in 1901.

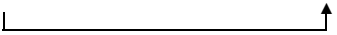
(25) There was a story circulating about Ms. McKinley that at one luncheon given in honor of the president and his wife, the centerpiece was a large, stuffed American eagle. *When* the guests sat down, the thing began to bob its head and move up and down in perky, lifelike movements.

The example includes an initial *when*-clause, which refers to a particular moment during the luncheon mentioned in the preceding sentence. As illustrated in (26), the adverbial clause is associated with the previous discourse as well as with the following main clause. It creates a thematic link between the particular event reported in the main clause and the setting of the episode established in the preceding sentence.

(26) There was a story circulating … *When* the guests sat down, the thing began to bob. …



the ADV clause creates a thematic link to the previous discourse



the ADV clause lays the foundation for subsequent information

What this example shows is that adverbial clauses serve an important discourse pragmatic function when they precede the main clause: they lay the foundation for the discourse that follows, and this is, I claim, the reason why adverbial clauses often precede the main clause despite the fact that they are easier to process sentence-finally. The examples in (27), (28), and (29) provide additional support for this hypothesis. In all of these examples, the adverbial clause occurs sentence-initially providing a thematic ground or orientation for the interpretation of subsequent clauses.

(27) Then I pushed open the barrier and went in. *As* I did so, a little dog barred my way.
(28) So it has to be approved by the board, but if we/*if* Jim and Kurt approve it today, that'd be two, and then I'll have to call two more.
(29) Dan orders rare steak for both of us and *after* he's finished his, he leans and spears the half of mine that's left with his fork.

Note that there are various types of thematic links between initial adverbial clauses and the preceding discourse (cf. Ford 1993). The adverbial clause in (27), for instance, resumes information from the previous sentence, but such a resumptive link is relatively rare. More frequently, the relationship between the adverbial clause and the previous discourse is indirect. In example (28), for instance, the adverbial clause presents specific information that is related to a general statement, and in example (29) the adverbial clause refers to a situation that can be seen as the expected outcome of the activity denoted in the preceding clause (cf. Ford 1993; see also Ford and Thompson 1986 for a detailed analysis of the various thematic links between initial conditional clauses and the previous discourse).

While the discourse pragmatic factor provides an important motivation for initial occurrence of adverbial clauses, it does not explain why certain semantic types of adverbial clauses precede the main clause more often than others. Specifically, it does not explain why conditional clauses tend to occur sentence-initially, while temporal clauses and especially causal clauses tend to occur after the main clause. The following section argues

that the distributional differences between conditional, temporal, and causal clauses can be explained in terms of their meanings.

3.3. *Semantic forces*

Conditional clauses express a wide variety of semantic relationships (cf. Traugott et al. 1986; Sweetser 1990; Athanasiadou and Dirven 1997; Dancygier 1998; Declerck and Reed 2001). The most common type denotes a future situation whose realization is construed as a sufficient condition for the realization of the main clause event (cf. Dancygier 1998; see also Comrie 1986). Since the realization of a future event cannot be entirely certain, these conditional clauses generally have a nonfactual interpretation: they are hypothetical statements that are commonly used to make a prediction about some future event (cf. Dancygier 1998).

Conditional clauses of this type express a contrast between two contradictory possibilities providing a framework for interpreting subsequent clauses (cf. Lehmann 1974; Haiman 1978; Dancygier 1998; Declerk and Reed 2001). Consider for instance example (30), which is taken from a doctor–patient discourse. After examining the patient, the doctor suggests that the patient's cholesterol level will be checked in a few weeks; in this context he says:

(30) The level [i.e. the cholesterol level] will be checked in a few weeks. *If* it is okay no further measures will be taken, otherwise medication must be considered.

What is interesting about this example is that the main clause contains two propositions, contained in two clauses, which are associated with the preceding *if*-clause. The first proposition presents the consequence of the possibility that is explicitly named in the initial *if*-clause: 'If the patient's cholesterol is at a normal level in a few weeks no further measures will be taken.' The second part of the main clause is introduced by *otherwise*. *Otherwise* draws the hearer's attention on an alternative situation that is pragmatically presupposed by the preceding *if*-clause. The proposition following *otherwise* expresses the consequence of the alternative situation: 'If the cholesterol level is still too high in a few weeks (i.e. if it is *not* okay) medication must be considered for further treatment.' Figure 4 illustrates the semantic relationships between the two possibilities expressed by the conditional clause and the two propositions of the main clause.

What this example suggests is that initial conditional clauses do not just provide a thematic ground for the discourse that follows; rather, they describe a contrastive situation that establishes a specific framework

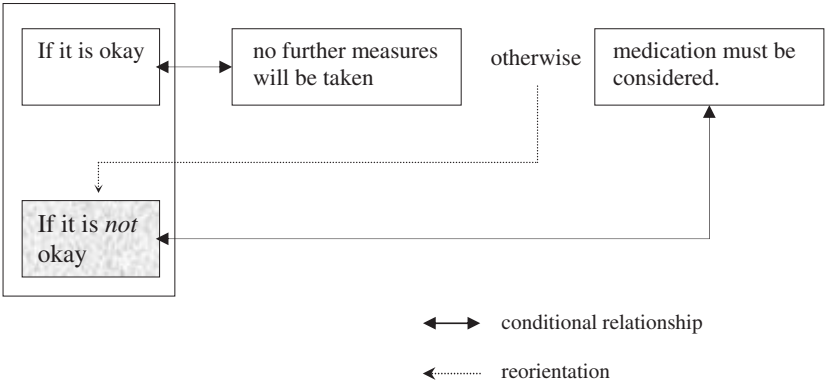


Figure 4. *Semantic interpretation of conditional clause*

— a specific semantic constellation — for the discourse that follows. In other words, conditional clauses predominantly precede the main clause, providing an orientation for interpreting subsequent clauses, because of their meaning (cf. Lehmann 1974; Dancygier and Sweetser 2000). In fact, the meaning of conditional clauses favors initial occurrence so strongly that the occurrence of final conditional clauses requires a particular explanation.

If a conditional clause occurs sentence-finally, the hearer might interpret the previous main clause as a factual statement when in fact it was meant as a hypothesis (cf. Diessel 1996). Since reinterpreting linguistic material disturbs the information flow, the occurrence of a final conditional clause is often indicated (or announced) in the preceding main clause. There are various linguistic means that may indicate the occurrence of a final conditional clause preventing the hearer from interpreting the main clause as a factual statement.

In spoken discourse, the occurrence of a final adverbial clause can be indicated by intonation (cf. Chafe 1984). In addition to intonation, there are various other means that may indicate the occurrence of a final adverbial clause, both in spoken and written discourse. In example (31), for instance, it is the scalar particle *only* that indicates the occurrence of the following *if*-clause, and in example (32) it is the subjunctive verb form that prevents the hearer from assigning a factual (or nonconditional) interpretation to the main clause.

(31) The sentence can *only* be assigned the right truth condition, or alternatively be given the correct semantic representation, *if* the grammatical significance of 'and' . . . is taken into account.

(32) I wouldn't be sick *if* I were, excuse me, . . . pregnant.

If the occurrence of a final conditional clause is not announced in the main clause, the conditional clause usually functions as an afterthought, as in example (33), or as a speech act conditional, as in example (34) (cf. Dancygier and Sweetser 2000).

(33) I guess we ought to put those in the oven, *if* we're gonna eat them.
(34) I will take the big one, . . . *if* you don't mind.

A conditional afterthought presents information that is pragmatically presupposed in the preceding sentence (cf. Dancygier and Sweetser 2000), and a speech act conditional presents information at a different speech act level than the associated clause (cf. van der Auwera 1986; Sweetser 1990). In both cases, the conditional clause does not affect the semantic interpretation of the main clause.

In contrast to conditional clauses, temporal and causal clauses do not affect the factivity of the associated main clause. In sentence-final position they either add new information to the preceding main clause or function as afterthoughts. Preposing of temporal and causal clauses is primarily motivated by general discourse pragmatic considerations; that is, temporal and causal clauses precede the main clause if they function to provide a thematic ground for the subsequent discourse.

In addition to the discourse pragmatic factor, there is a semantic factor that motivates initial occurrence of certain types of temporal clauses. As has been repeatedly argued in the literature, there is a tendency to arrange clauses in an iconic order such that linear clause order reflects the temporal ordering of the events they describe (see, for instance, Haiman 1985). This tendency affects the positional patterns of temporal adverbial clauses. As Kortmann (1991: 138) has shown for nonfinite adverbial clauses, temporal clauses denoting an event prior to the main clause event are much more likely to occur sentence-initially than temporal clauses denoting a posterior event. The same tendency can be observed in the domain of finite adverbial clauses. For instance, adverbial clauses marked by *after* (see example [35]) precede the main clause significantly more often than adverbial clauses marked by *before* (see examples [36]): an average of 54 percent of all *after*-clauses precede the main clause, but only an average of 11.5 percent of all *before*-clauses are preposed. *After* indicates that the event expressed in the adverbial clause occurs prior to the main clause event, whereas *before* indicates that the adverbial clause denotes a later situation. In other words, *after*-clauses seem to precede the main clause more often than *before*-clauses because they denote a situation prior to the one denoted by the main clause.

(35) *After* the moon went down the night was pitch black.
(36) They've started to have coffee together in the morning *before* I get out of bed.

Similarly, the positional patterns of *once*- and *until*-clauses (see examples [37]–[38]) seem to be affected by iconicity. An adverbial clause marked by *once* indicates the beginning of the event expressed in the main clause, whereas an adverbial clause marked by *until* marks the end of the main clause event. This is reflected in their positional patterns: an average of 81 percent of all *once*-clauses occurs sentence-initially, whereas all *until*-clauses follow the main clause.

(37) Well *once* you stretch the shoe out, well then the two corners, they go out too.
(38) And I remained sitting *until* it was daylight ...

Thus, there is good evidence that the positioning of certain temporal clauses is motivated by iconicity. However, since the iconicity factor interacts with the two other factors — discourse pragmatics and parsing — the positioning of temporal adverbial clauses is not generally iconic: a significant number of adverbial clauses does not conform to the iconicity principle because discourse pragmatic and processing considerations are in conflict with the semantic motivation for an iconic ordering.

In contrast to the positioning of temporal clauses, the positioning of causal clauses does not seem to be affected by iconicity. Although causal clauses denote an event that logically precedes the one in the main clause they tend to occur sentence-finally (see Figure 3 above).

The great majority of causal clauses are marked by *because*; causal *since*- and *as*-clauses are much less common. Only the scientific writings include a significant proportion of causal *since*- and *as*-clauses. In the short stories and especially in the conversations, causal clauses are almost always marked by *because*. If we look at the final *because*-clauses more closely, we find that they basically function like independent assertions: they tend to provide new information and are usually separated from the preceding clause by a comma or intonation (cf. Ford 1993). Moreover, in the conversational data *because* is often followed by a pause like a coordinate conjunction. For instance, in (39) the main clause ends with falling intonation, followed by *because*, which is separated from the rest of the clause by a short pause.

(39) You really don't need to know the technical nitty-gritty about it, ... *because* ... that's what Bankers System does.

These data suggest that final *because*-clauses are relatively independent of the preceding main clause: formally, they do not show any sign of embedding, and functionally, they serve like independent assertions explaining or supporting the semantically associated (main) clause. Since sentences of this type are incompatible with the discourse pragmatic functions of initial adverbial clauses, causal *because*-clauses tend to occur sentence-finally.

Interestingly, causal clauses that precede the main clause are typically marked by *since* or *as* rather than by *because*. While an average of only 6.7 percent of the *because*-clauses occurs sentence-initially, an average of 39.2 percent of the causal *since*-clauses and an average of 48.8 percent of the causal *as*-clauses precede the main clause. This suggests that causal *since*- and *as*-clauses serve somewhat different functions. While *because*-clauses tend to assert new information in the position after the main clause, causal *since*- and *as*-clauses tend to encode a known cause (cf. Dancygier and Sweetser 2000).

What remains to be explained is why causal clauses precede the main clause more often in the scientific articles than in the two other sources (notably in the conversations). I suggest that this is due to the fact that causes and reasons play a different role in different types of discourse. In conversations, causal clauses are primarily used to support a previous proposition, whereas in scientific articles, causal clauses are also used to express a conclusion or inference. Causal clauses supporting a proposition follow the main clause, whereas causal clauses providing a common ground for a conclusion tend to occur sentence-initially.

To summarize, I have argued that the positioning of adverbial clauses is determined by three competing forces. One of them is parsing (or utterance planning). Based on Hawkins' processing theory, I have shown that complex sentences are easier to process, and thus more highly preferred, if the adverbial clause follows the main clause. However, adverbial clauses still often precede the main clause because of discourse pragmatic motivations that favor initial occurrence and may override the processing motivation for final occurrence. Specifically, adverbial clauses occur sentence-initially if they provide a thematic ground or orientation for subsequent clauses. The discourse pragmatic function of adverbial clauses interacts with their meaning, which explains why different semantic types of adverbial clauses differ in their distribution. Conditional clauses tend to occur sentence-initially because they establish a specific framework for interpreting subsequent clauses. Temporal clauses tend to precede the main clause if they denote a situation prior to the one in the main clause so that initial occurrence results in an iconic order. And causal clauses tend to follow the main clause because causes and reasons are commonly

expressed in sentences that function like independent assertions, providing information that is communicatively too important to serve a subsidiary discourse function in the position preceding the main clause; only in the scientific articles, a substantial number of causal clauses occurs sentence-initially because in this type of discourse causal clauses are often used to provide a common ground for a subsequent conclusion.

4. The ordering of main and adverbial clauses in other languages

Concluding this article, let us take a brief look at the positioning of adverbial clauses in other languages. If the positional patterns of adverbial clauses in English are motivated by the competing forces described in this article, it seems reasonable to assume that the same forces also affect the positioning of adverbial clauses in other languages. Does that mean that the adverbial clauses of all languages show the same distributional patterns as the adverbial clauses in English? No, it doesn't. As shown in Diessel (2001), there are basically two cross-linguistic ordering patterns of main and adverbial clauses. There are languages like English in which adverbial clauses occur both before and after the main clause, and there are languages in which all adverbial clauses tend to precede the main clause, as for instance in Japanese. How do we account for the different ordering patterns? I suggest that they are motivated by specific processing considerations that can be explained in terms of Hawkins' parsing theory.

All of the languages in which adverbial clauses tend to precede the main clause are left-branching languages in Diessel's sample. According to Hawkins (1994), left-branching languages involve a somewhat different parsing strategy than right-branching languages. The difference is due to the position of the mother node constructing category (MNCC). If we look at the languages in which adverbial clauses tend to precede the main clause, we find that the MNCC of the adverbial clause (i.e. the subordinating conjunction or subordinating affix) always occurs at the end of the clause, as for instance in example (40) from Japanese.

(40) Japanese (Kuno 1978: 22)
Bukka ga agatta *node*, minna ga komatte iru.
Price rose since all suffering are
'Because prices have gone up, all are suffering.'

Table 2 shows that the positioning of adverbial clauses correlates very closely with the position of the subordinate conjunction in the adverbial clause. If the adverbial clause is marked by an initial conjunction as in English, adverbial clauses are common in both sentence-initial and

Table 2. *The ordering of main and adverbial clauses and the position of the subordinate conjunction (adopted from Diessel 2001)*

	Initial and final ADV-clauses	Initial ADV-clauses only	Total
Initial conjunction	21	0	21
Final conjunction	2	17	19
Total	23	17	40

sentence-final positions (with the same differences between conditional, temporal, and causal clauses as in English), but if the adverbial clause is marked by a final conjunction, as in Japanese, the adverbial clause usually precedes the main clause.

Examples (41a)–(41b) show that adverbial clauses marked by a final conjunction have a much shorter recognition domain if the adverbial clause precedes the main clause, which means that in this case adverbial clauses are easier to process, and thus more highly preferred, if they occur sentence-initially. So then the reason why languages like Japanese tend to place all adverbial clauses before the main clause is that there is no competition between discourse pragmatics, semantics, and parsing. All three forces favor initial occurrence and thus adverbial clauses consistently precede the main clause in this language type.

(41) a.

[[Peter came home *when*]$_{\text{SUB}}$ [Mary was working in the garden]$_{\text{MAIN}}$]$_{\text{S}}$

IC-to-word ratio: 2/2 = 1

b.

[[Mary was working in the garden]$_{\text{MAIN}}$ [[Peter came home *when*]$_{\text{SUB}}$]$_{\text{S}}$

IC-to-word ratio: 2/5 = 0.4

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1. Henceforth, I use the notion of "adverbial clause" as a short form for "finite adverbial clause." For an in depth analysis of nonfinite and verbless adverbial clauses, including their positional patterns, see Kortmann (1991, 1995); see also Thompson (1985).

2. Instead of dividing the number of ICs by the number of words, processing complexity can also be measured by dividing the number of ICs by the number of all terminal and nonterminal nodes dominated by the ICs. Although Hawkins considers the latter measure more precise, he often uses the IC-to-word ratio because dividing the number of ICs by the number of words is operationally simpler.
3. One of the reviewers argued that the finiteness of the verb functions as the MNCC of the main clause. While a finite verb allows the parser to construct a node S, it does not indicate that S is the MNCC of a main clause — there are also subordinate clauses including a finite verb.
4. Since the main clause does not include a specific MNCC, I assume that the recognition domain ranges from the subordinate conjunction at the beginning of the sentence to the first word of the main clause, which provides access to the second IC.
5. In language acquisition, English-speaking children begin to produce adverbial clauses in final position long before they produce adverbial clauses sentence-initially (cf. Clark 1970, 1973; Diessel 2004). Diessel (2004) argues that one of the reasons why initial adverbial clauses emerge relatively late in language acquisition is that children have difficulties in planning and producing them.
6. See also Thompson and Longacre (1985), Ramsay (1987), Biber et al. (1999), and Diessel (1996, 2001).

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