

Does the chronology principle operate on sentence level?

Evidence from the distribution of adverbial PP's*

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1. Introduction

One of the possible factors that govern the order of constituents in written Dutch is the chronology principle, which states that the order of constituents in the sentence corresponds to the temporal succession of the events they refer to.^{1,2} Jansen and Wijnands (2004) try to demonstrate the relevance of this principle on sentence level by comparing the following text fragment with variant (1a), in which the *na*-PP is postponed:

- (1) (Het systeem-Berlijn, geïntroduceerd in een oefenwedstrijd tegen AS Roma in Duitsland, bood Adriaanse een uitweg (nl. uit de problemen met Ajax FJ)). Na de zege op Feyenoord won Ajax achtereenvolgens van FC Twente, AZ, Sparta en, gisteren, FC Groningen. (*Volkskrant* 1–10–01)
(The Berlin system, introduced in a training match against AS Roma in Germany, gave Adriaanse a way out (viz. of the problems with Ajax (FJ)). After the victory Ajax beat respectively FC Twente, AZ, Sparta, and, yesterday, FC Groningen.
a. ?Ajax won achtereenvolgens van FC Twente, AZ, Sparta en, gisteren, FC Groningen na de zege op Feyenoord.

Example (1a) is stylistically marked in comparison to (1). In both variants, the reader has the task build up a mental representation of the correct order of events, in this case, the victories of Ajax. In (1), the sentence initial *na*-PP gives the reader a strong signal that the victory on Feyenoord is the starting point of the consecutive events. In (1a) the reader first has to process the series of events from the victory on FC Twente until that on Groningen. After that, after processing *na de zege op Feyenoord*, he realizes that he has to reconstruct his

mental representation of the time order, because the victory on Feyenoord precedes all the others.

So, (1) gives more service to the reader building up his mental representation than (1a), and that might be the explanation of the deviancy of (1a). In the absence of other more plausible explanations, I take the difference in acceptability of (1) and (1a) as anecdotic evidence that the chronology principle operates for PP's on sentence level, at least for some kinds of sentences.

In the remainder of this paper I will try to assess the relevance of chronology for constituent order. First, I will give some a priori evidence for and against chronology (Section 2). Then I will present the results of a corpus investigation of temporal PP's (Section 3). Since the results are negative, I will first discuss how we can better explain the distribution of temporal PP's (Section 4). In the last section (4) I will try to reconcile the negative results with the positive evidence presented in this section and the next sections.

2. A priori evidence for and against chronology on sentence level

2.1 The order of elements in conjunctions is conditioned by the chronology principle

The chronology principle is certainly operative on the level of narrative texts: independent asyndetic sentences of narrative texts are interpreted as referring to successive events (Labov and Waletzky 1967; Thompson 1987). The same holds for the interpretation of conjoined phrases, like

- (2) Jan at een appel en een ei
John ate an apple and an egg

Besides the irrelevant reading in which there is no specific claim about the order of events, example (2) has at least two possible readings: the events are simultaneous ('John ate the apple and the egg at the same time'), or consecutive chronologically ('John ate first the apple and then the egg'). There is one impossible reading: consecutive anti-chronologically ('John ate first the egg and then the apple').

If two temporal PP's are coordinated the chronology principle operates as well. At least that is how I can explain the deviancy of (3a) compared with (3) (both constructed by myself (FJ)):

- (3) Voor zijn afstuderen en na zijn pensioen heeft Peter veel gereisd
Before graduating and after his retirement, Peter travelled a lot
a. [?]Na zijn pensioen en voor zijn afstuderen heeft Peter veel gereisd

When the conjunction consists of two temporal prepositions the order is obligatorily chronological: *voor en na de oorlog* 'before and after the war' (**na en voor de oorlog*).³

2.2 The order of PP's in a complex PP is conditioned by the chronology principle

Adverbial phrases are sometimes a combination of two PP's, for example *van 10 uur tot half drie* 'from ten o'clock until two thirty'. If in PP's like this (henceforth complex PP's) the two PP's refer to two distinct time events, the internal order is conditioned by the chronology principle: the first PP obligatorily refers to the earlier event and the second PP to the subsequent event. This is the case for idiomatic expressions like *van begin tot eind* 'from the beginning till the end' (**tot eind van begin*), *van 's morgens vroeg tot 's avonds laat* 'from the early morning till the late evening' (**tot 's avonds laat van 's morgens vroeg*). However, more relevant for our goal are cases like (4) where the order of the elements is not frozen:

- (4) In de Finse hoofdstad werden vanaf vrijdag tot en met gisteren de volgende minima gemeten: (...). (*Trouw* 27-2-01)
In the Finnish capital from Friday till yesterday the following minimum temperatures were measured: (...).

The complex PP *vanaf ... gisteren* is easily split up (4a), but a reversed order of the PP's (like in (4b,c)) gives an odd impression:

- (4) a. Vanaf vrijdag werden in de Finse hoofdstad tot en met gisteren de volgende minima gemeten: (...).
b. [?]In de Finse hoofdstad werden tot en met gisteren vanaf vrijdag de volgende minima gemeten: (...).
c. [?]Tot en met gisteren werden in de Finse hoofdstad vanaf vrijdag de volgende minima gemeten: (...)

The same applies to complex PP's with the prepositions *van ... tot*, and complex PP's marking the beginning and endpoint of a path:

- (5) Het ziekteverzuim onder het personeel is teruggebracht van 12 naar 8 procent. (*Volkskrant* 8-11-2003)
a. [?]Naar 8 procent is het ziekteverzuim onder het personeel teruggebracht van 12.

From this and the preceding section I conclude that there are cases where an anti-chronological constituent order is unacceptable or at least highly marked.

2.3 Contra-evidence: The distribution of temporal clauses is not chronological

In Jansen, Troost and Sanders (MS), we discuss the chronological conditioning of temporal clauses in relation to the embedding sentence, like for example

- (6) a. Voordat Piet een taart bakte, braadde Carla het vlees
Before Peter baked a cake, Carla roasted the meat

- b. Carla braadde het vlees voordat Piet een taart bakte
Carla roasted the meat before Peter a cake baked
- (7) a. Nadat Joost afgewassen had, zette Johanna koffie
'After Joost had cleaned (sc. the dishes), Johanna made coffee'
- b. Johanna zette koffie nadat Joost afgewassen had

The chronology principle predicts that the chronological order of (6b) and (7a) will occur more frequently than the anti-chronological order of (6a) and (7b). However, a quantitative analysis of the temporal clauses in three corpora (policy documents, culinary recipes and chatbox conversations) demonstrated that this prediction was not born out by the facts, as the chronological orders did not occur more frequently in the texts than the antichronological orders. We conclude that there is no evidence that chronology is involved in the distribution of temporal clauses. So at least one type of temporal adverbial phrase is not conditioned by the chronology principle.

3. A corpus investigation of the distribution of temporal adverbial PP's

3.1 Hypotheses

In the light of the mixed results of the previous section, we need more evidence before we can decide on the relevance of the chronology principle on sentence level. Therefore I did a corpus investigation of temporal PP's, which is presented in this section. I included three types of PP's:

1. PP's with prepositions expressing chronological consecution: *na* 'after', *sinds* 'since' and *vanaf* 'from'. The chronology principle predicts that these PP's predominantly have a sentence initial position. So we expect the order in for example (8) to be significantly more frequent in texts than (9):

- (8) Na de oorlog werd hij hoogleraar economie aan de VU (*Parool* 27-12-2001)

After the war he became an economics professor at the VU

- (9) De Engelse acteur Nigel Hawthorne, (...), is gisterochtend op 72-jarige leeftijd overleden na een hartaanval. (*NH* 27-12-2001)

The English actor Nigel Hawthorne, (...), died yesterday morning after a heart attack

2. PP's with prepositions expressing anti-chronological consecution *voor* 'before', *voorafgaande aan* 'preceding' and *tot* 'until'. Chronology predicts here a preference for the sentence final position. We expect the order exemplified by (10) to occur more frequently than the order in (11)

- (10) Maar hij bleef preken, bijna elke zondag, tot aan het einde (*NH* 13-11-2001)

But he kept preaching, nearly every Sunday, until the end

- a. Tot vlak voor zijn dood gaf hij cursussen aan beginnende kamerleden
(*Trouw* 12–12–2001)
Until just before his dead he gave courses to beginning members of the
parliament.
3. PP's with prepositions expressing (partial) simultaneity: *tijdens*, *gedurende* and *onder*, all translatable by 'during'. Chronology predicts a position somewhere in the middle of the sentence, like in:
- (11) Ivanova veroverde tijdens de Winterspelen van Serajewo een bronzen medaille.
(*Volkskrant* 22–12–2001)
Ivanova conquered during the winter games of Serajewo a bronze medal

3.2 Material and method

I used the corpus of the *Krantenbank*, an electronic database comprising all articles of the Dutch journals *Algemeen Dagblad*, *NRC Handelsblad*, *Het Parool*, *Trouw* and *de Volkskrant*. I selected obituaries, a narrative genre, in 2001.⁴ The investigation was limited to adverbial PP's in non-elliptical independent declarative clauses. PP's that could be analysed as complements of an NP were excluded. I took at least 25 examples of every preposition into account. The distribution was analyzed by classifying the PP's in three positions: sentence initial, sentence final and in the middle of the sentence.

3.3 Results

In Table 1 the distribution of the PP's in the corpus is presented.

When we compare the distribution of *na*-type, *tijdens*-type and *voor*-type PP's, we see that the predictions of the chronology hypothesis seem to hold for the *na*-type and *tijdens*-type, as they occupy most frequently the first and middle position respectively. However, PP's of the *voor*-type occupy also the sentence initial position, and not the expected sentence final position. Furthermore, a statistical evaluation of the differences in distribution between the types revealed that none of the differences between the *na*- and the *voor*-type was statistically significant ($p > .05$). The distribution of the *tijdens*-type PP's differed from that of the *na*-type ($\chi^2 = 14.14$, $p < .001$) and from that of the *voor*-type ($\chi^2 = 12.17$; $p < .001$). However, this is a difference that cannot be attributed to chronology.

The lack of success of the chronology hypothesis deteriorates when we compare the distributions of individual prepositions. The chronology hypothesis predicts that the prepositions of one chronological type, like *tijdens* and *gedurende*, *na* and *sinds*, and *voor* and *tot* have a rather similar distribution pattern, but this is hardly the case.⁵ Conversely, we see two prepositions that are opposites of each other *na* and *voor*, do have similar distribution patterns.

Table 1. Distribution of three types of temporal PP's in obituaries

	position			total
	sentence initial	middle	sentence final	
<i>Na</i> -type	40 (49%)	10 (12%)	32 (39%)	82
<i>na</i>	16 (62%)	4 (15%)	6 (23%)	26
<i>vanaf</i>	15 (50%)	4 (13%)	11 (37%)	30
<i>sinds</i>	9 (34%)	2 (8%)	15 (58%)	26
<i>Tijdens</i> -type	29 (35%)	35 (43%)	18 (22%)	82
<i>tijdens</i>	13 (43%)	10 (33%)	7 (24%)	25
<i>gedurende</i>	8 (31%)	15 (58%)	3 (9%)	26
<i>onder</i>	8 (31%)	10 (38%)	8 (31%)	26
<i>Voor</i> -type	39 (48%)	13 (16%)	30 (36%)	82
<i>voor</i>	15 (60%)	2 (8%)	8 (32%)	25
<i>voorafgaand aan</i>	12 (55%)	5 (15%)	8 (30%)	27
<i>tot</i>	9 (30%)	7 (23%)	14 (45%)	30

3.4 Conclusion

The conclusion seems inevitable that the distribution of temporal PP's in Dutch narrative texts is not conditioned by the chronology principle. And taken into account the results of the temporal clauses discussed in Section 2.3, we would like to make a wider claim: chronology is irrelevant on sentence level. Or, if it is justified to consider the distributional facts as an indication of preferences of the reader: a reader can build up a mental representation of the time order of two events in a sentence, one in an adverbial PP and the other in the embedding sentence, irrespective of the position of that PP.

4. How to reconcile the negative evidence of the corpus investigation with the positive a priori evidence for chronology?

Since chronology turns out to be not the norm at all, the fragments we started with in the Sections 1, 2.1 and 2.2, which were the very reason for assuming that chronology is relevant, turn into a problem: why are they so exceptionally sensitive to chronology?

I assume that the chronological interpretation of asyndetic independent sentences and of coordinated phrases (see examples (2), (3) and (i) in note 3) is caused by the chronology principle. If a reader is confronted with two successive expressions with the same function and hierarchical position, he will assume that their order reflects the time order of the events.

Next, the examples in 2.2 (see (4) and (5)) seem to have something in

common in that there is mention of two lexical expressions of the order of events in both of them. Both expressions give the reader instructions how to build up a correct mental representation of the time order of the events referred to in the PP's and the event of the embedding clause. I conjecture that this is no problem for the reader if he can simply add the information provided by the second PP to the information provided the first PP. However, if a simple addition will not do, because the reader has to change his interpretation of the first PP as well, the sentence becomes less acceptable.

At this point one might wonder how example (1) (here repeated for convenience) fits into this explanation.

- (1) Na de zege op Feyenoord won Ajax achtereenvolgens van FC Twente, AZ, Sparta en, gisteren, FC Groningen
 a. ?Ajax won achtereenvolgens van FC Twente, AZ, Sparta en, gisteren, FC Groningen na de zege op Feyenoord.

At first sight, one might think that the temporal expressions *achtereenvolgens* and *na* pose the same reinterpretation problems to the reader as the two expressions in (4) and (5). However, if we delete *achtereenvolgens* the sentence remains awkward:

- (1) b. ?Ajax won van FC Twente, AZ, Sparta en, gisteren, FC Groningen na de zege op Feyenoord.

I surmise that the enumeration *FC Twente ... FC Groningen* itself is another device for signalling the time order. As the parts of enumerations are coordinated, the chronology hypothesis is operative. So the reader gets a powerful signal that the time order of the events is: first a victory on FC Twente, then on AZ, etc. The reader of (1) will add this information to the victory on Feyenoord. The reader of (1a) has to do some reconstruction work before he has built up the time order of events right.

The *na*-PP in (1) functions as a setting for the event depicted in the remainder of the sentence. Therefore it can be considered as a case of linear modification, the fact that a preceding phrase affects the semantic interpretation of the following phrases (see Pardoën 1998; and Jansen 2002 and the references cited there).

I hold Linear Modification also responsible for two other results of this investigation: the fact that we did not find mirror-image examples of (1) with *voor*-PP's and the fact that the distribution of *na* and *voor* turns out to be similar (see Table 1).

Example (1) stands not alone. I found more examples like it, with a sentence initial *na* or *sinds*-PP that could not easily be postponed. However, I did not find any mirror image example with PP's of the *voor*-type group: A sentence with a sentence final *voor*-PP that resisted preposing. And even worse

(for the chronology hypothesis) some of the non-sentence final *voor*-PP's (which should be odd because they are anti-chronological) resist postponing to the last position:

- (12) (...) en nu wilde hij (een stervende sprookjesverteller), voor zijn dood, nog een kabouter zien, een werkelijke kabouter. (*Algemeen Dagblad* 22-12-2001)
 (...) and now he (a dying fairy-teller (FJ)) wished, before his dead, to see a gnome, a real gnome
 a. ?en nu wilde hij nog een kabouter zien voor zijn dood, een werkelijke kabouter.

The problem with (12a) seems to be that it asserts that the subject wants something to happen before his death, which is obvious and therefore rather ridiculous, while the *voor*-PP in (8) gives only the setting of the event.

Voor-PP's might be even more fit for linear modification than *na*-PP's for a semantic reason. By the very meaning of the preposition *na*, *na*-PP's only assert a chronological series of events, which is expected: events follow each other. However, a *voor*-PP is different. When a writer inserts it in a sentence, it is to warn his readers that their chronological expectations are thwarted: something happened **before** the events they expected. I contend that this unexpected type of information is very suitable for settings. If this is correct I conclude that the astonishing similarity in distribution of PP's of the *na*-type and the *voor*-type is caused by opposed forces: sentence initial *na* is preposed to adjust to the chronology principle and sentence initial *voor* is preposed to emphasize the antichronology of the events.

Notes

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1. Jansen and Wijnands (2004) gives a survey of nine non-grammatical factors that may affect the order of constituents in written Dutch. Jansen (2002) is a more detailed discussion of the relevance of the factor 'Linear Modification'.

2. I use the term *events* here in the ordinary sense of all types of 'occurrences', by consequence also the 'states' and 'processes' in discourse representation theory terminology (see De Swart 1998 for example) are called *events* in this paper.

3. If two during-PP's are conjoined which refer to nonsimultaneous events, the result is a little less awkward than (3a):

- (i) ?Gedurende zijn pensionering en tijdens zijn studietijd en heeft Peter veel gereisd
 During his retirement and during his student years, Peter travelled a lot.

It is tempting to attribute the relative unacceptability of (3a) to the opposite signals that *na* and *voor* give to the reader (see Section 4).

4. At 1–1–04 the Krantenbank was taken over by another publishing company, and the tools changed for the worse as it became impossible to select genres. Therefore, I decided to select obituaries by combining in my queries forms of the verb *overlijden* ‘to pass away’ and the prepositions under investigation.
5. An anonymous reviewer suggests that the difference in distribution pattern between *na* and *sinds*, (and perhaps the same holds for *voor* and *tot*) to a difference in aspect: *na* being perfective and *sinds* being imperfective. This topic awaits further investigation in the future.

References

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