

Across ‘yesterday’ or ‘not’?  
*A study on the effect of adverb type on direct object scrambling  
in Dutch*

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## 1 Introduction

Direct object scrambling is a type of word order variation in which the direct object of a sentence moves to a more leftward position in the so-called middlefield of the clause<sup>1</sup>; i.e. the section between the auxiliary (in embedded clauses the complementizer) and the main verb (Kempen, 2009). The phenomenon of scrambling exists in a number of the Germanic languages among which Dutch, German and the Scandinavian languages. The present thesis will be concerned with scrambling in Dutch only, examples of which are given in (1), in which the direct object *de cursus* ‘the course’ scrambles across the adverb *onlangs* ‘recently’.

- (1) a. *Patrick heeft **onlangs** de cursus afgerond.* [UNSCRAMBLED]  
b. *Patrick heeft de cursus **onlangs** afgerond.* [SCRAMBLED]  
‘Patrick has recently completed the course’

While the permissibility and optionality of scrambling have recurrently been discussed in detail in the linguistic literature, it was always with a heavy focus on features of the direct object such as definiteness and anaphoricity (Van Bergen and de Swart, 2010; Bouma and De Hoop, 2008; Neeleman and Reinhart, 1998). It has been suggested that properties of the adverb also play a role in scrambling (Verhagen, 1986; Schaeffer, 1997, 2000, 2012), but to date there have been no dedicated, in-depth investigations of their influence. The present thesis aims to contribute to the theoretic discussion by examining how adverbial features may influence definite direct object scrambling.

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<sup>1</sup>Verhagen (1986, Section 3.2.2) shows that it is the noun phrase, and not the adverb, that moves. The most important reason is that it is the interpretation of the noun phrase that changes in the scrambled word order.

## 2 Theoretical Background

Even though there is a long tradition of research on the topic of direct object scrambling in Dutch, it is mainly the properties of the direct object that have been discussed. Properties of the adverb have not yet received the same amount of attention. In this section I will discuss the existing literature on Dutch scrambling – among which two experimental studies that surprisingly reach contradictory conclusions. The type of adverb used in the stimuli material is one of the two main aspects in which their experimental designs differ; the other is whether the participants were put under time pressure or not. I will describe how the type of adverb to be scrambled across and time pressure may affect Dutch scrambling behavior.

Moreover, the existing literature is mostly based on introspection (see also the discussion between De Hoop, 2016 and Broekhuis, 2016). In fact, there is a notable lack of naturally occurring language data supporting the claims made by theoretical linguists. In what follows it will become clear that the absence of experimental data to support theoretical claims may lead to potentially relevant information being overlooked (cf. P. de Swart and van Bergen, n.d.).

### 2.1 Direct Object Scrambling in Dutch

The vast majority of literature on Dutch scrambling is centered around features of the direct object, most notably its definiteness and its anaphoricity (Neeleman and Reinhart, 1998; De Hoop, 2003; Bouma and De Hoop, 2008). Consensus exists that pronouns scramble obligatorily, as illustrated by sentence (2)<sup>2</sup>, and that indefinite noun phrases (NPs) only do so optionally. Indefinites in the scrambled position elicit a different meaning than in the unscrambled position; compare for instance (3-a) and (3-b) (both examples are taken directly from Van Bergen and de Swart, 2009, who adapted the latter from De Hoop, 1992). Whereas the direct object *een kraker* ‘a squatter’ in (3-a) can be either specific or non-specific in its reference, it can only be interpreted as specific in (3-b).

- (2) *Ik heb { hem **gisteren** / #**gisteren** hem } gebeld.*  
‘I called him yesterday.’
- (3) a. *...dat de politie **gisteren** een kraker opgepakt heeft.*  
b. *...dat de politie een kraker **gisteren** opgepakt heeft.*  
‘...that the police arrested a squatter yesterday.’

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<sup>2</sup>This sentence can still be grammatical in the unscrambled order if the object *hem* ‘him’ or the adverb *gisteren* ‘yesterday’ is stressed, but this leads to different readings that I will not discuss here.

The incentives for definite NPs to scramble, however, are still matter of debate (Diesing and Jelinek, 1995; Van Der Does and de Hoop, 1998; Van Bergen and de Swart, 2009, 2010; P. de Swart and van Bergen, n.d.; De Hoop, 2016; Broekhuis, 2016). Diesing and Jelinek (1995) argue that the optionality to scramble a direct object is restricted by its referentiality. They assert that according to the *Novelty Condition* (Heim, 1982), the object position in the VP is reserved for discourse-new elements. Referential objects are thus forced out of that position because they provide given information, and obligatorily occupy the scrambled position (cf. Verhagen, 1986). Hence, scrambling is driven by the discourse status of the direct object and – since familiarity of the referent is an inherent feature of (regular) definites (e.g. Farkas, 2002) – this analysis makes clear predictions about the position of definite NPs relative to adverbs<sup>3</sup>. Diesing and Jelinek use the German sentences in (4) as an example, suggesting that (4-a) is ill-formed because *die Katze* ‘the cat’ as a definite object is referential.

- (4) a. \*?... weil ich **selten** die Katze streichle.  
 b. ... weil ich die Katze **selten** streichle.  
 ‘...since I seldomly pet the cat.’

By contrast, Van Der Does and de Hoop (1998) and De Hoop (2003) claim that (4-a) is perfectly grammatical and that it is truly optional for both referential and non-referential definites to scramble. They argue that scrambling is not obligatory – nor prohibited – by any property of the definite object or of the general context. The reason that definite NPs scramble more freely, they say, is that the alternation does not entail a difference in meaning, unlike that of indefinite NPs. The analyses of Diesing and Jelinek and Van Der Does and de Hoop clearly make different predictions regarding the positioning of definite direct objects. Whereas from Diesing and Jelinek’s point of view, definite objects necessarily occur in the scrambled position if they are referential; from Van Der Does and de Hoop’s, the proportions of scrambled and unscrambled definite objects should be around chance level. Consequently, Van Bergen and de Swart (2009, 2010) conducted two corpus studies to document how often direct objects are scrambled. They propose a definiteness hierarchy by which they claim the scrambling behavior in Dutch can be explained. They found that, in spoken Dutch, the more definite the object, the more likely it is to scramble (see Table 1).

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<sup>3</sup>Coincidentally, this analysis can also account for the difference in interpretation of scrambled indefinite NPs (cf. (3)).

Pronouns	Proper Nouns	Definite NPs	Indefinite NPs
99%	53%	12%	2%

Table 1: Proportion of scrambled utterances in sentences with different object types. Data from van Van Bergen and de Swart (2009), based on 2900 sentences. Similar results were found in Van Bergen and de Swart (2010), based on 8655 sentences.

These findings suggest that direct objects only scramble obligatorily if they are pronouns, and optionally if they are proper nouns. Surprisingly, definite NPs behave more like indefinite NPs in that they only scramble in one out of about ten sentences – an unexpected finding given both the analysis by Diesing and Jelinek (1995) and the one by Van Der Does and de Hoop (1998).

Noticing the lack of experimental studies, P. de Swart and van Bergen (n.d.) sought to consolidate the intuitions about scrambling of theoretical linguists and scrambling in spontaneous language use as found in their previous corpus studies, by conducting a set of psycholinguistic experiments. With these experiments they further investigate the influence of the definiteness (and referentiality) of direct objects on scrambling. They argue that an entity’s definiteness contributes to its accessibility (Bock and Warren, 1985; Bock, 1987; McDonald, Bock, and Kelly, 1993; Prat-Sala and Brannigan, 2000; Christianson and Ferreira, 2005). The cited psycholinguistic accounts suggest that more accessible constituents are preferably put in positions early on in the sentence. Accessible entities are retrieved from memory more easily and therefore occupy an earlier position. Accessibility can be contributed to by e.g. animacy (Branigan, Pickering, and Tanaka, 2008), functionality and topicality (Vogels and Lamers, 2008) or gender information (Esaulova and Stockhausen, 2015) – and according to P. de Swart and van Bergen also by definiteness (and word class accessibility, see P. de Swart and van Bergen, 2011). Ergo, entities that are more definite should preferably appear in earlier positions in the sentence.

As for the referentiality of a definite object, an interesting distinction can be made between the regular (‘strong’) definites and those that are known as ‘weak definites’ (Carlson and Sussman, 2005; P. de Swart and van Bergen, n.d.). The reason these NPs are called weak is that they do not have a unique referent entity. Therefore, they are semantically more like indefinites than their strong counterparts. An easy way to distinguish between the two is by using paraphrases in which the referents are made explicit, such as in the examples in (5) and (6) (from Carlson and Sussman, 2005).

- (5) a. Bill read Jane Austen’s *Pride and Prejudice*, and Joe read *The Hitchhiker’s Guide to the Galaxy*, by Douglas Adams.
- b. #Bill read the book, and Joe did too.

- (6) a. Bill read the *New York Times*, and Joe read the *Democrat and Chronicle*.
- b. Bill read the newspaper, and Joe did too.

Because *the book* in (5-b) is a strong definite, it has to refer to a unique referent and cannot be used to describe both *Jane Austen's Pride and Prejudice* and *The Hitchhiker's Guide to the Galaxy* by Douglas Adams in (5-a). *The newspaper* in (6-b), on the other hand, is a weak definite. It is not a problem for *the newspaper* to refer to both *the New York Times* and *the Democrat and Chronicle* in (6-a). Weak definites thus closely resemble the indefinite form *a newspaper*, which has no uniqueness restriction either.

In a rating task and a production task, P. de Swart and van Bergen (n.d.) investigate whether the definiteness level of the direct object (weak vs. strong definites) influences their likeliness to scramble in Dutch (see also P. de Swart and van Bergen, 2011, 2012). The comprehension task took the form of a pen-and-paper questionnaire. Sentences that minimally differed in their object's definiteness level and position (scrambled vs. unscrambled) were judged on a 7-point-scale. Strong definites were predicted to either be rated equally acceptable as the weak definites (in line with Van Der Does and de Hoop, 1998; De Hoop, 2003), or to be rated more acceptable in the scrambled position (in line with Diesing and Jelinek, 1995).

P. de Swart and van Bergen found that scrambled weak definites were significantly less acceptable than the other three conditions (which were rated equally acceptable – see Figure 1.). This finding is congruent with Diesing and Jelinek's (1995) view. Importantly, however, all definite objects in P. de Swart and van Bergen's experiment were rated at the high end of the scale (with mean ratings over 5.1), including scrambled weak definites. The fact that definite NPs were generally acceptable regardless of their position is irreconcilable with Diesing and Jelinek's account. It can, however, be explained by Van Der Does and de Hoop's (1998). P. de Swart and van Bergen (n.d.) argue that the reason for sentences with scrambled weak definite objects to be rated significantly lower is that there is a strong link between the object and the verbal head, together constituting the object's status as weak definite. This link is best preserved in the unscrambled word order. They claim that weak definites are idiomatic in this respect, such that if there is an adverb intervening between them and their verbal heads, the sentence is a lot less acceptable.



Figure 1: Mean ratings per condition from the sentence judgment task in P. de Swart and van Bergen (n.d.).

Moreover, the overall acceptability of scrambled definite NPs is unexpected on the basis of the results of the corpus studies in Van Bergen and de Swart (2009, 2010) and indicates that people do accept scrambled definite objects, but at the same time fail to produce them. In order to enrich their findings with language production data, P. de Swart and van Bergen continued to conduct a production experiment. Participants were asked to complete sentences (e.g. *Jan zei dat...* ‘John said that’) using four words, among which a direct object and an adverb. Again, the direct object was either a weak or a strong definite (e.g. *het boek* ‘the book’ vs. *de krant* ‘the newspaper’). The authors controlled for the order of presentation of the direct object and adverb in the analysis to keep priming effects from affecting the data.

The proportion of sentences produced with their object in the unscrambled position is given in Figure 2. They found that the grand majority of definite direct objects were left unscrambled (regardless of the order of presentation of the constituents). The results from this production task are comparable to those of the corpus studies and show a stark contrast with the results of the rating task, in which the scrambled word order was accepted as much as the unscrambled word order.

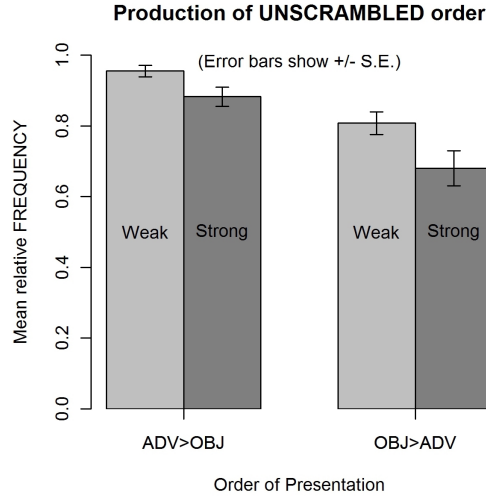


Figure 2: Mean percentage of produced unscrambled order per condition from the production task in P. de Swart and van Bergen (n.d.).

P. de Swart and van Bergen argue that the difference with their earlier results could be due to the task participants were involved in. There seems to exist an asymmetry between language production and comprehension (cf. Asudeh, 2011; Ünal and Papafragou, 2016; see also Hendriks, 2014). Traditionally, language was thought of as a one-to-one mapping of forms and meanings, essentially as the medium to transform concepts into sound (speaker) and vice versa (hearer). Under such a ‘language-as-a-code’ view (Blackburn, 1999), however, asymmetries like the one that P. de Swart and van Bergen encountered are inexplicable. Hendriks (2014) argues that the language process should instead be analyzed as more flexible. That is, speakers pick one from a number of forms to express a single meaning. In turn, listeners select from a range of meanings to attribute to a single form. Importantly, these processes are not each other’s inverse equivalents (see (7-a) and (7-b), taken from Hendriks, 2014, p. 10).

- (7) a. meaning  $m_1$   $\nearrow$  form  $f_1$   
 $\rightarrow$  form  $f_2$   
 $\searrow$  form  $f_3$
- b. form  $f_1$   $\nearrow$  meaning  $m_1$   
 $\rightarrow$  meaning  $m_2$   
 $\searrow$  meaning  $m_3$

Consequently, speakers and hearers are involved in different cognitive tasks during the process (Gathercole, 1988; Hurewitz, Brown-Schmidt, Thorpe, Gleitman, and Trueswell, 2000). Hence, a form may be associated with a

particular meaning in comprehension, even though a different form would have been used to express that same meaning in production. This task difference is presumably the source of the observed asymmetry, P. de Swart and van Bergen argue<sup>4</sup>. They ultimately claim that the scrambled word order for definite objects is an acceptable, but underused word order option.

Interestingly, the results from the production task in P. de Swart and van Bergen (n.d.) also show a clear contrast with those from a production experiment in another study investigating scrambling in Dutch. Unsworth (2005) conducted an experiment investigating the linguistic development of child L1, child L2-learners and adult L2-learners. She investigated the acquisition of direct object scrambling in a task that combined truth judgment and sentence production. Her participants were presented with picture books telling a story in three images, after which a sock puppet made a comment or asked a question. Participants were to indicate whether the comment was justified or not (and if not, to correct it) or to answer the question, and were explicitly asked to start their answers with the subject and the verb *gaan* ‘to go’. The questions were designed to evoke an answer in which there was a possibility for scrambling. In the definite NP-condition, the main character of the story (*Nijntje* in (8) below) set out to perform a transitive action, but in the end decides not to. The sock puppet subsequently remarks that the protagonist is still going to perform the action – which is obviously wrong. This way, negated expressions like the one in (8) were elicited.

- (8) *Nee, Nijntje gaat de olifant **niet** natekenen!*  
 ‘No, Miffy is not going to copy the elephant!’

For this experiment 11 Dutch adults (age 18-24) functioned as a control group, who scrambled 98.5% of the definite objects ( $SD = 5$ ). Unsworth (2005) thus concludes that Dutch adults scramble definite NPs consistently. Evidently, Unsworth’s conclusion is the exact opposite of that of P. de Swart and van Bergen: whereas Unsworth concludes that Dutch natives consistently scramble definite direct objects, P. de Swart and van Bergen conclude that the scrambled position is usually avoided.

## 2.2 Differences between the two studies

In Section 2.1, I have shown that P. de Swart and van Bergen (n.d.) and Unsworth (2005) both conducted production experiments investigating Dutch scrambling behavior, but end up with contradictory results. In this section, I will look into this discrepancy by comparing the experimental designs used in their studies. On closer inspection, two notable differences emerge: the use of time pressure in the experimental procedure and the type of adverbs

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<sup>4</sup>Still, the task (rating sentences) is not a comprehension task because it does not measure the hearer’s process of choosing between various meanings. Rather, it is a task in which the linguistic form is judged for acceptability.



used in the stimuli material. I will describe how these factors differ in the studies by P. de Swart and van Bergen and Unsworth, and how they may influence scrambling in Dutch.

### 2.2.1 Time Pressure

P. de Swart and van Bergen (n.d.) asked their participants to pronounce the target sentences within three seconds by presenting them with a time bar. Unsworth (2005), on the other hand, gave her participants all the time they needed to produce sentences. The effect of time pressure on word ordering strategies in learners of Dutch was already investigated many years ago by Hulstijn and Hulstijn (1984). They argue that time pressure influences the planning process of the utterance. Speakers review their utterances during the so-called monitoring stage, while they are still able to change it. This process takes time, so the speaker may decide to curtail this phase when put under pressure. Hulstijn and Hulstijn investigated in a sentence production experiment whether speakers under time pressure make more mistakes. They ultimately did not find fewer erroneous realizations of the word-ordering structures by participants under time pressure, but a more recent, visual network-description experiment by Oomen and Postma (2001) shows that time pressure does affect speech production and self-monitoring (error-repair). Additionally, Ganushchak and Schiller (2006) find an effect of time pressure on verbal self-monitoring in a comparable ERP-study<sup>5</sup>. Moreover, Ferreira and Swets (2002) conduct two experiments in which the participants were asked to pronounce the answer of a sum out loud. The second experiment was an adaptation of the first, adding a time pressure manipulation. They found that participants under time pressure begin speaking more quickly, but also that the utterance durations were longer. Ferreira and Swets attribute this finding to the calculating process carrying over into the articulation time – a process that the participants without time pressure were able to complete within the planning stage before initiating speech.

All in all, these studies contribute to the idea that if a speaker is pressured into rushing through the monitoring phase, they may resort to using the unmarked syntactic variant, because it is easier to process – in our case, the unscrambled word order. The use of time pressure in P. de Swart and van Bergen (n.d.)’s experiment may thus have been the reason that they encountered fewer scrambled utterances in their data (~30% scrambled utterances) than Unsworth (2005) did (98.5%).

Parenthetically, Verhagen (1986) suggests that if a constituent is introduced before an adverb (‘independently’; in the scrambled position), then the latter “sounds somewhat like a correction, added ‘on the way’, rather

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<sup>5</sup>The studies by Oomen and Postma and Ganushchak and Schiller both had native speakers of Dutch as participants.

than ‘planned’.” (Verhagen, 1986, p. 169). That is, sometimes a speaker intends to utter a sentence without an adverb, but adds extra information on-the-go. However, under this view one would expect that the scrambled word order is avoided at all times except when the adverb is an ad-lib addition. While this analysis could be able to account for the results in P. de Swart and van Bergen, by itself it cannot for those in Unsworth unless her participants consistently ‘corrected’ their sentence in a later stage by negating it. The use of time pressure is thus more likely to lead to *incomplete* rather than *erroneous* sentence planning. As a result, speakers refrain from using a marked variant (the scrambled order) simply because the unmarked one (the unscrambled order) is easier.

### 2.2.2 Adverb Type

A second difference in experimental design was the type of adverb used in the stimuli material. Unsworth (2005) only elicited sentences with the negation adverb<sup>6</sup> *niet* ‘not’, whereas P. de Swart and van Bergen (n.d.) used temporal adverbs like *gisteren* ‘yesterday’. Jackendoff (1972) was the first to categorize adverbs in (at least) two classes<sup>7</sup>. The distinction is between predicate adverbs, which – as the term suggests – modify the predicate in the verb phrase, and clause adverbs, which attach to a sentence or proposition (*internal* vs. *external* in Verhagen, 1986). Hence, these classes operate in different syntactic domains. Predicate adverbs operate in the lexical domain, comprising the main verb, its arguments and optional modifiers. Find in (9) an adapted example from Broekhuis and Corver (2016, p. 1121). The main verb *uitlezen* ‘to finish reading’ first takes *het boek* ‘the book’ as its direct object. This predicate is then modified by the adverb *snel* ‘quickly’, after which it applies to the external argument Jan, resulting in the logical formula FINISH.READING QUICKLY(John, the book).

- (9) [Jan [snel [het boek uitlezen]]]  
 John quickly the book finish.reading

The domain that clause adverbs operate in is called the functional domain, in which additional information about the proposition expressed in the lexical domain is provided. For instance, a clause adverb *helaas* ‘unfortunately’ can modify the whole predicate in (9) such that ‘it is unfortunate that (John has quickly finished reading the book)’. The syntactic domains are illustrated in (10) below, taken directly from Broekhuis and Corver (2016, p. 1121):

<sup>6</sup>See also Hoeksema (2014) for *niet* in a different type of word order variation in Dutch.

<sup>7</sup>Note that I separate the notions of *adverb class* and *adverb type*. *Adverb class* is a syntactic term consisting of multiple *adverb types*, which is a semantic term instead. See Broekhuis and Corver, 2016, pp. 1127-1168 for an exhaustive list and detailed description of adverb types in each adverb class (their classification).

(10)

$$\underbrace{[\text{CP} \dots C [\text{TP} \dots T [\text{XP} \dots X [\text{vP} \dots v [\text{VP} \dots V \dots ]]]]]}_{\text{Functional Domain}} \underbrace{\quad}_{\text{Lexical Domain}}$$

Because of their relative syntactic position, predicate adverbs could be (and often are) referred to as *low* and, in turn, clause adverbs as *high*<sup>8</sup>. Typical examples of low adverbs are manner adverbs, which describe the way in which an event took place, such as *luidruchtig* ‘loudly’ in sentence (11-a) below. Speaker-oriented adverbs such as *waarschijnlijk* ‘probably’ in (11-b), on the other hand, express the stance of the speaker toward the proposition and can be categorized as high adverbs (see also Morzycki, 2015).

- (11) a. *Jan snurkte luidruchtig.*  
           ‘John snored loudly.’  
       b. *Jan snurkte waarschijnlijk.*  
           ‘John probably snored.’

In order to separate the high from the low adverbs, Broekhuis and Corver (2016) suggest a total of three tests. The first is the ‘PRONOUN *doet dat*’ paraphrase (lit. ‘PRONOUN did that’ paraphrase) that helps to identify low adverbs. While sentence (11-a) can be paraphrased as *John snored, and he did so loudly*, sentence (11-b) cannot: \**John snored, and he did so probably*. The second test is that of entailment. If a low adverb is omitted from the phrase, the sentence still holds true. This is not the case for high adverbs. Compare examples (11-a) and (11-b) again. If the adverbs were omitted, as in (12-a) and (12-b) below, only the sentence with the low adverb (12-b) is still true.

- (12) a. *Jan snurkte luidruchtig.*      →    *Jan snurkte.*  
           ‘John snored loudly.’            ‘John snored.’  
       b. *Jan snurkte waarschijnlijk.*    ↗    *Jan snurkte.*  
           ‘John probably snored.’        ‘John snored.’

High adverbs, in turn, can be recognized by means of a scope paraphrase *het is ADVERB zo dat* ‘it is ADVERB the case that’, exemplified in (13).

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<sup>8</sup>Cinque (1999) argues that each adverb type is syntactically represented by its own adverb phrase (AdvP) and that AdvPs have a fixed relative order (at generation, cf. Barbiers, 2016 for an analysis of Dutch) from which they only deviate in specific constructions (e.g. when the AdvP directly modifies another AdvP, in focal constructions, after *wh*-movement, ...). AdvPs are generated in the Spec-positions of functional projections with verbal information in their head (i.e. mood, modality, tense, aspect and voice). The categorization of high and low adverbs is based on their relative position in this sequence, with low adverbs being located in the lower (pre-VP) portion of the clause – delimited to the left by the position that a past participle may occupy, and high adverbs in the higher portion.

- (13) a. *Jan snurkt waarschijnlijk.*  $\Leftrightarrow$  *Het is waarschijnlijk zo dat Jan snurkt.*  
 ‘John probably snores.’ ‘It is probably the case that John snores.’  
 b. *Jan snurkt hard.*  $\nLeftrightarrow$  *\*Het is hard zo dat Jan snurkt.*  
 ‘John snores loudly.’ ‘It is loudly the case that John snores.’

Broekhuis and Corver add that in case the tests fail, the fact that high adverbs generally precede low adverbs on the surface provides some sort of last resort for identification<sup>9</sup>: “For example, all adverbials<sup>[10]</sup> that precede the modal adverb *waarschijnlijk* can be considered clause adverbials” (Broekhuis and Corver, 2016, p. 1125).

Verhagen (1986) argues that this generalization is the result of the structural positions of the adverbials, remarking that high adverbials may even precede the subject in some sentences (e.g. *blijkbaar* ‘evidently’ in (14), adapted from Verhagen, 1986, pp. 58-59) – a position that is unavailable to low adverbials (e.g. *overtuigend* ‘convincingly’ in (15)). This observation suggests that high adverbials are external to the predicate, while low adverbials are internal to the predicate, resulting in interpretative differences between them (as apparent from Broekhuis and Corver’s adverbial tests).

- (14) a. ... dat **blijkbaar** de werkgevers de noodzaak steeds groter achten.  
 b. ... dat de werkgevers **blijkbaar** de noodzaak steeds groter achten.  
 c. ... dat de werkgevers de noodzaak **blijkbaar** steeds groter achten.  
 ‘... that evidently the employers think that the necessity is continually increasing.’
- (15) a. \*... dat **overtuigend** de werkgevers de noodzaak onderbouwden.  
 b. ... dat de werkgevers **overtuigend** de noodzaak onderbouwden.  
 c. ... dat de werkgevers de noodzaak **overtuigend** onderbouwden.  
 ‘... that the employers convincingly substantiated the necessity.’

<sup>9</sup>The rigidity of this generalization is not agreed upon by everyone (see the discussion between De Hoop, 2016 and Broekhuis, 2016). Still, these tests are convenient to discern adverb classes – albeit with certain discretion.

<sup>10</sup>The main difference between *adverbs* and *adverbials* is that the latter consist of multiple words (e.g. *in de tuin* ‘in the garden’). This thesis will only deal with adverbs and the terms will be used interchangeably.

Moreover, Verhagen claims that the difference in meaning as a result of the relative positioning of the direct object and the adverbial is not restricted to indefinite objects (e.g. the sentences in (3)). Even though the adverbial's positioning is relatively free, Verhagen argues that they intuitively modify the material on their right side<sup>11</sup>. Compare the sentences in (16) (taken from Verhagen, 1986, p. 84). In (16-a), *de eerste bladzij* 'the first page' is information that is new to the discourse, whereas it is already given at the time of utterance (16-b). Verhagen thus concludes that the difference in meaning comes from the discourse status of the direct object (regardless of its definiteness; cf. Diesing and Jelinek's 1995 account of Dutch scrambling). Note that the results of P. de Swart and van Bergen's (n.d.) experiments cannot be explained under this view and that Van Der Does and de Hoop (1998) have provided an alternative analysis with which their results fit better.

- (16) a. *Morgen heb ik **misschien** de eerste bladzij nagekeken.*  
           'Tomorrow I may have corrected the first page.'  
       b. *Morgen heb ik de eerste bladzij **misschien** nagekeken.*  
           'As far as the first page is concerned, tomorrow I may have corrected it.'

According to Verhagen, the way adverbials modify the common body of information is also a result of their structural position. High adverbials update it by providing a qualification of how the discourse-new information fits in, while low predicates modify the event or 'state of affairs' itself. Hence, the generalization that high adverbials precede low adverbials is only to be expected: they modify material that appears earlier in the sentence. Verhagen points out that if a low adverbial appears to the left of a discourse-new object, it is presented 'independently' and elicits a contrastive reading (see (17); cf. Bouma and De Hoop, 2008).

- (17) a. *...dat Jan het kozijn **vakkundig** heeft geschilderd.*  
           '...that John has skillfully painted the window frame.'  
       b. *...dat Jan **vakkundig** het kozijn heeft geschilderd.*  
           '...that it was the window frame that John painted skillfully.'

Nevertheless, the division between high and low adverbs gets more complicated as a fair number can switch between either reading depending on their position in the sentence (see also Barbiers, 2001). This becomes clear when we expose the temporal adverb *gisteren* 'yesterday' – used in P. de Swart and van Bergen's (n.d.) experiment – to Broekhuis and Corver's (2016) tests (see (18)).

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<sup>11</sup>Note that this need not be *all* material to the right side, but possibly only part of it. As such, a sentence sometimes yields multiple readings.

- (18) *Jan snurkte gisteren.* ‘John snored yesterday.’
- a. *Jan snurkte en dat deed hij gisteren.*  
‘John snored and he did so yesterday.’
  - b. *Jan snurkte gisteren.*  $\rightarrow$  *Jan snurkte.*  
‘John snored yesterday.’ ‘John snored.’
  - c. *Jan snurkte gisteren.*  $\Leftrightarrow$  *Het was gisteren zo dat Jan snurkte.*  
‘John snored yesterday.’ ‘It was yesterday the case that John snored.’

*Gisteren* flawlessly passes each test, because it can be used both as a high and as a low adverb. The difference in interpretation of sentences with a high or a low temporal adverb is not always clear, unless one compares their semantic representations. If an utterance expresses an event that occurred in the past, this can be represented on a timeline as in Figure 3 (adapted from Broekhuis and Corver, 2016, p. 1158) such that the predicate refers to an event  $k$  which precedes the speech time  $n$  ( $E < S$  in Reichenbach’s 1947 terms; for a dedicated analysis of the Dutch tense system see Verkuyl, 2008 and Broekhuis and Verkuyl, 2014). That is, past utterances refer to a subsection  $i_p$  on the timeline  $i$ .

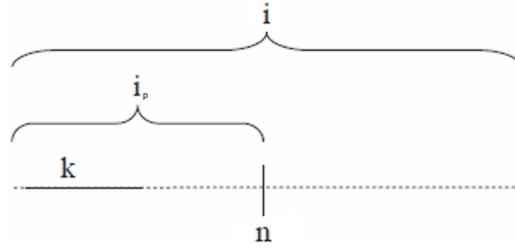


Figure 3: Reference to an event  $k$  in the past.

Imagine for example that a sentence like (19), with a low temporal adverbial *om 15.00 uur* ‘at three PM’, is uttered in the evening.

- (19) *Jan vertrok om 15.00 uur.*  
‘John left at three PM.’

The default interpretation is that the event happened at the nearest time axis that conforms to the requirements of the past tense – i.e.  $k$  in Figure 4 (John left at three *on that same day*; note that the numeral 3 here represents ‘at three PM’). A high temporal adverb like *gisteren* ‘yesterday’ overrules this initial interpretation by restricting the reference window to a time interval  $j$ . In that case (*Jan vertrok gisteren om 15.00 uur.* ‘John left at three PM yesterday’), the utterance can only refer to event  $k$ .

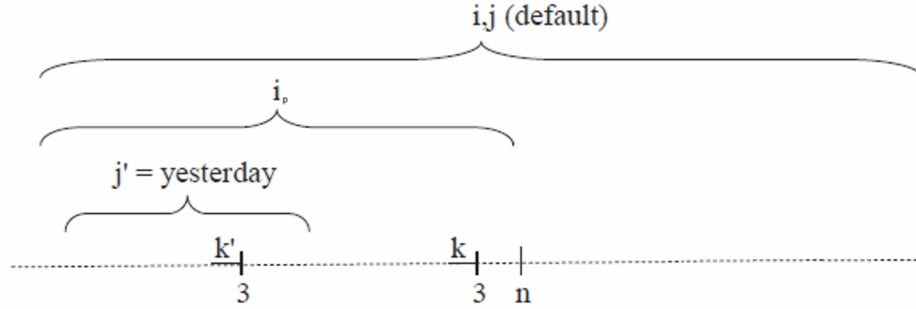


Figure 4: Reference to an event  $k'$  in the past.

At this point it becomes useful to mention that *gisteren* is a deictic adverb (i.e. it refers to a notion related to the contextual property of ‘here-and-now’). The difference between a temporal adverb’s high and low reading is probably easier to recognize using the adverbial *op zaterdag* ‘on Saturday’ instead, see e.g. (20) (adapted from Broekhuis and Corver, 2016, p. 1161). The adverb *waarschijnlijk* ‘probably’ is added here as a means to explicitly separate the two types of temporal adverbials; given the generalization that high adverbials precede low adverbials, the adverbial that precedes *waarschijnlijk* is presumably high.

- (20) a. ...dat Jan (*waarschijnlijk*) **om 15.00 uur** vertrok.  
‘...that John (probably) left at 3:00 PM.  
b. ...dat Jan **op zaterdag** (*waarschijnlijk*) **om 15.00 uur** vertrok.  
‘...that John (probably) left at 3:00 PM on Saturday.

Broekhuis and Corver argue that the semantic difference between high and low temporal adverbs is that the high ones (modifiers of  $j$ ) can contain the time interval referred to by the low ones (modifiers of  $k$ ), which is not possible the other way around (compare (20) and (21)).

- (21) #...dat Jan **om 15.00 uur** (*waarschijnlijk*) **op zaterdag** vertrok.  
‘...that Jan (probably) left on Saturday at 3:00 PM.

Elsewhere, temporal adverbs like *op zaterdag* are also able to modify  $k$  as low adverbs (see (22)). Temporal adverbs can thus be high or low, depending on their position in the sentence and the linguistic context.

- (22) ...dat Jan **vorige week** (*waarschijnlijk*) **op zaterdag** vertrok.  
‘...that John (probably) left on Saturday last week.’

It should be clear that the semantic difference is only evident from the relative ordering of multiple (temporal) adverbials and that it is not possible to make a clear distinction between high and low temporal adverbs in sentences

with a single adverb. Another complication of temporal adverbs is that in sentence-initial position they are often referred to as *frame-setters* or *circumstantials*. Due to their episodic nature, they are ideally suited to specify the circumstances under which the sentence should be interpreted (Maienborn, 2001). In this function, they are syntactically high in the clause (Rizzi, 1997) and modify the underlying event variable of the proposition (Davidson, 1967). Cinque (1999) describes this by remarking that “[circumstantials] cannot appear in any of the pre-VP positions [...] except for the absolute initial position of “adverbs of setting”, a topic-like position” (Cinque, 1999, p. 29; see also Maienborn, 2001 for a Krifkanian 1992 *structured meaning* approach to circumstantials that deals with topic/comment structuring). However, the temporal adverbs that objects can scramble across are located in the Dutch middlefield, and are therefore not circumstantials.

Broekhuis and Corver’s (2016) adverbial tests yield a different pattern for *niet* ‘not’ – used in Unsworth’s (2005) experiment – see (23).

- (23) *Jan snurkte niet.* ‘John did not snore.’
- a. # *Jan snurkte en dat deed hij niet.*  
‘John snored and he did not do so.’
  - b. *Jan snurkte niet.*      $\nrightarrow$      \**Jan snurkte.*  
‘John didn’t snore.’     ‘John snored.’
  - c. *Jan snurkte niet.*      $\Leftrightarrow$      *Het was niet zo dat Jan snurkte.*  
‘John didn’t snore.’     ‘It was not the case that John snored.’

Instead, we find that *niet* cannot be used as a predicate modifier, but only passes the test for clause adverbs – Broekhuis and Corver consequently classify identify negation as a high adverb.

Schaeffer (1997, 2000, 2012, 2017) notes that there is supposedly a behavioral difference in scrambling across high and across low adverbs, because moving an object across a high adverb would take more ‘movement steps’. High adverbs are syntactically farther removed from the original position of the direct object than low adverbs, because of which moving the object across high adverbs is cognitively more costly. Gibson (2000) provides psycholinguistic evidence for this complication, known as the *dependency locality theory* (DLT). In sentence comprehension, each consecutive word uttered in a sentence has to be connected to the structure so far, which in turn has to be stored in memory. In doing so, the hearer has to keep track of incomplete *dependencies*. This process is a lot easier if the distance (movement steps, *locality*) between the new word and (elements in) the existing structure is short – i.e. the integration cost is low.



DLT is based on ‘nesting complexity’ theories (Chomsky, 1957; Yngve, 1960; Chomsky and Miller, 1963; Miller and Chomsky, 1963; Miller and Isard, 1964), which suggest that an increase in intervening material between the subject and the predicate complicates sentence processing (see (24), taken from Gibson, 2000, p. 96).

- (24) a. The reporter disliked the editor.  
 b. The reporter [<sub>S'</sub>who the senator attacked] disliked the editor.  
 c. #The reporter [<sub>S'</sub>who the senator [<sub>S'</sub>who John met] attacked] disliked the editor.

Whereas (24-a) is easy to understand for the hearer and (24-b) is still feasible, (24-c) is a lot harder because it contains a third embedded clause. Yet, not only the number of embedded relative clauses (*nestings*) complicates sentence comprehension. For instance, the amount of nestings in (25) is equal to that in (24-c), but the sentence is a lot easier to process and understand.

- (25) John met the senator [<sub>S'</sub>who attacked the reporter [<sub>S'</sub>who disliked the editor]].

According to the nesting complexity theories, this difficulty is due to the fact that (25) has fewer incomplete dependencies than (24-c). Still, Gibson (1998, 2000) remarks that many sentences that have a similar structure as (25) are not at all complicated (see (26)).

- (26) a. A book [that some Italian [that I have never heard of] wrote] will be published soon. (Frank, 1992)  
 b. The reporter [who everyone [that I met] trusts] said the president won’t resign yet. (Bever, 1974)

The crucial difference, he says, between these sentences and (25) is that the subject of the most deeply embedded relative clauses in (26) is a pronoun (i.e. the first person pronoun *I*). Pronouns are a lot easier to process in this position than proper names (*John* in (24-c)) or full NPs such as *the professor* (Bever, 1970; Kac, 1981). Gibson thus proposes that the integration of new material into the existing structure is determined by their distance from the existing construction. The distance between elements can be affected by various features, among which the relative syntactic position of the new element. In a number of experiments, Warren and Gibson (2002) tested the hypothesis that shorter distances facilitate sentence processing by manipulating the distance of the subject of the deepest nesting in sentences such as (26), and found that constructions with a pronoun were significantly easier to understand than constructions with definite NPs or proper names. Gibson (2000) provides further, neurological evidence for DLT and is able to account for a large number of phenomena.

According to Schaeffer (2000), syntactic distance also plays a role in sentence production, especially in constituent movement. Returning to scrambling, moving an object across a low adverb should be less costly than moving it across a high adverb, because their distance from the object's initial position is shorter (see Figure 5, but note that this figure only serves to show that it takes more movement steps to scramble an object across high than across low adverbs and that no explicit syntactic assumptions are made with it).

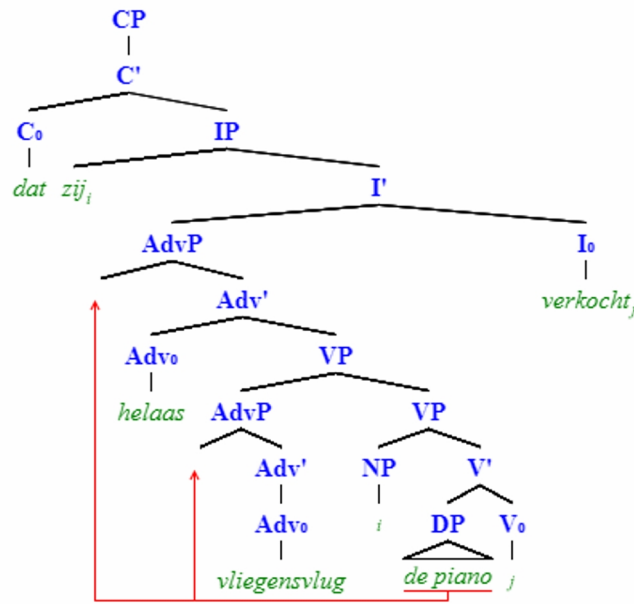


Figure 5: Syntactic tree illustrating the movement of the object *de piano* in the clause *...dat zij helaas vliegensvlug de piano verkocht* ‘...that, unfortunately, she sold the piano in the blink of an eye’.

Ergo, movement across low adverbs requires fewer movement steps and one would expect that speakers scramble objects across low adverbs fairly often. Indeed, Schaeffer (2000) finds in an experimental study with Dutch children that the adult scrambling rate is 93% for definite direct objects across low adverbs. At the same time, however, she finds that 96% of the direct objects were scrambled across negation (an adverb that was classified as high<sup>12</sup>), and 88% across high adverbs. These results suggest that Dutch natives scramble definite objects consistently, which is the opposite of what Van Bergen and de Swart (2009, 2010) found in their corpus studies. Importantly, the

<sup>12</sup>Actually, it is common practice that negation constitutes its own functional projection NegP rather than occupying a Spec- or adjunct position like other adverbs, but NegP is still located higher in the syntactic tree than low adverbs.

high adverbs in Schaeffer’s experiment were temporal and locative, because children do not use high adverbs to the same extent as adults (in fact, they hardly produce them at all). Her results therefore also contradict those in P. de Swart and van Bergen (n.d.), who found that speakers scramble across temporal adverbs in only ~30% of the sentences. The discrepancy between the results of P. de Swart and van Bergen and Schaeffer is striking. However, the experiment in Schaeffer, that was designed for children, elicited answers with a heavy emphasis on the adverb. The experiment went as follows (taken from Schaeffer, 2000, p. 58):

(27) *Scenario for referential definite DP object – Dutch*

Scene: PICTURE OF A TREE

**Cookiemonster:** *Kijk, een boom. Die vind ik zo mooi, die ga ik MOOI inkleuren.*

‘Look, a tree. I find it so beautiful, I’m going to color it BEAUTIFULLY.’

**Tom the Tiger:** *De boom gaat Cookiemonster LELIJK inkleuren!*

‘Cookiemonster is going to color the tree IN-AN-UGLY-WAY!’

**Child:** *Nee!*

‘No!’

**Experimenter:** *Nee he? Wat gebeurt er echt?*

‘No? What’s really happening?’

**Child<sub>1</sub>:** *Kookiemonster gaat de boom MOOI inkleuren!*

**Child<sub>2</sub>:** *Kookiemonster gaat MOOI de boom inkleuren!*

‘Cookiemonster is going to color the tree BEAUTIFULLY.’

In this experiment, one experimenter played the part of Tom the Tiger – a silly non-native Dutch puppet who can only learn Dutch by being corrected by the child. Another played the part of a friendly Cookiemonster sockpuppet. In each trial, Cookiemonster would initiate an action in a certain way (*color the tree **beautifully*** in (27)) and tell the child about it. Next, Tom the Tiger would repeat what Cookiemonster said he was going to do, but with a contradictory adverb (*color the tree **in-an-ugly-way*** in (27)). This way, the child was expected to correct Tom the Tiger’s utterance using either the scrambled (Child<sub>1</sub>) or the unscrambled (Child<sub>2</sub>) word order. The adverb in this set-up is emphasized to express a contrast with the adverb Tom the Tiger used. However, emphasis is known to influence word order in Dutch (see also Neeleman and Reinhart, 1998; Bouma and De Hoop,

2008; Verhagen, 1986 for analyses of the influence of prosody and contrast on word order). Because of the contrastive emphasis on the adverb, it may be that Schaeffer’s participants were inclined to use the scrambled word order regardless of the type of adverb. Either way, the elicited responses are essentially different from those in P. de Swart and van Bergen (n.d.) because of the explicit contrast.

The proportion of scrambled objects in sentences with the negation adverb in Schaeffer’s experiment do match Unsworth’s (2005) results; speakers preferably scramble objects across negation. However, negation is a syntactically high adverb and, according to DLT, it is costly to move an object across *niet* ‘not’. Interestingly, utterances with negation trigger different readings for the scrambled and the unscrambled variant due to the scope-taking nature of negation. That is, there is a semantic difference between *constituent negation* and *sentential negation* (Zeijlstra, 2004; following Klima, 1964), which in Dutch is discerned by means of word order (see also Borschev, Paducheva, Partee, Testelefs, and Yanovich, 2006 for an analysis of negation in Russian). The negation operator yields sentential negation if a full proposition falls under its scope. If only a constituent does, it yields constituent negation. This difference is illustrated in (28) below.

- (28) a. *Alvin heeft **niet** de hond geaaid.*    CONSTITUENT  
       b. *Alvin heeft de hond **niet** geaaid.*    SENTENTIAL  
           ‘Alvin did not pet the dog.’

Constituent negation elicits a contrastive reading, such that the hearer of sentence (28-a) understands that Alvin did not pet the dog, but petted something else instead (e.g. the cat). The sentential negation in (28-b) makes explicit that no petting-event has taken place altogether. See the constituent representations in (29) for comparison.

- (29) a. *Alvin heeft [**niet** [de hond]] geaaid]*  
       b. *Alvin heeft [de hond] [**niet** geaaid]]]*

Klima (1964) developed a number of tests to distinguish sentential from constituent negation. He shows that (at least in English) only sentential negation allows for ‘*not even*’ tags and positive question tags. If the same tests are applicable to Dutch sentences like (30) and (31) below<sup>13</sup>, the a-sentences should presumably be odd (or at least considered ‘bad taste’) because the unscrambled order yields constituent negation.

<sup>13</sup>Note that the direct object is a ‘weak’ definite, i.e. it does not have a unique referent, as a referential definite would invariably render the *not even*-continuation of the sentence infelicitous. It does not matter for the purposes of this example, but see P. de Swart and van Bergen (n.d.) for an analysis of the effect of the direct object’s definiteness level on Dutch direct object scrambling.

- (30) a. ??*Fred heeft **niet** de krant gelezen, niet eens de Metro.*  
 b. *Fred heeft de krant **niet** gelezen, niet eens de Metro.*  
 ‘Fred did not read the newspaper, not even the Metro.’
- (31) a. ??*Fred heeft **niet** de krant gelezen, toch?*  
 b. *Fred heeft de krant **niet** gelezen, toch?*  
 ‘Fred did not read the newspaper, did he?’

However, Dutch natives will probably not firmly reject (30-a) nor (31-a). Perhaps a more accurate test to tell apart sentential and constituent negation in Dutch is to continue the sentences by providing an alternative for the negated part of the main clause (‘fixing’ the construction, so to say). Sentential negation can be fixed by supplementing it with an alternative predicate. Because the main verb in constituent negation is preserved, an alternative direct object is enough to fix the predicate (compare (32) and (33)). To do this one can use the affirmative particle *wel* ‘too’ (see Hogeweg, 2009a, 2009b for an analysis of *wel* as a double negation).

- (32) a. *Fred heeft de krant **niet** gelezen, maar wel doorgebladerd.*  
 b. #*Fred heeft **niet** de krant gelezen, maar wel doorgebladerd.*  
 ‘Fred did not read the newspaper, but he did browse through.’
- (33) a. #*Fred heeft de krant **niet** gelezen, maar wel het boek.*  
 b. *Fred heeft **niet** de krant gelezen, maar wel het boek.*  
 ‘Fred did not read the newspaper, but he did (read) the book.’

Because the scrambled word order yields sentential negation, the negated sentence can only be properly fixed by providing it with a new predicate (i.e. *doorgebladerd* ‘browsed through’ in (32-a)). The unscrambled word order yields constituent (contrastive) negation, which can be fixed by providing the constituent with which the negated element is contrasted (i.e. *het boek* ‘the book’ in (33-b)). One may argue that other modifiers, like temporal adverbs, elicit a contrastive reading similar to that of constituent negation, because all adverbs are inherently scopal (Bonami, Godard, and Kampers-Manhe, 2004; Bonami and Godard, 2007; Nilsen, 2003; Schäfer, 2004). Bonami et al. (2004) even propose a generalization for adverbial scope-taking in (34) (cf. Jackendoff, 1972; Cinque, 1999; Ernst, 2001).

- (34) If adverbs A and B occur in the same syntactic domain, A precedes B iff A takes scope over B.

However, their study concerns the relative word order of multiple adverbs, and not that of the direct object and an adverb. The meaning difference between sentences in which the object is scrambled or not, is not as explicit when the adverb is temporal as it is with negation. Negation is semantically a different type of adverb, as the positioning (and the scope) of the negation adverb has a direct influence on the truth value of the sentence (H. de

Swart, 2000, 2010; Hendriks, de Hoop, Kramer, de Swart, and Zwarts, 2010; Hoeksema, 2008; Moeschler, 2010). Whether the object falls within the scope of a temporal adverb or not does not necessarily change the meaning of the sentence. For instance, Broekhuis and Corver (2016) mention that speakers judge sentences like those in (35) to be near-synonymous because they both refer to ‘reading the newspaper’ events on Saturday.

- (35) a. *Jan heeft **zaterdag** de krant gelezen.*  
 b. *Jan heeft de krant **zaterdag** gelezen.*  
 ‘John read the newspaper on Saturday.’

In conclusion, the adverb types used in the stimuli material of P. de Swart and van Bergen (n.d.) and Unsworth (2005) differ in both their syntactic and their semantic features. Adverbs can be syntactically high or low, which may have an effect on the effort it takes to scramble an object – movement over long syntactic distances is undesirable. In any case, the negation adverb is used in different positions than temporal adverbs, as demonstrated by the tests in Broekhuis and Corver (2016). Semantically, negation elicits a meaning difference that is unavailable for temporal adverbs (constituent vs. sentential negation). The adverbs that P. de Swart and van Bergen and Unsworth use in their experiments differ intrinsically, due to which their participants may have altered the word order of their utterances accordingly.

## 2.3 The aim of this thesis

In this thesis I scrutinize the differences in the experimental designs of P. de Swart and van Bergen (n.d.) and Unsworth (2005) by conducting three new experiments. The goal is twofold. First, I will investigate (i) how Dutch natives judge scrambled and unscrambled sentences, taking into account the different adverb types in a sentence judgment task in Section 3.1, and (ii) how Dutch natives produce sentences in which the scrambling variation is available, manipulating adverb type and time pressure in a sentence completion experiment in Section 3.2. Second, I will attempt to generalize across adverb types by examining scrambling behavior involving syntactically different adverbs in a third experiment (sentence completion) in Section 4.1. This way, this thesis explores whether semantic or syntactic features of the adverb influence Dutch scrambling behavior, or a combination thereof.

This thesis will provide experimental data with which theoretical claims about direct object scrambling can be reconsidered and improved. In language interaction people sometimes accept linguistic constructions that they would never produce themselves, or vice versa. These asymmetries cannot be captured by mere intuitions about language, but (psycholinguistic) experimental research may help to find and explain them. Most importantly, though, this thesis will give the adverb a place in theoretical accounts of direct object scrambling.

## 3 Experiments

In this section I will repeat the plausibility judgment task and the production task from P. de Swart and van Bergen (n.d.), this time manipulating the variables `TIME PRESSURE` and `ADVERB TYPE`, in an attempt to account for the discrepancy between their results and Unsworth’s (2005).

### 3.1 Experiment 1: Judgment task

With a 7-point scale plausibility judgment test I investigated whether I could replicate the findings in P. de Swart and van Bergen (n.d.). Their experiment indicated that, contrary to what one would expect on the basis of the corpus data collected in Van Bergen and de Swart (2010), native speakers of Dutch accept definite objects in the scrambled position as much as in the unscrambled position. P. de Swart and van Bergen concluded that the scrambled word order is acceptable for listeners and merely fails to occur in production. P. de Swart and van Bergen used temporal adverbs in their stimuli sentences and were mainly interested in the difference between weak vs. strong definite objects. In this study, I omitted the variable `DEFINITE-NESS LEVEL` and added the variable `ADVERB TYPE` (temporal adverbs vs. negation) instead.

Given the results in P. de Swart and van Bergen, the sentences with temporal adverbs are predicted to be rated equally acceptable for both word orders again. Both word orders are predicted to be acceptable for the negated sentences, too – however, the negation’s scope in the negation/unscrambled condition suggests a contextual contrast that, in this experiment, is left undefined (as it tests isolated sentences). Hence, sentences in this condition may feel incomplete and participants may be inclined to give lower ratings to negated, unscrambled sentences.

#### 3.1.1 Method

##### Participants

60 native Dutch students (51 female; mean age 19.8, 17-46) participated in an online survey distributed via the SONA system of the Radboud University Nijmegen for course credit. The data from one participant were incomplete and discarded. The data from 13 more were discarded because they gave predominantly positive ratings to ungrammatical sentences. The results of 46 participants were analyzed.

##### Factors

The experiment included two factors: `ADVERB TYPE` (negation vs. temporal) and `OBJECT POSITION` (scrambled vs. unscrambled), adding up to a total of four conditions: negation/scrambled, negation/unscrambled, temporal/scrambled and temporal/unscrambled.

## Materials

28 sentences were used with either a temporal adverb or the negation adverb, in the scrambled (object - adverb) or unscrambled (adverb - object) order. Half the stimuli were taken directly from the rating experiment in P. de Swart and van Bergen (n.d.); the other half were newly created. All sentences consisted of a subject (all proper nouns) and a transitive verb with a definite object (all inanimate and singular). The sentences in (36) illustrate the target sentences for each condition (where NEG=negation, TEMP=temporal, SCR=scrambled and UNSCR=unscrambled).

- (36) a. *Hanneke heeft **zojuist** de piano gestemd.* (UNSCR/TEMP)  
b. *Hanneke heeft de piano **zojuist** gestemd.* (SCR/TEMP)  
c. *Hanneke heeft **niet** de piano gestemd.* (UNSCR/NEG)  
d. *Hanneke heeft de piano **niet** gestemd.* (SCR/NEG)  
'Hanneke has {just now / not} tuned the piano.'

The items were distributed over four lists ensuring that a participant would not see the same sentence twice in a different order or with the same adverb. Participants saw each experimental item in one of two orders and each order equally often. Each condition was represented by seven sentences and each list contained 56 fillers most of which were taken and adjusted from the original experiment in P. de Swart and van Bergen. Fillers consisted of transitive sentences and ditransitive sentences without adverbs. Half of the filler sentences were ungrammatical in either article congruence (structured as *de* + NOUN.DIM, e.g. *\*de spijkertje* 'the little nail') or in erroneous inflection (e.g. *\*Richard hebben* 'Richard have'). Half the filler sentences had a proper noun in subject position, the other half a definite noun phrase. Fillers were controlled for scrambling possibilities and were identical in each list. Each list contained 84 sentences in total. No noun phrase or lexical verb occurred more than once throughout the experiment. The sentences were presented in six randomized blocks, each starting with three filler items of which at least one ungrammatical. The experiment was conducted in Qualtrics (Snow, 2012).

## Procedure

The experiment was an on-line questionnaire in which participants were asked to rate sentences for acceptability. Acceptability was defined as how native-like a friend would sound if they would produce the utterance. The ratings were on a 7-point scale, a rating of 1 being "completely not (acceptable) Dutch" and a rating of 7 "completely (acceptable) Dutch". An example of a test item can be found in (37), supplemented here with English translations.



- (37) *Hanneke heeft zojuist de piano gestemd.*  
‘Hanneke has just tuned the piano.’

		○	○	○	○	○	○	
<i>Vostrekt niet Nederlands</i>	1	2	3	4	5	6	7	<i>Volkomen Nederlands</i>
‘Absolutely not Dutch’								‘Perfectly Dutch’

The questionnaire contained a written introduction explaining how to indicate the rating of a sentence. After the last block, participants were asked if something seemed off in the experiment and whether they had any clue as to what the experiment was about.

### 3.1.2 Results

The mean ratings and z-scores per condition are given in Table 2 and visually in Figure 6 below. Z-scores indicate how much a given rating deviates from the participant’s average (i.e. a z-score of 0) in terms of their standard deviation. As such, the analysis can be performed with relative rather than absolute ratings. Values over 0 represent ratings that were above average and values below 0 the ratings that were below; the further the number is from zero, the larger the deviation.

As was to be expected, the ungrammatical filler sentences were unacceptable and the grammatical filler sentences were acceptable ( $M = 2.19$  vs.  $6.07$ ;  $z = 0.76$  vs.  $-1.33$ ). Additionally, temporal adverbs were acceptable in either configuration ( $M = 6.03$ ,  $z = 0.82$  for unscrambled sentences;  $M = 6.06$ ,  $z = 0.54$  for scrambled sentences). More interestingly, sentences in the negation/unscrambled condition were less acceptable than their scrambled counterparts ( $M = 4.29$ ,  $z = -0.08$  vs.  $M = 6.36$ ,  $z = 0.92$  respectively). At first sight it seems like the negated/unscrambled condition was rated above neutral ( $M > 4.1$ ), but the z-score reveals that they were actually rated below average ( $z < 0$ ). Note that its z-score is not that far below zero, so these sentences were not rated as utterly unacceptable either. The other conditions were rated as highly acceptable.

Condition	Avg. Rating	z-score
Filler (grammatical)	6.07	0.76
Filler (ungrammatical)	2.19	-1.33
Scrambled/Negation	6.36	0.92
Unscrambled/Negation	4.29	-0.08
Scrambled/Temporal	6.06	0.54
Unscrambled/Temporal	6.03	0.82

Table 2: Average rating per condition.

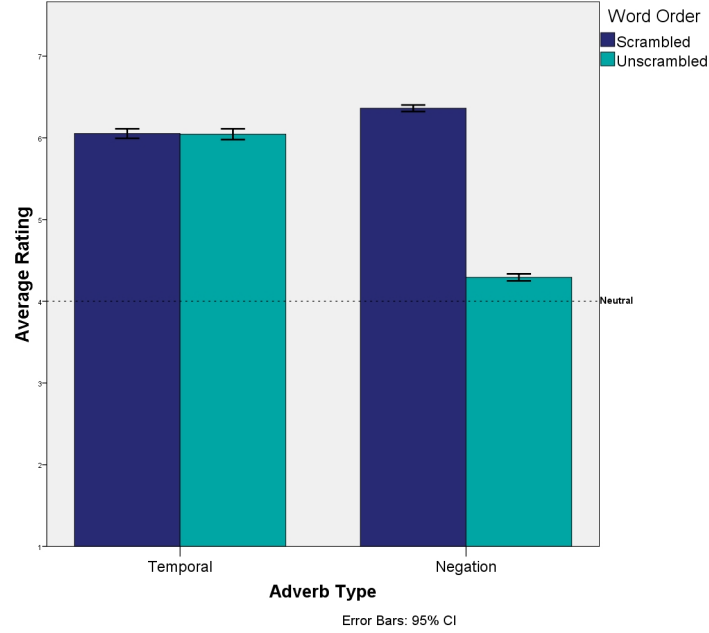


Figure 6: Average rating per condition.

For the statistical analysis, the z-scores were compared to one another using the software SPSS (“IBM SPSS Statistics for Windows”, 2011). A factorial ANOVA was used to test for main effects of the two factors and their possible interaction. There were main effects of scrambling ( $p < 0.001$ ;  $F = 120.749$ ;  $\eta_p^2 = .729$ ) and adverb type ( $p < 0.001$ ;  $F = 73.102$ ;  $\eta_p^2 = .619$ ), as well as an interaction between the two ( $p < 0.001$ ;  $F = 174.922$ ;  $\eta_p^2 = .795$ ). The interaction confirms that it is the combination of a negation adverb and an object in the unscrambled position that is rated significantly worse than the other conditions. A fair number of participants noticed something weird about the adverb type, and, especially, about the positioning of the negation. Since there is no explicit prescriptive rule about the positioning of adverbs, this should not have influenced their intuitions about the native-likeness of sentences much. Indeed, a reanalysis without these participants yielded similar results ( $N = 42$ ; ADVERB TYPE:  $p < 0.001$ ;  $F = 58.840$ ;  $\eta_p^2 = .589$ ; SCRAMBLING:  $p < 0.001$ ;  $F = 100.330$ ;  $\eta_p^2 = .710$ ; *interaction*:  $p < 0.001$ ;  $F = 154.581$ ;  $\eta_p^2 = .790$ ).

Speakers accept both the scrambled and the unscrambled word order for sentences with temporal adverbs. Hence, the results from this study are in line with the predictions based on the original experiment in P. de Swart and van Bergen (n.d.). Moreover, negated sentences in the scrambled order were acceptable, but in the unscrambled order they were rated significantly worse than in the other conditions.

### 3.1.3 Discussion

In the original experiment, P. de Swart and van Bergen (n.d.) found that both word orders were equally accepted. The present experiment was intended to expand on the original by adding an adverb type manipulation (i.e. temporal adverbs vs. negation). Sentences with a temporal adverb were rated as acceptable for both word orders once more, but something different is happening with negation. Sentences with their direct object in the unscrambled position were rated as significantly less acceptable than the ones with their object in the scrambled position. This finding can be attributed to the different readings that negation and its scope can elicit, triggering a contrastive reading in the case of constituent negation, with no (contextual) contrast provided in the experiment. As such, only part of the predicate is negated, with no ‘fix’, causing the sentences to feel a bit wonky. Sentential negation, on the other hand, negates the full predicate and therefore does not feel incomplete. All in all, the results suggest that semantic features of the adverb influence people’s judgments about scrambling.

## 3.2 Experiment 2: Production task

Besides the judgment task, I also attempted to replicate the findings of the production experiment in P. de Swart and van Bergen (n.d.). They concluded that the vast majority of definite direct objects were left unscrambled in spoken sentences. These results are in contrast with those in Unsworth (2005) and Schaeffer (2000), who found instead that definite objects were typically scrambled. As argued in Section 2, the main differences in the experimental designs of these studies are ADVERB TYPE and TIME PRESSURE.

Section 2.2.1 described how time pressure may influence word ordering in Dutch. Participants under time pressure are expected to rely on the unmarked word order (i.e. they keep the direct objects unscrambled) because of their limited amount of time, while participants with no time restriction may be more susceptible to syntactic or semantic factors that bring about word order variation. In Section 2.2.2, I discussed a semantic difference between temporal adverbs and negation. The scrambled word order in sentences with a negation may induce an unintended<sup>14</sup> meaning due to the adverb’s scope-taking nature, while this word order alternation with temporal adverbs does not lead to a difference in meaning. From a semantic point of view, direct objects are expected to scramble on a large scale in sentences with negation and to a lesser extent in sentences with temporal adverbs. These predictions are in line with the results in P. de Swart and van Bergen (n.d.), Unsworth (2005) and Schaeffer (2000), as well as those from the sentence judgment task in Section 3.1.

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<sup>14</sup>It is assumed here that sentential negation is the intended meaning because it is more salient than contrastive negation (see also Klima, 1964; McCawley, 1991).

In this experiment, TIME PRESSURE and ADVERB TYPE will be manipulated and analyzed. The result will specify whether a lack of planning time results in the use of the cognitively easier unscrambled word order, but also affirm whether semantic features of the adverb influence the choice of word order.

### 3.2.1 Method

#### Participants

50 students (44 female; mean age 20.4, 18-26) from the Radboud University Nijmegen participated for course credit. All participants were native speakers of Dutch. Data from two participants were not audible due to technical error and were subsequently discarded.

#### Factors

The experiment included two independent variables: ADVERB TYPE (negation vs. temporal; within-subjects) and TIME PRESSURE (yes vs. no; between-subjects). The dependent variable was WORD ORDER (scrambled vs. unscrambled).

#### Materials

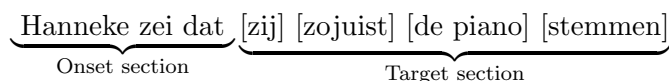
The experiment was adapted from the original version used in P. de Swart and van Bergen (n.d.), written in E-Prime (Schneider, Eschman, and Zuccolotto, 2012). 24 of the items from Experiment 1 were used (12 per condition), embedded under a verb of saying (either *zeggen* ‘to say’, *vertellen* ‘to tell’, or *bevestigen* ‘to confirm’) which was preceded by a proper noun referring to either a male or a female and followed by the complementizer *dat* ‘that’. 45 filler items (coming from other experiments) with ditransitive and transitive verbs were included, which did not contain an adverb and were controlled for scrambling possibilities. Filler items were the same in each list and at least the first three items of each list were filler items. Each list contained 69 sentences in total. The lists were preceded by nine practice trials that were constructed under the same conditions as the filler items. After the practice trials, participants had the opportunity to ask questions. No noun phrase or lexical verb occurred more than once throughout the experiment. There were two versions of the experiment; one with time pressure and one without. Except for the presence of a timing bar, the two versions were identical.

#### Procedure

Participants were shown instructions and were asked to fill out a declaration of consent. They were seated in front of a computer screen and a PST serial response box with a microphone attached that functioned as a voice key. Audio data were recorded on a separate device for later transcription.

The trials started with a fixation cross in the center of the screen. The cross disappeared when participants pressed a button, followed by a 250ms blank screen. They were shown the beginning of a sentence, which always consisted of a proper noun, a verb of saying and the complementizer *dat* ‘that’ (see the onset section in (38)). After 1500ms, this half sentence was replaced by four words presented below each other: a nominative pronoun that matched the person and gender in the main clause subject, a temporal or negation adverb, a definite NP and an infinite verb (see the target section in (38)). The order in which the adverb and the definite NP were presented was balanced. Participants were asked to audibly complete the sentence using these four words, but they were also told they were allowed to change the word form or add words if deemed necessary.

(38)



Hanneke said that she just.now the piano to.tune

Participants were asked to start speaking as quickly as possible, but also that making up the sentence before speaking out aloud would help them to pronounce the sentence fluently. Moreover, they were asked to speak loudly and clearly. The sound of voice would trigger a voice key, which would replace the words on the screen depending on the TIME PRESSURE manipulation:

- i. **Time pressure:** A timing bar that filled itself up in 4800ms. Participants were asked to complete the sentence before time ran out.
- ii. **No time pressure:** A new fixation cross. Participants had to press a button to continue to the next trial.

On average, the experiment took 15 minutes.

### 3.2.2 Results

Target-like utterances were defined as complete grammatical sentences with one adverb occurring in the middlefield with a definite direct object, for which the inverse order would have been grammatical as well. A small number of the produced sentences were not target-like and were discarded from the analysis (2.8%). The proportions of scrambled word orders in the remaining utterances can be found per condition in Table 3. On average, the direct objects were scrambled across the negation adverb far more often than across temporal adverbs (90.9% vs. 37.6%). Table 3 also shows that participants under time pressure did not scramble much more often than those which were not (37.8% vs. 37.4% across temporal adverbs and 93.6% vs. 88.2% across negation).

	Temporal Adverbs	Negation Adverbs
Time Pressure	37.8%	93.6%
No Time Pressure	37.4%	88.2%
Total	37.6%	90.9%

Table 3: Percentages of scrambled utterances per condition.

As TIME PRESSURE is a between-subjects factor and ADVERB TYPE a within-subjects factor, the proportions of scrambled utterances per participant were compared in a mixed design ANOVA using the software SPSS (“IBM SPSS Statistics for Windows”, 2011). The ANOVA confirmed that TIME PRESSURE did not have a significant effect ( $p = .769$ ;  $F = .264$ ;  $\eta_p^2 = .012$ ), indicating that the direct objects in utterances of participants under time pressure were generally scrambled equally often as those in utterances of participants under no time pressure. The effect of ADVERB TYPE, on the other hand, was highly significant ( $p < .001$ ;  $F = 143.495$ ;  $\eta_p^2 = .864$ ). Order of presentation was controlled for, but the effect of adverb type remained highly significant in each condition (ADV < OBJ:  $p < .001$ ;  $F = 196.146$ ;  $\eta_p^2 = .810$ ; OBJ < ADB:  $p < .001$ ;  $F = 114.988$ ;  $\eta_p^2 = .714$ ) which means that negation is scrambled across more often than temporal adverbs systematically, regardless of order of presentation. Moreover, the proportion of scrambled sentences is above chance level (50%) for sentences with negation, and below for sentences with temporal adverbs. That is, direct objects are preferably scrambled across negation, but they are also preferably left unscrambled if the adverb is temporal. There was no interaction between TIME PRESSURE and ADVERB TYPE ( $p = .776$ ;  $F = .255$ ;  $\eta_p^2 = .011$ ).

The results are illustrated in the graph in Figure 7 below, demonstrating that the difference between time pressure or not is very small (dark vs. light bars), but sizable between the two adverb types (green vs. red bars). If the object was presented above the adverb, participants were more likely to scramble it than if it were presented below. Still, there was a clear effect of adverb type for both orders of presentation.

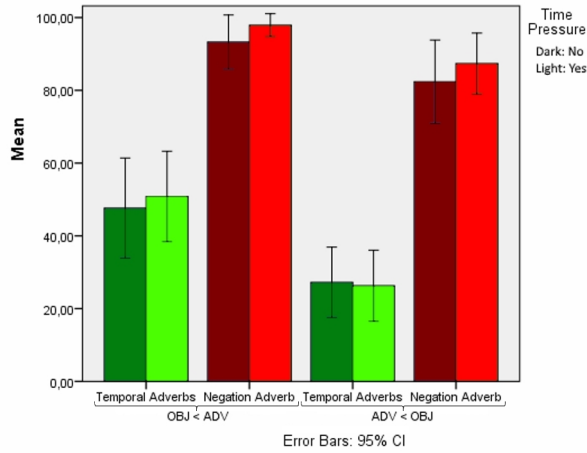


Figure 7: Percentages of scrambled sentences per adverb type by order of presentation for participants under time pressure and participants not under time pressure.

In conclusion, this production experiment demonstrates that TIME PRESSURE does not have an effect on the number of scrambled utterances, but ADVERB TYPE does. Participants consistently scrambled direct objects across negation, but preferred to leave them unscrambled if the adverb was temporal.

### 3.2.3 Discussion

The effects of time pressure found in the experiments of Oomen and Postma (2001), Ganushchak and Schiller (2006), Ferreira and Swets (2002) are due to their participants' shortage of planning time. In this experiment, participants were instructed to have the sentence ready before initiating speech. The time pressure manipulation therefore influenced the production stage, rather than the (at that point already completed) planning stage, which is probably the reason that no effect was found here. Likewise, the participants in P. de Swart and van Bergen's (n.d.) experiment were instructed to have the sentences ready before initiating speech. Therefore, the time pressure manipulation could not have been the reason for the discrepancy with Unsworth's (2005) results.

The type of adverb caused a clear difference in scrambling behavior. While there is a preference to scramble definite objects across negation, a similar preference exists to keep them unscrambled with temporal adverbs. This finding resembles the discrepancy between the experiments in P. de Swart and van Bergen (n.d.) with temporal adverbs, and Unsworth (2005) / Schaeffer (2000) with negation, who obtained similar results in their experiments. Unsworth used negation and found that 98.5% of the direct objects were

scrambled (96% in Schaeffer, 2000); P. de Swart and van Bergen used temporal adverbs and found that only  $\sim 30\%$  of the direct objects were scrambled. Hence, I will attribute the discrepancy between their studies to the fact that they used a different type of adverb in their stimuli (cf. Schaeffer, 2000).

With regards to the predictions, it appears that semantic factors of the adverb determine whether a direct object scrambles across it or not (cf. the judgment task in Section 3.1). Whether the direct object falls within the scope of negation or not can change the meaning of the sentence; whether it falls within the scope of temporal adverbs or not cannot. Hence, participants scrambled their direct objects across the adverb that would elicit an unintended meaning in the unscrambled word order.

Still, these results are not fully congruent with those from the judgment task in Section 3.1. Recall that sentences in the unscrambled order with the negation adverb were rated very close to neutral ( $z = -.08$ ); now they are produced in less than ten percent of the trials. More striking is the finding that Dutch natives accepted either word order for sentences with temporal adverbs and gave them equal ratings, but now they scramble only 37.6% of the objects in such sentences. P. de Swart and van Bergen (n.d.) found a similar imbalance between sentence judgments and production in their experiments and attribute the difference to the nature of the task, implying an asymmetry between language judgment and language production (cf. Hendriks, 2014, see also Section 2.1); I will follow them in doing so. Speakers (production) have to select from a number of forms to express an intended meaning, whereas hearers (comprehension/judgment) have to select a meaning for the produced form. In this case, the comprehension task amounts to judging given forms, but it may still occur that a particular form is not the ideal but still an acceptable candidate for a particular meaning. As a result, such forms would receive an acceptable rating in Experiment 1, but at the same time they would not be produced in Experiment 2 because there are better candidates.

Nevertheless, results from the production experiment suggest that scrambling in sentence production is influenced by semantic features of the adverb.

## 4 Beyond ‘yesterday’ and ‘not’

The experiments in the previous section replicate the findings in P. de Swart and van Bergen (n.d.), Unsworth (2005) and Schaeffer (2000), and prove that adverb type matters for scrambling in Dutch. Semantic features of the adverbs revealed to influence scrambling: participants scrambled the objects across negation, but not across temporal adverbs, because negation elicits an unintended meaning (viz. constituent negation) if it precedes the object.



Moreover, sentences were rated significantly lower if their object was not scrambled across negation. In order to investigate whether the syntactic position of adverbs (i.e. high vs. low) also plays a role, more adverb types than just temporal adverbs and negation have to be tested. Besides, temporal adverbs and negation are no ‘plain vanilla’ adverbs. For one, we have seen that temporal adverbs can sometimes receive either reading depending on the (linguistic) context and can “be interchangeably in one another’s scope” (Cinque, 1999, p. 28); they can even out-scope evaluative (high) adverbs in some cases (Bonami et al., 2004)<sup>15</sup>. Moreover, negation is arguably located “at the boundary between the functional and the lexical domain” (Broekhuis and Corver, 2016, p. 1122, further motivated in Chapter 13.3)<sup>16</sup> and considered to constitute their own functional projection in most syntactic analyses (cf. e.g. Cinque, 1999; *contra* Ernst, 2001, 2009; cf. Footnote 12). In the next section, simpler high and low adverbs will be used instead.

The syntactic positions that adverbs occupy have been discussed in Section 2.2.2, as well as the idea that long-distance movement of the direct object is undesirable (Gibson, 1998, 2000; Schaeffer, 2000). Moving the object across a high adverb requires more movement steps than moving it across a low one. One would thus expect speakers to scramble their objects across low adverbs more often than across high adverbs. In this section, I will investigate whether the adverb’s syntactic position influences direct object scrambling.

## 4.1 Experiment 3: Production task

In an attempt to provide an analysis accounting for adverb types more generally, a third experiment was conducted in which high adverbs, such as evaluatives and modals, are contrasted with low adverbs, such as agentive and manner adverbs. In doing so, it should become clearer if the syntactic properties of the adverb have an influence of direct object scrambling. Movement across long syntactic distances is unfavorable compared to movement across nearer distances (Gibson, 1998, 2000; Schaeffer, 2000), so the participants are expected to scramble their objects across low adverbs, but not across high adverbs.

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<sup>15</sup>Temporal reference is generally regarded as a complex category in the field of semantics; Morzycki (2015) even deliberately excludes temporal adverbs from his book on Modification (Chapter 5).

<sup>16</sup>Cinque (1999) argues that negation has as many as four distinct positions in the clause, administered by matters of scope.

### 4.1.1 Method

#### Participants

24 native Dutch students (18 female; mean age 21.4, 18-25) from the Radboud University Nijmegen participated in exchange for a five euro gift certificate. Data from one participant were discarded because they produced only non-targetlike sentences; data from another were because they obviously used a strategy<sup>17</sup> in sentence configuration, resulting in all sentences being produced in the scrambled word order only. Data from 22 participants were analyzed.

#### Factors

In this experiment there was a manipulation of ADVERB TYPE (high vs. low) and PRESENTATION ORDER (adverb – object vs. object – adverb), measuring their influence on the dependent variable OBJECT POSITION (scrambled vs. unscrambled).

#### Materials

The sentences from Experiment 2 were minimally changed in order to prevent the produced sentences from being pragmatically odd. For the same reason, the verb of saying *bevestigen* ‘to confirm’ was omitted from the beginnings of sentences. In total, 24 target sentences and 45 filler items (from Section 3.2) were tested. Each list contained 69 items in total, preceded by nine practice trials. No noun phrase or lexical verb occurred more than once throughout the experiment. The adverbs chosen as stimuli were categorized according to the following requirements:

- i. High adverbs modify a proposition, low adverbs modify a predicate.
- ii. High adverbs pass the scope paraphrase test, low adverbs pass the ‘PRONOUN *doet dat*’-paraphrase and entailment tests from Broekhuis and Corver (2016).
- iii. The chosen adverbs did not violate the word order constraints in Bonami et al. (2004) (see Section 2.2.2).
- iv. The combination of adverb and predicate was not pragmatically odd in the target sentences. For instance, sentences like *John said that he probably decorated the cake* and *Fred said that he knocked over the vase beautifully* were avoided.

Four different adverb types were used: evaluative (*gelukkig* ‘fortunately’ and *helaas* ‘unfortunately’) and modal adverbs (*waarschijnlijk* ‘probably’ and *inderdaad* ‘indeed’) represented the high adverbs; agentive (*bewust* ‘consciously’ and *vakkundig* ‘skillfully’) and manner adverbs (*prachtig* ‘beautifully’ and *vliegensvlug* ‘in the blink of an eye’) represented the low.

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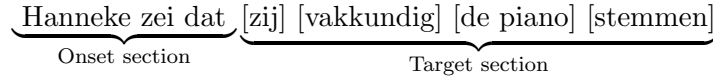
<sup>17</sup>i.e. using exaggerated intonation patterns and semi-consciously repairing unscrambled sentences

## Procedure

The procedure was identical to that in Section 3.2, except that there was no time pressure manipulation. Instead, *every* participant was presented with a timing bar after each trial. Participants were shown instructions and were asked to fill out a declaration of consent. They were seated in front of a computer screen and a PST serial response box with a microphone attached that functioned as a voice key. Audio data were recorded on a separate device for later transcription.

The trials started with a fixation cross in the center of the screen. The cross disappeared when participants pressed a button, followed by a 250ms blank screen. They were shown the beginning of a sentence, which always consisted of a proper noun, a verb of saying and the complementizer *dat* ‘that’ (see the onset section in (39)). After 1500ms, this half sentence was replaced by four words presented below each other: a nominative pronoun that matched the person and gender in the main clause subject, a temporal or negation adverb, a definite NP and an infinite verb (see the target section in (39)). The order in which the adverb and the definite NP were presented was balanced. Participants were asked to audibly complete the sentence using these four words, but they were also told they were allowed to change the word form or add words if deemed necessary.

(39)



Hanneke said that she skillfully the piano to.tune

Participants were asked to start speaking as quickly as possible, but also that making up the sentence before speaking out aloud would help them to pronounce the sentence fluently. Moreover, they were asked to speak loudly and clearly. The sound of voice would trigger a voice key, which would replace the words on the screen with a timing bar that filled itself up in 4800ms. Participants were asked to complete the sentence before time ran out. On average, the experiment took 15 minutes.

### 4.1.2 Results

Table 4 shows the average number of scrambled utterances across high and low adverbs for both presentation orders. The order of presentation clearly influenced the order of production: a larger portion of the sentences were scrambled if the object appeared above the adverb (77.7% vs. 57.3% for low adverbs and 50.3% vs. 29.5% for high adverbs). More interestingly, direct objects were scrambled more often across the low than across the high adverbs (67.5% vs. 39.9%).

	Low Adverbs	High Adverbs
Adverb – Object	57.3%	29.5%
Object – Adverb	77.7%	50.3%
Average	67.5%	39.9%

Table 4: Percentages of scrambled utterances per condition.

The data were compared in a factorial ANOVA using the software SPSS (“IBM SPSS Statistics for Windows”, 2011). Indeed, a significant effect of constituents’ presentation order was found ( $p = 0.002$ ;  $F = 10.574$ ;  $\eta_p^2 = .112$ ), indicating that it functioned as a prime for the produced word order. There was also a highly significant main effect of adverb type ( $p < .001$ ;  $F = 18.953$ ;  $\eta_p^2 = .184$ ). There was no interaction between presentation order and adverb type ( $p = .976$ ;  $F = .789$ ;  $\eta_p^2 < .001$ ). Figure 8 shows that the effect of adverb type is evident independently of presentation order.

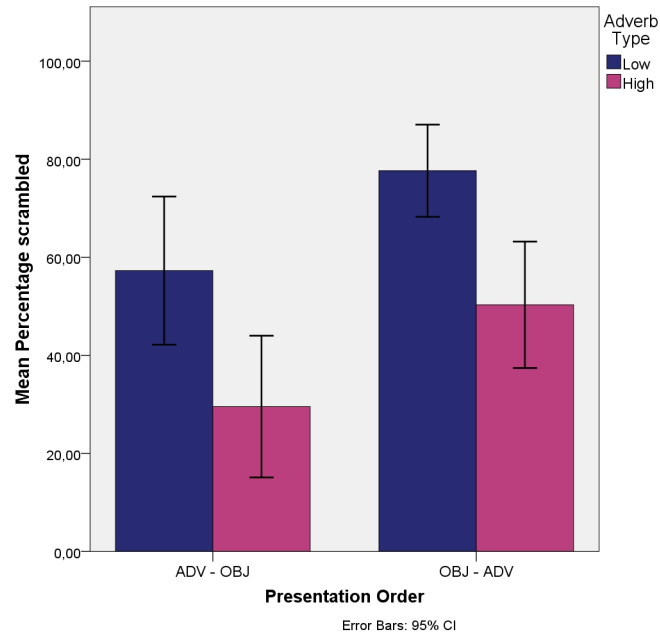


Figure 8: Percentage of scrambled utterances per adverb type per presentation order

These results confirm that participants scrambled across the low adverbs significantly more often than across the high adverbs. The order of presentation served as a prime, but the adverb type effect is maintained regardless.

### 4.1.3 Discussion

The finding that the type of adverb triggers a difference in scrambling behavior encountered in Experiment 2 persists on a more general level in Experiment 3, regardless of the order of presentation of the constituents. However, while Experiment 2 provided evidence that semantic features of the adverb play a role, Experiment 3 shows that the syntactic position of the adverb does too. Direct objects are preferably moved across adverbs that are syntactically near than across long distances. Hence, participants scrambled their objects across low adverbs and not across high adverbs – the distance between the syntactic site of high adverbs with respect to that of the object-to-move discourages scrambling. In the first production experiment, the movement of the object was administered by the scope pattern of the negation adverb (in line with Cinque, 1999). As a result, participants scrambled across negation consistently even though the negation adverb is syntactically high. The pertinent influence of negation’s scope on the meaning of the sentence overrules the distance difficulty, enforcing the scrambled order instead. It thus appears that avoiding the expression of unintended meanings is a stronger constraint than bypassing long-distance movement. In conclusion, both syntactic and semantic features of the adverb influence direct object scrambling in Dutch.

## 5 General Discussion

The results from the experiments above suggest that both syntactic and semantic features of the adverb influence the likeliness of a direct object to scramble. However, prosody and stress can easily change the reading of the sentence in Dutch (see e.g. Verhagen, 1986; Neeleman and Reinhart, 1998; Bouma and De Hoop, 2008 for analyses of the interaction between Dutch scrambling and stress). In this thesis I attempted not to manipulate the intonation of the sentences to confine its effect to the personal, mental prosody participants conjure up when reading a sentence (which is inherently always present; *implicit prosody* in Fodor, 2002). It should be clear that the product of this thesis is a theoretic account of the influence of the adverb on scrambling prior to any such speech-related strategy. Moreover, in this thesis I have only discussed one-word adjuncts. For a full picture, it is necessary to incorporate effects of multiple-word adjuncts such as full PPs – but also to look at sentences with more than one single adverb. I will leave such complexities for follow-up research.

## 6 Conclusion

From the experiments in this thesis it is evident that not only features of the direct object (Van Bergen and de Swart, 2010; P. de Swart and van Bergen, n.d.; Bouma and De Hoop, 2008; Neeleman and Reinhart, 1998; Van Der Does and de Hoop, 1998; Diesing and Jelinek, 1995), but also features of the adverb influence direct object scrambling behavior in Dutch. Adverbs differ from each other in their scope-taking properties as well as in their position in the syntactic tree, effects of which can be seen in the word order used to express a sentence. Dutch natives have clear preferences whether or not to scramble a direct object across an adverb, that are partly determined by the adverb's syntactic and semantic features. Even though time pressure turned out not to have any influence on word order decision-making, adverb type transpired to play a prominent role.

In the first and second experiment, semantic features of the adverb were put to the test in a sentence judgment task and a sentence completion task. The scope-taking nature of negation leads to meaning differences between the scrambled and unscrambled sentences, viz. sentential and constituent negation respectively. This difference does not exist with temporal adverbs. Constituent negation evokes a contrast that was not made explicit ('fixed') in the judgment task. Hence, sentences that featured the negation adverb with their object in the unscrambled position were rated significantly worse than scrambled, negated sentences. No such difference exists between the word orders in sentences with temporal adverbs – which were both rated as highly acceptable. Participants in the sentence completion task refrained from using the unscrambled/negation construction too, in order to avoid the (unintended) contrastive reading. Objects were preferably kept unscrambled across temporal adverbs, but these proportions were a lot closer to chance level probably due to the intangible nature of temporal adverbs on the syntax-semantics interface. The third experiment was another sentence completion task, in which syntactically different adverb types were contrasted. This experiment provides evidence that syntactic features of the adverb also play a role in scrambling. Participants scrambled their objects across syntactically low adverbs significantly more often than across syntactically high adverbs. This finding illustrates a cognitive difficulty in moving constituents across longer distances (cf. Gibson, 2000; Schaeffer, 2000). The results from this thesis indicate that both semantic and syntactic features of the adverb influence direct object scrambling behavior in Dutch.

P. de Swart and van Bergen (n.d.) and Unsworth (2005) conducted scrambling experiments in which it was the direct object that was manipulated – features of which proved to influence scrambling behavior. Nonetheless, they ended up with contradictory conclusions because of the adverb type used in the stimuli material. This thesis thus proves that adverb type should receive more attention and find its place in the theoretical literature.

Moreover, this thesis demonstrates that experimental research can contribute to a better understanding of direct object scrambling. The experiments by P. de Swart and van Bergen and the ones in this thesis indicate that Dutch natives accept certain sentences even though they would not produce them themselves. That is, there seems to exist an asymmetry between language production and judgment (cf. Hendriks, 2014). Most theoretic research on direct object scrambling is based on intuitive grammaticality judgments of their example sentences. As was the case with the experimental sentences in this thesis, the example sentences in the theoretic literature too may be acceptable, but never produced in everyday language. As a result, such studies do not accurately represent the way scrambling happens in spontaneous speech. Experimental research may thus contribute to theoretical accounts of the phenomenon.

All in all, I have shown that adverb type really does matter in Dutch scrambling and that it is definitely worth our while to examine not only characteristics of the direct object, but also of the *adverb* in (experimental) studies on scrambling.

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