Finding Candidate Antecedents: Phrases or Conceptual Entities

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Abstract

Five experiments on Dutch are reported which were designed to test how candidate antecedents are initially identified during the processing of personal pronouns: by reference to a surface linguistic representation, the "Grammatical Priority" hypothesis, or by reference to a conceptual representation, the "Conceptual Priority" hypothesis. The pronoun "hij" ('he') preferentially takes an animate (male entity) antecedent, though it may also refer to inanimate entities introduced by a word of a particular ("de") gender class. According to the Conceptual Priority hypothesis, an animate male NP should be identified as a preferred candidate antecedent for "hij" since only animates will contain gender specifications in conceptual representation. Hence, the presence of a male entity in the conceptual (discourse) representation should interfere with the comprehension of sentences where the true antecedent of "hij" is inanimate. Three self-paced reading studies disconfirmed this prediction, showing an animacy effect only for the true antecedent of "hij" but not for decoy antecedents. The Grammatical Priority hypothesis was also disconfirmed. The results support a model where both linguistic and conceptual representations are checked during initial candidate antecedent identification and semantic/pragmatic information is used to select an antecedent. The advantage for animate antecedents observed in Experiments 1 and 2 is attributed to a later stage of antecedent evaluation where more plausible or expected relations or the use of more common referential mechanisms lead to faster comprehension times.

1.   Introduction

The boundary between linguistic and nonlinguistic mental representations remains unclear, despite many recent advances in linguistic and psycholinguistic research. Hankamer and Sag (1976) draw a distinction between deep (1a) and surface (1b) anaphora, suggesting that deep anaphors only require a conceptual antecedent, whereas surface anaphors must find an antecedent of the appropriate linguistic form, e.g., one matching the deleted VP. Hence, the string with the surface anaphor is illformed in (1b), though the deep anaphor is fine. Notice that both are acceptable after a simple active sentence "I watered the plants."

(1)   a. The plants needed to be watered. Tim didn't want to do it.
        b. The plants needed to be watered. *Tim didn't want to.

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Tanenhaus and Carlson (1990) discuss the early processing literature on deep vs. surface anaphora and report a series of studies supporting Hankamer and Sag's proposal. They suggest that perceivers directly find a conceptual antecedent when presented with a deep anaphor. Hence, syntactic parallelism of the antecedent matters only for surface anaphors, not deep anaphors. In a similiar vein, McKoon, Ward, Ratcliff and Sproat (1990) show effects of surface form for surface anaphors ("do so") and strong effects of topicality for deep anaphors ("do it").

VP-anaphora and NP-anaphora need not behave alike. Despite fascinating studies like those above, and a huge literature on the processing of pronouns, there is little evidence concerning what type of antecedent normal personal pronouns take during language comprehension or precisely how that antecedent is initially identified. Lucas, Tanenhaus and Carlson (1991) suggest that definite NP anaphora and pronouns immediately map onto a discourse referent, probably not going through a linguistic or lexical representation except in cases where the antecedent is out of discourse focus. Similiarly, Ward, Sproat and McKoon (1991) show that pronouns may refer to constituents of words but only under the appropriate pragmatic conditions. Both studies support the Conceptual Priority hypothesis discussed below in that pragmatic and discourse factors determine the ease or acceptability of antecedents for pronouns. As the authors of these studies acknowledge, the fact that personal pronouns can take conceptual antecedents does not entail that they always do so. Nor does it entail that a conceptual antecedent is identified directly without any reference to a surface linguistic representation of the phrase that introduced the antecedent.

The existing literature on pronouns suggests that the first noun phrase in a text is a particularly salient one (Gernsbacher, 1989) and that topics receive special consideration during the processor's search for an antecedent (Clifton and Ferreira, 1987; Crawley, 1986; Garrod and Sanford, 1988). It also shows that a conceptual antecedent can be identified without any observable cost in cases where no linguistic antecedent is available, such as "them" in "I think I'll order a frozen margarita. I just love them." (Gernsbacher, 1991). A pronoun can reinstate its antecedent as shown by probe recognition studies, where the occurrence of a pronoun reactivates its antecedent or at least inhibits alternative antecedents much like a second occurrence of the antecedent itself (e.g., Chang, 1980). Thus, the probe "Mary" is recognized faster than "John" following "John and Mary went to the grocery store and Mary/she bought a quart of milk," providing that "Mary" is reinstated in the second clause, either by the name itself or by a pronoun ("she"). Phrases which are inappropriate to be an antecedent for a pronoun because of their gender or number are rapidly excluded from consideration (Tyler, 1983; Vonk, 1984) and thus, for example, do not show consistent priming effects (Nicol, 1988). The implicit causality of verbs can determine the assignment of an antecedent to an ambiguous pronoun, as in "Jane hit/angered Mary because she had stolen a tennis racket." The effects of congruent causality are present even when the gender of the pronoun disambiguates its antecedent, as in "Jane hit John because she had stolen a tennis racket." This might be taken to show either that disambiguation of the antecedent is not always accomplished by means of number and gender features, even when they would suffice to identify the antecedent, or it might be interpreted as a plausibility effect due to interpretive processes which operate even in fully unambiguous sentences such as those which do not contain any pronouns.

In much of the literature on processing pronouns, no attempt is made to determine whether an antecedent is linguistic or conceptual, nor to distinguish

between the processes occurring during comprehension of a phrasal (linguistic) antecedent for a pronoun vs. an antecedent which is a conceptual representation of the referent (e.g. a discourse entity). An exception is work on Spanish and French, which shows that, in the absence of very strong pragmatic constraints, gender disambiguation can facilitate comprehension of a pronoun even for sentences about objects, where gender is arbitrary and thus presumably only present in the linguistic representation of the word or phrase introducing the object, not in its conceptual representation (Carreiras, Garnham and Oakhill, 1993; Garnham, Oakhill, Carreiras and Ehrlich, 1993). For example, "La arena se pegó al helado porque lo arrojaron al suelo" ('The sand stuck to the ice-cream because [omitted subject] it-ACCUSATIVE threw onto the ground' = because it was thrown onto the ground) was read faster than the same sentence with a masculine NP ("el polvo," 'the dust') replacing the feminine NP "la arena." These results suggest that surface linguistic representations are involved in finding an antecedent for a personal pronoun.

2. The present study

The studies reported here take up the role of arbitrary gender in processing pronouns, exploring the processing of the Dutch pronoun "hij" ('he'). The work exploits an interesting property of the Dutch pronominal system. The singular masculine pronoun "hij" ('he') may take an inanimate singular as its antecedent, providing the inanimate noun belongs to the class of nouns taking "de" ('the'), not the neuter "het" ('the'), when the noun occurs with a definite article. This is illustrated in (2), where the a-form exhibits the use of "hij" to refer to a male human and the b-form refers to an inanimate introduced by either a masculine or feminine noun. The sentence in (c) is generally judged to be illformed because it refers to a neuter noun, i.e., one taking "het" ('the') as the definite article. In (2c), "vork" appears in the diminutive ("-je") and therefore, like all diminutives in Dutch, it is neuter, i.e., a "het" word.

(2) a. Henk vertrok. Hij... ('Henk left. He...')
     b. De vork brak. Hij... ('The fork broke. He...')
     c. Het vorkje brak. *Hij... ('The fork-DIM broke. He...')

Unlike English, there is nothing particularly cute or literary about this use of the pronoun. The speaker is not anthropomorphizing an object by using the pronoun in this way. In Dutch, there is a clear preference for "hij" to refer to male entities, as was confirmed in the present study in a sentence completion experiment (Experiment 1).

The "de/het" distinction is very much alive in the grammar of Dutch. Which class a noun belongs to determines the form of the definite article. It also controls the form of the prenominal adjective, which is inflected with "-e" for all forms of "de"-words ("de kleine vork" or "een kleine vork," 'the/a small fork'), but not for "het"-words when they occur in the singular indefinite ("een klein vorkje," 'a small fork-DIM') or without a determiner ("klein vorkjes," 'small fork-DIM-plural'). By contrast, the distinction within "de"-words between masculine "de"-words and feminine "de"-words is essentially moribund: native speakers are very unsure about this distinction and, at most, it controls the form of possessive pronouns -at least for those speakers who know the (historically) correct form or bother to look it up in the dictionary.

Assume at least for the moment (we'll return to this later) that linguistic representations of phrases are distinct from discourse representations which may encode nonlinguistic conceptual information about the referents of phrases (discourse entities), events, and relations between them. Given a sequence like (2a), where a pronoun refers to a male individual, presumably the reader/listener will have a conceptual representation of "Henk" as an entity with certain specified properties, one of them being that he is male. Hence, either a linguistic or a conceptual antecedent will be marked for gender in this case. By contrast, when presented with (2b), the reader/listener will presumably have a conceptual representation of "de vork" ('the fork') as an inanimate object with specified properties, but being male will not be one of them.

What consequences does this distinction have for processing sentences such as (2a) and (2b)? Consider, first, the possibility that readers/listeners directly access conceptual representations before linguistic representations of potential antecedents for a pronoun. When given a sentence like (2a) or (2b), in the search for a set of potential candidate antecedents for "hij," the perceiver would first check the conceptual representation, where (only) natural gender is assumed to be represented. We have called this the "Conceptual Priority" hypothesis, according to which conceptual representations would receive priority over linguistic representations in early stages of identifying candidate antecedents for a pronoun. The hypothesis predicts that the presence of a male entity in the conceptual representation would slow processing of "hij" when the true antecedent is not a male entity, such as in (2b), but would facilitate comprehension when the male entity corresponds to the true antecedent as in (2a).

According to an alternative hypothesis, initially candidate antecedents for pronouns would be identified in the linguistic representation. We have called this the "Grammatical Priority" hypothesis. According to this hypothesis, no advantage would be expected for the animate antecedent. The hypothesis also predicts that the presence of a tempting (e.g., recent) inanimate antecedent in the linguistic representation might interfere with processing "hij" even when the true antecedent is a male entity.

Thus, according to the first hypothesis, it should be easier to process sentences of type (2a) than sentences such as (2b). According to the second hypothesis, on the other hand, the two sentences should be processed with the same ease, at least in terms of procedures for identifying potential antecedents for a pronoun. The two hypotheses have been tested in the present study. Taken jointly, the experiments address the question of whether perceivers first identify a set of potential antecedents for "hij," on a par with proposals about how intrasentential anaphors are processed (Cowart and Cairns, 1987; Nicol, 1988), whether this set is identified only with respect to linguistic representations or only with respect to conceptual representation (or both), and whether the animacy (male entity) preference for "hij" occurs during the identification of initial candidate antecedents or during some other phase of interpretation.

The present study includes five experiments. Since our test of the Conceptual Priority hypothesis clearly rests on the assumption that the pronoun "hij" does indeed prefer an animate antecedent, we checked this assumption in a simple sentence completion study. The Conceptual Priority hypothesis was tested in Experiment 2a and 2b. Experiment 2a tests the prediction that the presence of a male entity in the conceptual representation should slow down the processing of a

sentence containing the pronoun "hij" when the true antecedent is not male. Experiment 2b is a control experiment.

Experiment 3 tested whether candidate antecedents are ranked by their grammatical function (Subject > Direct object > Oblique object) and also examined possible effects of topic preference in the selection of the antecedents.

The "Grammatical Priority" hypothesis was directly tested in Experiment 4. The hypothesis predicts that the presence of a tempting (e.g., recent) inanimate antecedent in the linguistic representation might interfere with processing "hij" even when the true antecedent is a male entity.

3.   Experiment 1: A sentence completion study

In this experiment we tested the assumption that Dutch speakers prefer to assign the pronoun "hij" to an animate antecedent. The study consisted of a simple sentence completion task in which a number of Dutch speakers were given sentences containing an animate human NP and an inanimate NP.

<u>Materials, method and subjects</u>

Eight one-clause sentences were constructed. Each contained a male human NP and an inanimate "de" word, either of which could serve as antecedent for "hij.""Hij" appeared as the first word of a following sentence, followed by a blank where subjects could complete the sentence fragment, as in (3).

(3)   De computer kost te veel voor de advocaat.
       Hij.................

       'The computer cost too much for the lawyer.
       He/it..............'

In four sentences the animate NP appeared in subject position of the first sentence; in four, the inanimate appeared as the subject. Four unambiguous distractor examples contained fragments beginning with a feminine pronoun or a plural pronoun. The materials appear as Appendix I.

Ten native Dutch speakers were asked to complete the fragments. After doing so, each was asked to circle the NP taken as antecedent of the pronoun. Inanimate antecedents were chosen only ten times (12.5% of the responses). These were distributed across sentences #1, 6, 9, 10 and 12 (the numbers refer to the sentence numbers in Appendix I).

There was at most only a slight preference for the subject of the first sentence to be taken as the antecedent of the pronoun; three of the ten inanimate NPs chosen as antecedents for "hij" occurred in object position. Four subjects chose only animate antecedents. The results thus strongly support the assumption that "hij" preferentially takes an animate antecedent. This overwhelming preference for animate antecedents suggest that animate (male entity) decoy antecedents for "Hij" may well disrupt sentence processing in Experiment 2.

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4.   Experiment 2

4.1   Experiment 2a.

In this experiment we tested the Conceptual Priority hypothesis by measuring reading comprehension times for a number of two sentence passages. If an advantage for animate antecedents is really due to the process of identifying possible or likely antecedents, then being animate should not only serve to facilitate the true antecedent but also to interfere with processing when it is a decoy antecedent which is animate. The processor should incorrectly favor an animate decoy, briefly distracting attention or taking processing resources away from consideration of the true antecedent. In principle it is imaginable that pronoun processing is completely automatic and resource independent. However, we find this unlikely. Processing pronouns involves the processing of novel representations, not ones already prestored in an associate network in memory. Further, various empirical findings show complexity effects when an antecedent is difficult to identify (Ehrlich and Rayner, 1983).

Materials. 18 two-sentence discourses like those in (4) below were presented to subjects in a selfpaced reading study, with each sentence broken into two frames. (In (4) the position of the frame break is represented with a "I"). The antecedent of the pronoun is underlined here for convenience, but was never underlined on the subjects' display. The full set of materials can be found in Appendix II. To be sure that any observed advantage for animate antecedents was really due to the sort of mechanism implied by the Conceptual Priority hypothesis, i.e., checking discourse representations for potential antecedents before a linguistic representation, six forms of each example were constructed. The simple contrast of an inanimate vs. animate antecedent for "hij" occurred under conditions where no other potential antecedent for "hij" occurred in the sentence, as in (4a,b) below. Here the true antecedent for "hij" is the object of the preposition. In (4c,d) "hij" is again coreferential with the object of the preposition. However, the direct object in the first sentence could in principle – in terms of its linguistic form – also serve as the antecedent for the pronoun "hij," in contrast to the (4a,b) forms. This was done because the effect of having an animate antecedent may be subtle and thus not observable when the pronoun has only one potential antecedent, but magnified, so that it could be observed, under conditions where some (temporary) ambiguity of reference is present. In the final condition (4e,f) the true antecedent for the pronoun was changed to make it the direct object, to see if in this case it is the animate phrase in particular which inhibits comprehension, i.e., serves as a 'better' decoy (a possible and tempting but ultimately inappropriate antecedent), thus interfering with performance more than an inanimate phrase.

In each version of an example, the subject of the first sentence was inappropriate in form to be the antecedent of the pronoun – in order to separate out topic effects from other effects (we return to topics in Experiment 3).

(4)　　a.　Susan stuurde het boek I naar <u>de boekhandel</u>.
　　　　　　'Susan sent the book I to the bookstore.'

　　　　　　Hij had haar I een verkeerd boek verkocht.
　　　　　　'He(it) had her I a wrong book sold.'
　　　　　　(He(it) sold her the wrong book.)

　　　b.　Susan stuurde het boek I naar <u>de vader</u>.
　　　　　　'Susan sent the book I to the father.'

　　　　　　Hij had er I al lang op zitten wachten.
　　　　　　'He(it) had it I already long for sit wait.'
　　　　　　(He had waited a long time for it.)

　　　c.　Susan stuurde de brief I naar <u>de boekhandel</u>.
　　　　　　'Susan sent the letter I to the bookstore.'

　　　　　　Hij had haar I een verkeerd boek verkocht.
　　　　　　'He(it) had her I a wrong book sold.'
　　　　　　(He(it) sold her the wrong book.)

　　　d.　Susan stuurde de brief I naar <u>de vader</u>.
　　　　　　'Susan sent the letter I to the father.'

　　　　　　Hij had er I lang op zitten wachten.
　　　　　　'He(it) had it I already long for sit wait.'
　　　　　　(He had waited a long time for it.)

　　　e.　Susan stuurde <u>de brief</u> I naar de boekhandel.
　　　　　　'Susan sent the letter I to the bookstore.'

　　　　　　Hij was I in een vreemde taal geschreven.
　　　　　　'He(it) was I in a foreign language written.'
　　　　　　(He(it) was written in a foreign language.)

　　　f.　Susan stuurde <u>de brief</u> I naar de vader.
　　　　　　'Susan sent the letter I to the father.'

　　　　　　Hij was I in een vreemde taal geschreven.
　　　　　　'He(it) was I in a foreign language written.'
　　　　　　(He(it) was written in a foreign language.)

Obviously it would be impossible to keep both the first and second sentences constant across these manipulations. Direct comparisons of reading times for the crucial second sentences is legitimate only in (4e,f). Thus we may compare only the relative difference between the inanimate version and its animate counterpart in the other sentences, i.e., compare the relation (4d-4b) with the relation between (4c-4a).

The experimental items were divided into six lists for presentation. The lists were counterbalanced to insure that an equal number of each experimental type occurred in a list, but no list contained more than one version of a single example. Thus, each presentation list contained three two-sentence discourses per condition. The experimental items were randomly intermixed with filler items in a set containing 90 other two-sentence discourses: a) 18 of these fillers had the pronoun "er" ('it'-Accusative) at the beginning of the second sentence; b) the second set of

18 fillers were the experimental materials for the study described as Experiment 3 below; c) the remaining 54 filler items were of mixed form – but with pronouns other than "hij."

Subjects. Seventy-five subjects, mostly students at the University of Nijmegen, all native speakers of Dutch, took part in the experiment and were paid for their participation. They were divided in six groups, of 13, 13, 12, 13, 12, 12 subjects respectively.

Method. The experimental items were divided in four sentence frames; two frames for each sentence. The division into sentence frames was done in such a way that no frame ended halfway through a phrase, and was similar for all experimental items and for many of the filler items. All experimental items and a number of the filler items (in total 50% of all items) were followed by a comprehension question. The nature of the question required an answer other than 'yes' or 'no,' to prevent subjects from guessing.

The subjects were seated in a sound-proof room. The sentences were presented on a monitor in front of the subject. Each trial started with the presentation of an asterisk in top-left position on the screen, which served as a fixation point. After the subject pressed a button, the first frame appeared. With each button-press the next frame appeared, slightly lower on the screen than the previous frame. Each frame disappeared as soon as the next frame was presented. When a question followed the item on the screen, the subject was required to speak the answer into a microphone. In an adjacent room, the experimenter, wearing headphones connected to the microphone, manually recorded the answer. Two seconds after termination of the subject's response, which had activated a voice key, a new asterisk appeared, to indicate that the subject could press the button for the next trial. If the item was not followed by a question, the fixation asterisk would appear 2 seconds after the subject had read the last frame and pressed the button. The subject was instructed to read the sentences as fast as possible, but warned to make sure that s/he understood the meaning of the sentences. Thus the instructions stressed that the subject had to answer the questions correctly. After a practice series of 12 items, the subject was presented with two blocks of 54 sentences each, separated by a short break.

Results. Reading times per frame and answers to the questions were recorded. All responses for items in which the subjects gave a wrong answer to the question were replaced by the subject's mean for that sentence type. All reading times beyond two standard deviations from the subject's mean were replaced by the mean itself. The data thus consisted of reading times per frame (the intervals between the key-pressing responses). From these data the reading times for the second sentence (frames 3 and 4) were computed. The reading times are reported in Table 1.

Table 1. Experiment 2a. Reading times (msec) for the second sentence of the six conditions and the percentage of errors. (For an example of the different conditions, see sentences 4a-f.)

Sentence Form	RT	% Errors
Het-decoy ("book")		
a) Inanimate antecedent ("bookstore")	2014	14.6
b) Animate antecedent ("father")	1849	9.1
De-decoy ("letter")		
c) Inanimate antecedent ("bookstore")	2009	15.6
d) Animate antecedent ("father")	1807	6.3
De-antecedent ("letter")		
e) Inanimate decoy ("bookstore")	1916	12.0
d) Animate decoy ("father")	1911	13.3

An ANOVA on the reading times for the second sentence showed that the effect of sentence-type ((3a,b) vs. (c,d) vs. (e,f)) was thoroughly nonsignificant ($F1(2,138)$= 0.40, $p>0.7$; $F2(2,34)$= 0.06, $p>0.9$), while the effect of animacy was significant ($F1(1,69)$= 49.4, $p<0.001$, $F2(1,17)$= 4.37, $p<0.06$). The interaction of animacy with sentence-type was significant by subjects ($F1(2,138)$= 7.2, $p<0.001$) but not by items ($F2(2,34)$= 1.6, $p>0.20$) which was apparently due to the fact that numerically there is hardly any difference between the e- and f-forms, which differ only in the animacy of the decoy (non)-antecedent. An analysis including only the a-, b-, c-, and d-forms confirmed this: the effect of animacy was robust ($F1(1,69)$= 53.7, $p<0.001$, $F2(1,17)$= 6.8, $p<0.02$), but the interaction disappeared ($F1(1,69)$= 0.46, $p>0.49$, $F2(1,17)$= 0.13, $p>0.72$).

The error data show the same pattern. The effect of sentence type ((a,b) vs. (c,d) vs. (e,f)) was not significant ($F1(2,138)$= 0.30, $p>0.7$; $F2(2,34)$= 0.24, $p> 0.7$), but animacy was again significant ($F1(1,69)$= 5.92 $p<0.02$; $F2(1,17)$=4 .09, $p<0.06$), and so was the interaction of animacy with sentence-type ($F1(2,138)$= 4.26, $p<0.02$; $F2(2,34)$= 2.78, $p>0.08$).

Discussion. The results of Experiment 2a provide clear answers with respect to a number of questions. An inanimate antecedent for "hij" results in slow reading times compared to an animate antecedent.[1] This holds even when no ambiguity is present concerning the possible antecedents for "hij" as in the (a,b) examples where all nonantecedents are formally inappropriate to be antecedents for the pronoun. However, an animate decoy is apparently no worse than an inanimate decoy: when "hij" takes some other phrase as its true antecedent, the animacy of a potential antecedent was not important. While the advantage of animate antecedents – by hypothesis, those marked as male in their conceptual representation – readily

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[1] Intuitively, and also pointed out by subjects 'institutions' such as bookstores, are better referred to as "men" or "zij'' ('one' or 'they') than "hij." One would rather say 'One/they had sold her the wrong book'; so, referring to a particular person in that institution. It would be an alternative explanation for the slower reading times (a) vs. (b) and (c) vs. (d) (i.e. had we used inanimate objects, such as chair or apple, we might not have found a (significant) difference). On the other hand, we would then expect (c) to be particularly slow, because there is an inanimate object here for which "hij" is in principle a more appropriate antecedent than for bookstore.

follows from the view that conceptual representations are checked first during pronominal interpretation, the last finding does not fit so readily with this view. Indeed, the existence of a (decoy) conceptual representation of the male entity in the (f) example should interfere with comprehension, rendering reading times for the example slower than for its (e) counterpart. But, as just noted, what is observed instead is simply the absence of the advantage found for the animate form, contrary to the predictions of the Conceptual Priority hypothesis.

Before accepting these conclusions, we should note that the second sentence of the (a,c) and (b,d) forms were different from each other. There's no reason to believe that the (a,c) forms were more difficult than the (b,d) ones apart from the relation between the antecedent and the pronoun. Also, the sentences were equated for length (across the experimental materials). Nevertheless, to be sure that the obtained advantage for animate antecedents was not due to accidental differences in the continuation sentences, a control experiment was conducted.

4.2   Experiment 2b.

In principle the results of Experiment 2a might have been due to differences in the processing complexity of the second sentence of the discourse, since the sentence varied across conditions. Though the overall length and intuitively judged complexity of the second sentence was matched across sentence forms, accidental complexity differences between the sentences with inanimate antecedents (4a,c) and those with animate antecedents (4b,d) might have produced spurious evidence for the animate antecedent advantage. To control for this, a second experiment was conducted, similar to Experiment 2a, but without pronouns in the second sentence.

Materials. The materials from Experiment 2a were adapted so that the pronoun in the second sentence was replaced by a proper name. In order to keep the adapted sentence in an unchanging context as a second sentence of a discourse, one of the original forms of the first sentence, usually the animate, preceded all forms of the adapted sentence. In a few instances it was necessary to replace the animate antecedent by the inanimate or by a completely new noun phrase, to maintain a reasonable level of coherence between the two sentences. An example is given in (5), where "|" indicates a frame break; the NP that was the antecedent in experiment 2a is underlined, but was not underlined on the subjects' display. The materials are presented as Appendix III.

(5)   a.   Susan stuurde het boek | naar de verkoper.
            'Susan sent the book | to the bookseller.'

            Paul had har en verkeerd boek verkocht.
            'Paul had her | a wrong book sold.'
            (Paul had sold her a wrong book.)

        b.   Susan stuurde het boek | naar de verkoper.
            'Susan sent the book | to the bookseller.'

            Paul had er | al lang op zitten wachten.
            'Paul had it-Acc | already long for sit wait.'
            (Paul had been waiting for it a long time.)

Subjects. Seventy-five subjects, all native speakers of Dutch, took part in the experiment and were paid for their participation. They were divided into six groups of 13, 13, 12, 13, 12 and 12 subjects respectively.

Method. The preparation and presentation of the materials was almost identical to that of Experiment 2a with one difference, due to the fact that the materials now involve a two-way contrast between the second sentence of (5a vs. 5b), not a six way contrast, as in (4a-f). Where sentences from Conditions (c,e) and (f,d) had appeared in Experiment 2a, these were now replaced by the adapted sentences from Condition (a) and (b), respectively. Since the fillers for the different subject groups differed in Experiment 2a, we still used 6 subject groups with their respective filler items so that the materials of interest here appeared under exactly the same conditions as they did in Experiment 2a.

Results. Reading times for the second sentence and answers to the questions were recorded. Reading times for items on which subjects gave a wrong answer to the question and reading times beyond two standard deviations from the subjects' mean were replaced by the subjects' mean for that sentence type. The average error rate for this experiment was around 3.5 percent, and the difference between the errors in the two conditions less than 1 percent, so no analysis of the errors was performed. The reading times for the second sentence are presented in Table 2.

Table 2. Experiment 2b, control for Experiment 2a. Reading times (msec) for the second sentence of each item and the percentage of errors. (First sentence example: "Susan sent the book to the bookseller.")

Relation to Exp. 2a	Second sentence example	RT	% Errors
a) Control for a, c (Inanimate original)	Paul had sold her a wrong book	2115	3.0
b) Control for b, d (Animate original)	Paul had been waiting for it a long time	2085	3.9

The analysis of variance on the reading times gave no significant difference between the two continuation types once the pronoun was replaced with a proper name (F1(1,73)= 1.54, p>0.21; F2(1,17)= 0.10, p>0.75). Thus we may safely conclude that the results of Experiment 2a were not an artifact of accidental differences in the continuation sentences of that experiment.

Discussion. Experiment 2 seems to provide evidence that the animacy preference for "hij" does not arise because the conceptual representation is initially checked in order to identify candidate antecedents for "hij." This incorrectly predicted that perceivers should have been decoyed in Experiment 2a. However, it is possible that perceivers were not decoyed only because of an independent preference for phrases expressing certain grammatical functions to preferentially be chosen as the antecedent of a pronoun. For intrasentential anaphoric processes there are some indications that phrases which are higher on the grammatical function hierarchy receive priority during antecedent selection. For reflexives, a subject preference can be demonstrated in English (Plunkett, Clifton and Frazier, 1991) and in Japanese for the reflexive "jibun" (Nagata, 1991). Indeed for personal pronouns, there is also evidence from Italian that in pragmatically neutral sentences a pronoun will preferentially take the subject of the preceding sentence as antecedent rather than the direct object (Flores d'Arcais and Berzuini, 1993). If perceivers rank potential antecedents according to grammatical function, then the Conceptual

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Priority hypothesis may not have been tested at all, since the true antecedent appears as direct object whereas the decoy animate antecedent appeared as an oblique (prepositional) object, which places it lower on the grammatical function hierarchy. In short, the absence of an animacy effect in sentences like (4e,f) where the animacy of a decoy antecedent was manipulated might only indicate that the decoy phrase was not checked until after the true antecedent, the direct object in (4e,f), had already been identified. Experiment 3 tests for this possibility.

5.   Experiment 3

In Experiment 2 we purposely avoided dealing with issues of the role of topichood in pronoun interpretation, by placing all relevant noun phrases after the subject which occurred in initial (topic) position and by making the subject a female proper name and thus unavailable as the antecedent for "hij." Topics are known to be important in establishing the antecedent for pronouns (See Clifton and Ferreira, 1987, and Garrod and Sanford, 1988, for example). Experiment 3 explicitly manipulates the topic-focus structure of sentences, using examples like those in (6). These sentences allow us to test both for the presence of a possible topic preference in antecedent selection and provides a control for the ranking of antecedents according to grammatical function. The basic contrast is between passives, where the antecedent for "hij" is in subject/topic position, as in (6a), and actives, where the antecedent is in object position, as in (6b). In (6c) and (6d) the same passive-active contrast is maintained, but semantically less plausible relations are asserted in the first sentence. This was done simply because processing of less plausible sentences might be slower and therefore reveal effects not observed with highly plausible sentences or sentences asserting stereotypical relations. In (6e) and (6f) a male decoy, a human, occurs in the passive (6e) and active (6f) sentences. The study explores whether topics (the subject of a passive) serve as particularly effective antecedents for "hij" even when there is no ambiguity of reference (as in (6a-d)). It also provides an independent test of whether an animate phrase serves as a decoy for "hij," in which case (6e,f) should take longer to read than the other sentence forms.

Materials. 18 sentences were constructed with six versions of each, as illustrated in (6) below. The second sentence remained identical across sentence-types (6a-f). The first sentence appeared in either the passive (6a,c,e) or active (6b,d,f). Sentences (6a-d) mentioned no human male entity, but only an inanimate "de" word ("de schotel," 'the dish' in (6)) and a human female ("Anna"). The a- and b-forms contained a particularly common and plausible entity as the instantiation of the verbs patient role; the c- and d-forms mentioned some patient which, though perfectly sensible as an instantiation of the patient role, was a less stereotypic instantiation of that role for the particular verb, as determined by our own intuitions. The e- and f-forms replaced the name of the female human with the name of a male human.

(6)   a.   <u>Deze schotel</u> werd I door Anna gemaakt.
              (This (food)dish was I made by Anna).

              Hij is I erg mooi geworden.
              (He(it) is I well made).

        b.   Anna maakte I <u>deze schotel</u>.
              (Anna made I this (food)dish).

              Hij is I erg mooi geworden.
              (He(it) is I well made).

        c.   <u>Deze tafel</u> werd I door Anna gemaakt.
              (This table was I made by Anna).

              Hij is I erg mooi geworden.
              (He(it) is I well made).

        d.   Anna maakte I <u>deze tafel</u>.
              (Anna made I this table).

              Hij is I erg mooi geworden.
              (He(it) is I well made).

        e.   <u>Deze schotel</u> werd I door Henk gemaakt.
              (This (food)dish was I made by Henk).

              Hij is I erg mooi geworden.
              (He(it) is I well made).

        f.   Henk maakte I <u>deze schotel</u>.
              (Henk made I this (food)dish).

              Hij is I erg mooi geworden.
              (He(it) is I well made).

The antecedent of the pronoun is underlined here for convenience, though it was not underlined on the subjects' display. A "I" indicates where frame breaks occurred. All experimental sentences are presented in Appendix IV.

Subjects. Seventy-five subjects, all native speakers of Dutch, were paid for their participation. They were divided into six groups of 13, 13, 12, 13, 12, and 12 subjects respectively (the same subjects as in Experiment 2a).

Method. The methods were identical to those of Experiment 2a. The materials for the present experiment served as fillers for Experiment 2a, and vice versa.

Results. In the various conditions there was a significant difference in reading times between passive and active first sentences ($F1(1,69)= 34.7$, $p<0.0001$, $F2(1,17)= 8.24$, $p<0.02$), where passives took longer to read than actives (1816 vs. 1696, respectively), perhaps only because of their length. Table 3 presents the average reading times for the second sentences. The difference between active and passive conditions in sentence two, which involved only a difference in the length of the prior sentence, was significant in the analysis by subjects ($F1(1,69)= 6.92$, $p<0.02$) but not in the analysis by items ($F2(1,17)= 1.5$,

$p>0.23$). The antecedent type/plausibility ((a,b) vs. (e,f,) vs. (c,d)) was not significant ($F1(2,138)= 0.51$, $p>0.60$; $F2(2,34)= 0.10$, $p>0.9$) and the interaction of antecedent/plausibility and active/passive did not even approach significance ($F1(2,138)= 0.10$, $p>0.9$; $F2(2,34)= 0.02$, $p>0.9$). Turning to the error rates, we found that these are low (below 2 %) in all cases. The conditions did not differ significantly from each other (all $p>0.18$).

Table 3. Experiment 3. Reading times for sentence 2 for the various types of sentences (plausible and implausible, passives and actives).

Plausibility	Gender of non-antecedent	Sentence form	RT
a) Plausible	Female	Passive	1764
b) Plausible	Female	Active	1693
c) Implausible	Female	Passive	1762
d) Implausible	Female	Active	1709
e) Plausible	Male	Passive	1740
f) Plausible	Male	Active	1687

      The fact that on sentence 2 itself, the reading times are longer following a passive than following an active suggests that in cases where no ambiguity is present, no advantage accrues to the topic as an antecedent for a pronoun.[2] Indeed, reading times for sentence 2 were shorter when the pronoun referred to the object – the focus – of the first sentence. This suggests that topic-effects must be carefully distinguished: having already established a topic in discourse through repeated mention may differ from the circumstance examined here. In the present examples, the pronoun in the second sentence may itself establish the expected topic of the discourse by virtue of establishing a relation involving an entity mentioned in the first sentence. In any case, no topic advantage is present under the conditions tested here. Failure to obtain a topic effect is also reported in Crawley (1986) under conditions where the nontopic and topic (determined by the title of a passage and by first mention) are mentioned equally often.

      Clearly, no effect of the decoy in the e- and f-forms is present. In these materials an identical second sentence occurs in all forms of an example. Nevertheless, the e- and f-forms are read just as fast as their a- and b- counterparts. Thus, as expected given the results of Experiment 2, no animacy effect is observed when it is the animacy of a decoy antecedent, rather than the animacy of the true antecedent, which is manipulated. Given the results of Experiment 3, the outcome of Experiment 2a can not be attributed to the higher ranking of the true antecedent relative to the decoy on the grammatical function hierarchy. We thus conclude that no decoy effect exists due to the presence of animate (male entity) nonantecedents.

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[2] As Simon Garrod pointed out to us, a topic effect might have been canceled out by a recent-antecedent advantage, since the study made no attempt to control this factor.

6.   Discussion of Experiments 1-3: A three-stage model

The results so far could easily be handled by a simple mechanism which incorporates the assumption that an animate antecedent for "hij" is more expected than an inanimate antecedent is, thus explaining the observed animate antecedent effect in a manner entirely compatible with other plausibility effects. In Experiment 1 perceivers may prefer an animate antecedent simply because "hij" is usually used to refer to a singular male entity. In Experiment 2, an animate antecedent for "hij" is comprehended faster than an inanimate one, but no effect of animacy occurs when the animacy of a decoy is manipulated. This suggests that the effect of animacy occurs during interpretation, not during antecedent selection. The results would not be expected if the processor immediately compared pronouns to a conceptual representation of discourse entities, matching their feature specification to that of the pronoun. This matching process would be able to account for the advantage found for pronouns referring to animate individuals (with natural gender matching the pronoun), but it also incorrectly predicts a disadvantage for pronouns with animate natural gender decoys, as in (4f) in Experiment 2a, and (6e,f) in Experiment 3.

The lack of an animacy effect for decoys thus fits best, we think, with a three stage model for comprehending sentences. At the first stage, either the linguistic representation alone or the linguistic representation and the conceptual representation is checked for grammatically permissible antecedents (Experiment 4 below addresses this issue). At the second stage, general inferences are drawn from the sentences, presumably focusing on the relation between the current sentence and prior discourse, to identify the main assertion of the speaker/author and determine which discourse entity might best satisfy the thematic role of the pronoun. Assuming the two stages converge on a discourse entity 'linked' to a grammatically permissible antecedent, a pronoun-antecedent assignment may be made. The pronoun and the antecedent may be coindexed. In the third stage, semantic interpretation of the analysis assigned may begin once the pronoun bears the index of its antecedent. It will proceed quickly under conditions where the sentence is pragmatically plausible either because the properties asserted of an individual are already expected or because a stereotypic reference mechanism is used, such as employing singular masculine pronouns to refer to singular masculine entities in the present study.

Consider how the model would account for the comprehension of the sentences in (4). In (4e,f) the pronoun "hij" will find two grammatically permissible antecedents in the first sentence: "de brief" (the letter) and either "de boekhandel" (the bookstore) in (4e) or "de vader" (the father) in (4f). The predicate "was written in a foreign language" is clearly compatible with selection of "de brief" as antecedent but not with selection of the alternative as the antecedent. Thus, in stage two, general inferences will permit "de brief" to be selected as the antecedent, allowing the pronoun and the antecedent to receive a common index. Presumably at this point semantic interpretation of the assigned index may proceed, allowing "was written in a foreign language" to be predicated of the referent of "de brief."

Stage 1 is motivated by the evidence presented here against the Conceptual Priority hypothesis. The Grammatical Priority hypothesis, which predicts that only linguistic representations are checked when the initial candidate antecedent set is established, will be tested below. Stage 2, the use of general knowledge to select the most probable antecedent, is assumed as a component process of all pronoun interpretation models. The co-indexing of pronoun and antecedent is assumed in order to guarantee consistency in the interpretation of all (and only) phrases which

may bear the same index, e.g. in "He destroyed him," "him" may not receive the same index as "he" (see below for additional examples). Once "hij" is coindexed with "de brief," "hij" may be interpreted as referring to the same entity as "de brief" allowing a new predication involving this entity to be established in the discourse representation. The plausibility or expectedness of either the referential mechanism used to identify a discourse entity or of the relation predicated of the entity will presumably influence processing times: generally processing unexpected relations takes longer than processing usual, frequent or expected ones. Our results do not place many constraints on the timing or relation between stages 1, 2 and 3 apart from that dictated by the rejection of the Conceptual Priority hypothesis, namely that the set of candidate antecedents for "hij" includes grammatically permissible linguistic antecedents even if they do not refer to male entities. In the processor's first attempt to identify an antecedent, linguistic phrases are considered among the candidate antecedents or as the only candidate antecedents. At this stage animates (male entities) receive no priority.

This interpretation of our results rests on the assumption that "hij" does indeed prefer animate antecedents, established in Experiment 1 and 2. It leaves open the question of whether it is only linguistic representations which participate in initial candidate selection. This is tested in Experiment 4. If only linguistic representations are initially considered, we would expect that form-based decoy antecedents might effectively decoy the processor even when an animate antecedent is present in the discourse model.

7.   Experiment 4

The Grammatical Priority hypothesis suggests that noun phrases with the appropriate surface syntactic form serve as candidate antecedents for a pronoun. Semantic and pragmatic information are used to choose among these antecedents. We assume that discourse antecedents in the conceptual representation of the discourse remain available throughout the discourse, though the discourse topic may be more salient than other discourse antecedents. With syntactic antecedents (NPs), however, we assume that the surface syntactic representation does not persist for too long. Perhaps it only remains for phrases in the current clause or sentence and the previous one (see Garnham et al, 1993, for supporting evidence). The precise accessibility properties of such representations is of great interest, but it is not the issue of central concern here.

Assuming that at least the syntactic form of NPs in the previous clause remain available, the Grammatical Priority hypothesis predicts that a NP with the appropriate form to be antecedent of "hij" will be identified as a candidate in examples like those in (7b) below (In the examples, the antecedent has been underlined, but never occurred underlined on the subjects' display). In examples like (7a,b) the true antecedent is the animate introduced in the first sentence.

However, according to the Grammatical Priority hypothesis (nontopic) antecedents in the conceptual representation should not be identified immediately before any form-based candidates have been attempted. Hence, in (7b) where "de jas" is a possible antecedent for "hij," a ("de"-word) decoy effect should be observed, resulting in longer reading times for the third sentence in (7b) than for the third sentence in (7a), where "het colbert" does not have the appropriate form to serve as antecedent.

(7) a. De kleren bevielen <u>de jongen</u> niet.
   'The clothes pleased the boy not.
   (The clothes didn't please the boy.)

   Het colbert was vuil.
   (The jacket was dirty.)

   Hij zag er graag verzorgd uit.
   (He/it liked to look neat.)

  b. De kleren bevielen <u>de jongen</u> niet.
   (The clothes didn't please the boy.)

   De jas was vuil.
   (The coat was dirty.)

   Hij zag er graag verzorgd uit.
   (He/it liked to look neat.)

  c. De kleren bevielen de jongen niet.
   (The clothes didn't please the boy.)

   <u>De jas</u> was vuil.
   (The coat was dirty.)

   Hij zag er ook gekreukeld uit.
   (He/it also looked creased.)

  d. De kleren bevielen de winkel niet.
   (The clothes didn't please the shop.)

   <u>De jas</u> was vuil.
   (The coat was dirty.)

   Hij zag er ook gekreukeld uit.
   (He/it also looked creased.)

By contrast to the form-based decoy effect predicted to exist in (7b), the Grammatical Priority hypothesis predicts that no conceptual-based decoy effect should exist in (7c), despite the availability of the animate discourse antecedent. To summarize, the Grammatical Priority Hypothesis predicts that the third sentence of (7b) should take longer to read than the third sentence of (7a) due to the existence of a nonantecedent with the appropriate form in (7b). However, (7c) should not take longer than (7d) since the true form-based antecedent in the c,d-sentence pair should be identified as a candidate antecedent straight off and confirmed by semantic and pragmatic information from the remainder of sentence 3.

  Materials. To test these predictions, we constructed 16 passages like those in (7) above. In the a-c-forms, the first sentence contained a human male non-subject noun phrase which served as the antecedent in (7a,b) and as the conceptual 'decoy' antecedent in (7c). In the a-form, the second sentence began with a "het" word which therefore is not a permissible antecedent for "hij." In the b-d-forms, the "het"-word was replaced by a "de"-word which could thus decoy the processor in (7b). This "de"-word served as the true antecedent for "hij" in (7c,d). The third sentence always began with "Hij." In (7a,b) the remainder of the sentence was consistent only with the male human antecedent introduced by sentence 1. In the (c,d) examples, the remainder of the third sentence was only consistent with the "de"-word in sentence 2 as the antecedent for "hij." The third sentence of (a) and

(b) were identical, and the third sentence of the (c) and (d) were identical to each other. All materials are presented in Appendix V.

Subjects. Fifty-six subjects, all native speakers of Dutch were paid for their participation. They were divided in four groups, of 13, 17, 12, and 14 subjects respectively. Once subjects below our accuracy criterion were discarded, each group contained 12 subjects.

Method. The passages were divided into four lists for presentation. The lists were counterbalanced to ensure that an equal number of each experimental form (a, b, c, or d) occurred in a list, but that no list contained more than one form of a single example. The passages were randomly mixed with 48 distractor passages. These included a set of materials that are of no relevance to the experiment here but in which the first sentence differed in plausibility (as found in a rating study), for example "In deze kamer studeert het prettig" ('In this room it is pleasant to study'), and "In deze winkel studeert het prettig" ('In this shop it is pleasant to study'). Of the 48 fillers, 32 consisted of 2-line passages, whereas the remaining 16 were 3-line passages. Thus, overall there were 50% 2-line and 50% 3-line passages. Four of the experimental passages of interest and 12 of the filler passages were followed by a one-line verification statement about the preceding text, to check for accurate comprehension. The subjects were tested alone or in pairs. The sentences were presented on a monitor in front of the subject. Each trial started with the presentation of an asterisk in center-left position on the screen, which served as a fixation point. After the subject pressed the middle button of a 3-button button box, the first sentence appeared on the screen. By pressing the button again, the second sentence appeared one line lower on the screen. If there was a third sentence to follow, this would appear after yet another button press, again one line lower on the screen. Whenever a verification statement followed, subjects were required to press the left or right button, in order to answer "wrong" or "right." Each sentence disappeared from the screen as soon as a new sentence (or statement) appeared. After the last sentence or the verification statement, a new asterisk appeared. The subject was instructed to press the middle button as soon as s/he had read and understood the sentence. It was stressed that for the verification statements, it was more important to give the right answer to be fast. After a practice series of 8 passages, the subject was presented with the 64 passages of the experiment. Because the experiment took between 10 and 15 minutes, there was no pause, although subjects were told they could take a short rest whenever there was an asterisk on the screen.

Results. Reading times per sentence and responses to the verification statements were recorded. All reading times for passages where the subjects gave a wrong answer to the statement were replaced by the subject's mean for that sentence type. All reading times beyond two standard deviations from the subject's mean were replaced by the mean itself. Eight subjects were discarded because of the high number of mistakes they made on the verification statements (four or more errors, >= 25%) or because of their high standard deviation (over 900 msec). After discarding subjects using these criteria, in each group of subjects there were exactly 12 subjects left. The reading times for the third sentence of each passage are reported in Table 4. An analysis of variance showed no differences between the four sentence forms ($F1(3,144)= 0.433$, $p>0.7$, $F2(3,45)= 0.92$, $p>0.4$). There is no reason to believe that the lack of a significant effect comes from an insensitivity of the technique used. In the subset of fillers where the plausibility of the first sentence was manipulated, a significant effect of plausibility was found, where

implausible sentences took longer to read than plausible ones ($F1(1,44)= 10.01$, $p<0.003$; $F2(1,15)= 10.5$, $p< 0.01$).

Table 4. Experiment 4. Reading times (msec) for the third sentence of each item. (For an example of the different conditions, see sentences 7a-d.)

Sentence 1	Sentence 2	RT
a) Animate NP (antecedent)	"Het" NP	1376
b) Animate NP (antecedent)	"De" NP (decoy)	1341
c) Animate NP (decoy)	"De" NP (antecedent)	1332
d) Inanimate NP	"De" NP (antecedent)	1336

Discussion. In three experiments (2,3,4) we have failed to observe a decoy effect due to the presence of an animate male entity in the conceptual representation, despite evidence of a strong animacy preference in the interpretation of "hij" (observed in Experiments 1 and 2). In Experiment 4 we do not observe faster times for the sentences with an animate antecedent for "hij" but this study was not set up appropriately to test for the effect: the animate antecedent sentences (7c,d) differ completely from the inanimate antecedent sentences (7a,b) in the crucial sentence containing the pronoun. Experiment 4 also disconfirmed the Grammatical Priority hypothesis since absolutely no indication of a ("de-word") decoy effect was observed, despite evidence of sensitivity of the experiment.

8. General Discussion

The three stage model discussed above has several virtues and can account for all of the data presented here. Since the 'animacy' effect is attributed to interpretation of an indexed pronoun, it correctly predicts that animacy of true antecedents, but not decoy antecedents, should influence comprehension times. Animate antecedents with a natural gender matching the gender of the pronoun will correspond to confirmed or plausible assignments. Animate discourse entities with a natural gender matching the gender of the pronoun will not be considered as particularly tempting antecedents if some other grammatically possible antecedent is more likely on pragmatic grounds.

This model may seem odd in permitting inferences about the individual most likely to instantiate the pronoun's thematic role to be drawn before the pronoun is indexed with a noun phrase introducing or referring to that individual. But notice that this process is no different from the interpretation of other (nonpronominal) noun phrases. Encountering a phrase like "the thief," the perceiver will presumably draw inferences using discourse and world knowledge and attempt to find the intended entity in a discourse representation. Likewise, with a pronoun, we suggest that inferencing permits the most plausible candidate entity to be identified.

Indexing the pronoun with a phrase introducing or referring to that entity will then determine whether the candidate hypothesis is consistent with other referential constraints of the sentence, as noted above. In "George saw the thief" or

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"George saw him," the index on the object noun phrase must be distinct from the index on "George." Having identified a potential index for a phrase, coindexing constraints may apply to insure that the hypothesized antecedent observes grammatical constraints and results in a licensed interpretation of the sentence fragment (Chomsky, 1981; Kamp, 1981). For example, the pronouns must not be coindexed ('coreferential') in (8a), the pronouns must necessarily be coindexed in (b), the pronoun may possibly be 'bound' by the hidden universal quantifier in (c), may not be coindexed with "which man" in (d), and possibly is coindexed with "which man" in (e).

(8)   a. He hit him.
       b. He hit himself.
       c. If someone owns a pet, then he feeds it.
       d. Which man does his mother love?
       e. Which man loves his mother?

Assuming that a linguistic search for grammatically permissible antecedents begins immediately upon sentence presentation (Cowart and Cairns, 1987) and proceeds separately but simultaneously with general inferencing, the model reconciles two apparently conflicting findings in the pronoun interpretation literature. On the one hand, interpretation of pronouns may begin immediately (Nicol, 1988; Sanford and Garrod, 1989) as evidenced, for example, by long fixation durations and short saccades when the antecedent is difficult to locate (Ehrlich and Rayner, 1983). Observable effects of form-based antecedent selection occur within 250 msec after the pronoun as evidenced by priming effects (Nicol, 1988; Coulson, 1990). On the other hand, gender-based disambiguation of pronouns influences sentence comprehension only some of the time. For example, Vonk (1984) finds it alters fixation patterns but does not decrease reading times for the clause containing the pronoun. Crawley (1986) shows that gender disambiguation eliminates topic and subject effects when one entity or potential antecedent is mentioned as often as the other, but it fails to eliminate these effects when one potential antecedent is mentioned more often than the other. This would follow if general inferencing is faster than the linguistically based coreference system when new information may be related to the existing conceptual representation, where presumably the thematic subject or 'topic' is most salient (Garrod and Sanford, 1988). When general inference mechanisms are very fast, e.g., in the case of topics, the nonlinguistic system operates quickly enough to identify a plausible candidate for indexing before a linguistically unique candidate has been identified. Hence, when a pronoun or other noun phrase must be related to the thematic subject (already established discourse topic) comprehension will be easy. When linguistic features uniquely identify an antecedent, comprehension times will be short. But when sufficient pragmatic knowledge disambiguates a pronominal assignment, or when the pronoun may refer to the topic, potential antecedents other than the true antecedent may be irrelevant. Hence, the existence of multiple possible antecedents does not necessarily inhibit processing under these circumstances.

To conclude then, our results suggest that pronominal antecedents are not identified by a reference mechanism which directly checks only for a conceptual antecedent or only for a linguistic antecedent for the pronoun. Rather general inferential processes of relating new material to old seem to occur at the same time as linguistic operations which identify permissible antecedents. The linguistic component of the system may operate without benefit of world knowledge (Cowart and Cairns, 1987). But it is not only linguistically identified antecedents which are

considered, at least in the case of cross-sentence anaphora. If a discourse entity 'linked' to a grammatically permissible antecedent is a likely candidate to instantiate the thematic role assigned to the pronoun, then an index will be assigned and this index, unless altered, will constrain semantic interpretation.

Acknowledgments

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Appendix I.

Materials for Experiment I, a sentence completion study. Beneath each sentence is an English translation in brackets.

1. De brief verrast Jan. Hij ....
    (The letter surprised Jan. He/it ...)
2. Marie ging naar Italie. Haar vader ....
    (Mary went to Italy. Her father ...)
3. Pieter maakte de keuken schoon. Hij ....
    (Peter cleaned the kitchen. He/it ...)
4. De boodschap bracht de politieman in de war. Hij ....
    (The message confused the policeman. He/it ...)
5. De buitenlanders spreken nog niet goed Nederlands. Zij ....
    (The foreigners didn't yet speak good Dutch. They ...)
6. De jas bevalt de jongen niet. Hij ....
    (The coat didn't please the boy. He ...)
7. Ino kocht een auto. Hij ....
    (Ino bought a car. He ...)
8. Pienie en ik willen naar de Grut gaan. Wij ....
    (Pienie and I want to go to "The Grut." We ...)
9. De computer kost te veel voor de advocaat. Hij ....
    (The computer cost too much for the lawyer. He/it ...)
10. Hans bakte een heel lekkere taart. Hij ....
    (Hans baked a very delicious cake. He/it ...)
11. De winkels zijn dicht. Zij ....
    (The shops are closed. They ...)
12. De tourist houdt niet van de rekening. Hij ....
    (The tourist doesn't like the bill. He/it ...)

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Appendix II.

Materials for Experiment 2a. Beneath each of the sentences is a word-by-word gloss, and a translation. In cases where the gloss and translation are identical, the gloss is omitted. Each sentence was presented to the subjects in two frames, and a "|" indicates where a frame started / ended.

1. a. Susan stuurde het boek | naar de boekhandel.
      (Susan sent the book to the bookstore.)
      Hij had | haar een verkeerd boek verkocht.
      'He(it) had her a wrong book sold.'
      (He(it) had sold her the wrong book.)
   b. Susan stuurde het boek | naar de vader.
      (Susan sent the book to the father.)
      Hij had er | al lang op zitten wachten.
      'He(it) had it-ACC already long for sit wait.'
      (He(it) had been waiting for it a long time.)
   c. Susan stuurde de brief | naar de boekhandel.
      (Susan sent the letter to the bookstore.)
      Hij had | haar een verkeerd boek verkocht.
   d. Susan stuurde de brief | naar de vader.
      (Susan sent the letter to the father.)
      Hij had er | al lang op zitten wachten.
   e. Susan stuurde de brief | naar de boekhandel.
      Hij was | in een vreemde taal geschreven.
      'He(it) was in a foreign language written.'
      (He(it) was written in a foreign language.)
   f. Susan stuurde de brief | naar de vader.
      Hij was | in een vreemde taal geschreven.

2. a. Anja gooide het colbert | naar de paal.
      (Anja threw the jacket to the post.)
      Hij stond | in een hoek van de zaal.
      (He(it) was in a corner of the hall.)
   b. Anja gooide het colbert | naar de jongen.
      (Anja threw the jacket to the boy.)
      Hij stond | in een hoek van de zaal.
   c. Anja gooide de jas | naar de paal.
      (Anja threw the coat to the post.)
      Hij stond | in een hoek van de zaal.
   d. Anja gooide de jas | naar de jongen.
      (Anja threw the coat to the boy.)
      Hij stond | in een hoek van de zaal.
   e. Anja gooide de jas | naar de paal.
      Hij was | van een ander kind.
      (He(it) was from another child.)
   f. Anja gooide de jas | naar de jongen.
      Hij was | van een ander kind.

3. a. De makelaars verhuurden het gebouw | aan de groothandel.
      (The estate agents let the building to the wholesaler.)
      Hij wil | de concurrentie voorblijven.
      'He(it) wants the business-rivals to-stay-ahead.'
      (He(it) wants to stay ahead of the business rivals.)

b.   De makelaars verhuurden het gebouw I aan de vriend.
     (The estate agents let the building to the friend.)
     Hij wil I dichter bij zijn werk wonen.
     'He(it) wants closer to his work live.'
     (He(it) wants to live closer to his work.)
c.   De makelaars verhuurden de zolder I aan de groothandel.
     (The estate agents let the attic to the wholesaler.)
     Hij wil I de concurrentie voorblijven.
d.   De makelaars verhuurden de zolder I aan de vriend.
     (The estate agents let the attic to the friend.)
     Hij wil I dichter bij zijn werk wonen.
e.   De makelaars verhuurden de zolder I aan de groothandel.
     Hij lag I in de duurste wijk van de stad.
     'He(it) laid in the most-expensive part of the town.'
     (He(it) was situated in the most expensive part of the town.)
f.   De makelaars verhuurden de zolder I aan de vriend.
     Hij lag I in de duurste wijk van de stad.

4.   a.   Anneke verkocht het brood I aan de Franse winkel.
          (Anneke sold the bread to the French shop.)
          Hij was I vlak bij haar woning.
          (He(it) was close to her house.)
     b.   Anneke verkocht het brood I aan de Franse koopman.
          (Anneke sold the bread to the French salesman.)
          Hij woonde I vlak bij haar huis.
          (He(it) lived close to her house.)
     c.   Anneke verkocht de cake I aan de Franse winkel.
          (Anneke sold the cake to the French shop.)
          Hij was I vlak bij haar woning.
     d.   Anneke verkocht de cake I aan de Franse koopman.
          (Anneke sold the cake to the French salesman.)
          Hij woonde I vlak bij haar huis.
     e.   Anneke verkocht de cake I aan de Franse winkel.
          Hij zag er I heel erg vers uit.
          'He(it) looked it-ACC very much fresh out.'
          (He(it) looked very fresh.)
     f.   Anneke verkocht de cake I aan de Franse koopman.
          Hij zag er I heel erg vers uit.

5.   a.   De eigenaars leenden het standbeeld I aan de gemeente.
          (The owners lent the statue to the council.)
          Hij organiseert I een grote tentoonstelling.
          (He(it) organises a large exhibition.)
     b.   De eigenaars leenden het standbeeld I aan de beelhouwer.
          (The owners lent the statue to the sculptor.)
          Hij organiseert I een grote tentoonstelling.
     c.   De eigenaars leenden de vaas I aan de gemeente.
          (The owners lent the vase to the council.)
          Hij organiseert I een grote tentoonstelling.
     d.   De eigenaars leenden de vaas I aan de beelhouwer.
          (The owners lent the vase to the sculptor.)
          Hij organiseert I een grote tentoonstelling.
     e.   De eigenaars leenden de vaas I aan de gemeente.
          Hij was nodig I voor een tentoonstelling.
          (He(it) was needed for an exhibition.)
     f.   De eigenaars leenden de vaas I aan de beelhouwer.
          Hij was nodig I voor een tentoonstelling.

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6.   a.   De professoren beschreven het kasteel I aan de studieclub.
          (The professors described the castle to the study club.)
          Hij bestond I uit geschiedenisstudenten.
          (He(it) consisted of history-students.)
     b.   De professoren beschreven het kasteel I aan de baron.
          (The professoren described the castle to the baron.)
          Hij was er I erg in geinteresseerd.
          'He(it) was it-ACC very in interested.'
          (He(it) was very interested.)
     c.   De professoren beschreven de gevangenis I aan de studieclub.
          (The professors described the prison to the study club.)
          Hij bestond I uit geschiedenisstudenten.
     d.   De professoren beschreven de gevangenis I aan de baron.
          (The professors described the prison to the baron.)
          Hij was er I erg in geinteresseerd.
     e.   De professoren beschreven de gevangenis I aan de studieclub.
          Hij bevond zich I midden in de stad.
          'He(it) located itself middle in the town.'
          (He(it) was in the middle of town.)
     f.   De professoren beschreven de gevangenis I aan de baron.
          Hij bevond zich I midden in de stad.

7.   a.   Ik morste het biertje I over de stoel.
          (I spilled the beer over the chair.)
          Hij werd I meteen weer schoongemaakt.
          'He(it) was immediately again cleaned.'
          (He(it) was immediately cleaned.)
     b.   Ik morste het biertje I over de barman.
          (I spilled the beer over the barman.)
          Hij werd er I gelukkig niet boos om.
          'He(it) was it-ACC fortunately not angry about.'
          (He(it) wasn't angry about it, fortunately.)
     c.   Ik morste de wijn I over de stoel.
          (I spilled the wine over the chair.)
          Hij werd I meteen weer schoongemaakt.
     d.   Ik morste de wijn I over de barman.
          (I spilled the wine over the barman.)
          Hij werd er I gelukkig niet boos om.
     e   Ik morste de wijn I over de stoel.
          Hij was I mij door een gast aangeboden.
          'He(it) was me by a guest offered.'
          (He(it) was offered to me by a guest.)
     f.   Ik morste de wijn I over de barman.
        · Hij was I mij door een gast aangeboden.

8.   a.   Anna bracht het bericht I naar de inlichtingendienst.
          (Anna brought the message to the intelligence-bureau.)
          Hij was I erg tevreden met het nieuws.
          (He(it) was very content with the news.)
     b.   Anna bracht het bericht I naar de politieman.
          (Anna brought the message to the policeman.)
          Hij was I erg tevreden met het nieuws.
     c.   Anna bracht de boodschap I naar de inlichtingendienst.
          (Anna brought the message to the intelligence bureau.)
          Hij was I erg tevreden met het nieuws.
     d.   Anna bracht de boodschap I naar de politieman.
          (Anna brought the message to the policeman.)
          Hij was I erg tevreden met het nieuws.

   e.   Anna bracht de boodschap I naar de inlichtingendienst.
Hij was I door de hoofdinspecteur gezonden.
'He(it) was by the chief-of-police sent.'
(He(it) was sent by the chief of police.)

   f.   Anna bracht de boodschap I naar de politieman.
Hij was I door de hoofdinspecteur gezonden.

9. a.   Wij declareerden het bedrag I bij de organisatie.
(We claimed the amount from the organisation.)
Hij betaalde I alleen deze maand uit.
'He(it) paid only this month out.'
(He(it) would pay us only this month.)

   b.   Wij declareerden het bedrag I bij de advocaat.
(We claimed the amount from the solicitor.)
Hij zou het I verder voor ons regelen.
'He(it) would it further for us arrange.'
(He(it) would arrange the rest for us.)

   c.   Wij declareerden de rekening I bij de organisatie.
(We claimed the bill from the organisation.)
Hij betaalde I alleen deze maand uit.

   d.   Wij declareerden de rekening I bij de advocaat.
(We claimed the bill from the solicitor.)
Hij zou het I verder voor ons regelen.

   e.   Wij declareerden de rekening I bij de organisatie.
Hij was hoger I dan we verwacht hadden.
'He(it) was higher than we expected had.'
(He(it) was higher than we expected.)

   f.   Wij declareerden de rekening I bij de advocaat.
Hij was hoger I dan we verwacht hadden.

10.a.   De zangeres droeg het zangstuk I aan de muziekschool op.
'The singer-FEM dedicated the song to the music-school on.'
(The singer-FEM dedicated the song to the music school.)
Hij speelde I een grote rol in haar carriere.
(He(it) played a large role in her carreer.)

   b.   De zangeres droeg het zangstuk I aan de directeur op.
'The singer-FEM dedicated the song to the director on.'
(The singer dedicated the song to the director.)
Hij speelde I een grote rol in haar carriere.

   c.   De zangeres droeg de opera I aan de muziekschool op.
'The singer-FEM dedicated the opera to the music-school on.'
(The singer dedicated the opera to the music school.)
Hij speelde I een grote rol in haar carriere.

   d.   De zangeres droeg de opera I aan de directeur op.
'The singer-FEM dedicated the opera to the director on.'
(The singer dedicated the opera to the director.)
Hij speelde I een grote rol in haar carriere.

   e.   De zangeres droeg de opera I aan de muziekschool op.
Hij was I door haar eigen man gecomponeerd.
'He(it) was by her own husband composed.'
(He(it) was composed by her own husband.)

   f.   De zangeres droeg de opera I aan de directeur op.
Hij was I door haar eigen man gecomponeerd.

11.a.   Wij betaalden het gebak I bij de kassa.
        'We paid the sweets at the counter.'
        (We paid for the sweets at the counter.)
        Hij had I geen wisselgeld meer.
        'He(it) had no change anymore.'
        (He(it) didn't have any change left.)
   b.   Wij betaalden het gebak I bij de kelner.
        (We paid for the sweets at the waiter).
        Hij had I geen wisselgeld meer.
   c.   Wij betaalden de taart I bij de kassa.
        (We paid for the cake at the counter.)
        Hij had I geen wisselgeld meer.
   d.   Wij betaalden de taart I bij de kelner.
        (We paid for the cake at the waiter.)
        Hij had I geen wisselgeld meer.
   e.   Wij betaalden de taart I bij de kassa.
        Hij was I lekker en heel goedkoop.
        'He(it) was tasteful and very cheap.'
        (He(it) tasted good and was very cheap.)
   f.   Wij betaalden de taart I bij de kelner.
        Hij was I lekker en heel goedkoop.

12.a.   Mevrouw Van Riemsdijk gaf het geld I aan de kerk.
        (Mrs. Van Riemsdijk gave the money to the church.)
        Hij kon I iedere cent goed gebruiken.
        'He(it) could every cent well use.'
        (He(it) could use every cent.)
   b.   Mevrouw Van Riemsdijk gaf het geld I aan de bedelaar.
        (Mrs. Van Riemsdijk gave the money to the beggar.)
        Hij kon I iedere cent goed gebruiken.
   c.   Mevrouw Van Riemsdijk gaf de gulden I aan de kerk.
        (Mrs. Van Riemsdijk gave the guilder to the church.)
        Hij kon I iedere cent goed gebruiken.
   d.   Mevrouw Van Riemsdijk gaf de gulden I aan de bedelaar.
        (Mrs. Van Riemsdijk gave the guilder to the beggar.)
        Hij kon I iedere cent goed gebruiken.
   e.   Mevrouw Van Riemsdijk gaf de gulden I aan de kerk.
        Hij kwam I uit haar eigen spaarpot.
        (He(it) came from her own piggy-bank.)
   f.   Mevrouw Van Riemsdijk gaf de gulden I aan de bedelaar.
        Hij kwam I uit haar eigen spaarpot.

13.a.   Wij vertaalden het verhaal I voor de krant.
        (We translated the story for the newspaper.)
        Hij accepteerde I het resultaat meteen.
        (He(it) accepted the result immediately.)
   b.   Wij vertaalden het verhaal I voor de neef.
        (We translated the story for the cousin.)
        Hij was heel erg blij I met onze hulp.
        'He(it) was very much happy with our help.'
        (He(it) was very happy with our help.)
   c.   Wij vertaalden de column I voor de krant.
        (We translated the column for the newspaper.)
        Hij accepteerde I het resultaat meteen.
   d.   Wij vertaalden de column I voor de neef.
        (We translated the column for the cousin.)
        Hij was heel erg blij I met onze hulp.

    e.   Wij vertaalden de column I voor de krant.
          Hij behandelde I de heel recente moord.
          'He(it) dealt-with the very recent murder.'
          (He(it) dealt with the very recent murder.)
    f.   Wij vertaalden de column I voor de neef.
          Hij behandelde I de heel recente moord.

14.a.   Juffrouw Noorddijk legde het kleingeld I naast de rekening.
          'Miss Noorddijk put the coins next-to the bill.'
          (Miss Noorddijk put the coins next to the bill.)
          Hij had I een heel verkeerd totaalbedrag.
          (He(it) had a completely wrong total-amount.)
    b.   Juffrouw Noorddijk legde het kleingeld I naast de ober.
          (Miss Noorddijk put the coins next to the waiter.)
          Hij had I het helemaal niet in de gaten.
          'He(it) had it at-all not in the notice.'
          (He(it) didn't notice it at all.)
    c.   Juffrouw Noorddijk legde de kleine fooi I naast de rekening.
          (Miss Noorddijk put the small tip next to the bill.)
          Hij had I een heel verkeerd totaalbedrag.
    d.   Juffrouw Noorddijk legde de kleine fooi I naast de ober.
          (Miss Noorddijk put the small tip next to the waiter.)
          Hij had I het helemaal niet in de gaten.
    e.   Juffrouw Noorddijk legde de kleine fooi I naast de rekening.
          Hij kwam I uit haar reserve-portemonnaie.
          (He(it) came from her spare-purse.)
    f.   Juffrouw Noorddijk legde de kleine fooi I naast de ober.
          Hij kwam I uit haar reserve-portemonnaie.

15.a.   De gastvrouw gaf het eten door I aan de andere tafel.
          'The hostess gave the food through to the other table.'
          (The hostess passed the food to the other table.)
          Hij stond I het verst van de keuken.
          (He(it) was the farthest from the kitchen.)
    b.   De gastvrouw gaf het eten door I aan de Amerikaan.
          'The hostess gave the food through to the American.'
          (The hostess passed the food to the American.)
          Hij at I het meest van allemaal.
          'He(it) ate the most from everybody.'
          (He(it) ate the most.)
    c.   De gastvrouw gaf de kaas door I aan de andere tafel.
          'The hostess gave the cheese through to the other table.'
          (The hostess passed the cheese to the other table.)
          Hij stond I het verst van de keuken.
    d.   De gastvrouw gaf de kaas door I aan de Amerikaan.
          'The hostess gave the cheese through to the American.'
          (The hostess passed the cheese to the American.)
          Hij at I het meest van allemaal.
    e.   De gastvrouw gaf de kaas door I aan de andere tafel.
          Hij was I nogal scherp van smaak.
          'He(it) was quite strong from taste.'
          (He(it) had quite a strong taste.)
    f.   De gastvrouw gaf de kaas door I aan de Amerikaan.
          Hij was I nogal scherp van smaak.

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16.a.   Het boze meisje gooide het glas | naar de deur.
        (The angry girl threw the glass at the door.)
        Hij stond open | en iedereen kon het zien.
        'He(it) stood open and everybody could it see.'
        (He(it) was ajar and everybody could see it.)
   b.   Het boze meisje gooide het glas | naar de chauffeur.
        (The angry girl threw the glass at the driver.)
        Hij was dronken | en iedereen lachtte erom.
        'He(it) was drunk and everybody laughed it-about.'
        (He(it) was drunk and everybody was laughing.)
   c.   Het boze meisje gooide de schaal | naar de deur.
        (The angry girl threw the bowl at the door.)
        Hij stond open | en iedereen kon het zien.
   d.   Het boze meisje gooide de schaal | naar de chauffeur.
        (The angry girl threw the bowl at the driver.)
        Hij was dronken | en iedereen lachtte erom.
   e   Het boze meisje gooide de schaal | naar de deur.
        Hij brak natuurlijk | in duizend stukjes.
        'He(it) broke of-course in thousand pieces.'
        (He(it) broke into a thousand pieces, of course.)
   f.   Het boze meisje gooide de schaal | naar de chauffeur.
        Hij brak natuurlijk | in duizend stukjes.

17.a.   Ik nam het nieuwe boek mee | naar de universiteit.
        (I took the new book to the university.)
        Hij is | niet ver van mijn huis.
        (He(it) is not far from my home.)
   b.   Ik nam het nieuwe boek mee | naar de docent.
        (I took the new book to the teacher.)
        Hij woont | niet ver van mijn huis.
        (He(it) lives not far from my home.)
   c.   Ik nam de nieuwe tas mee | naar de universiteit.
        (I took the new bag to the university.)
        Hij is | niet ver van mijn huis.
   d.   Ik nam de nieuwe tas mee | naar de docent.
        (I took the new bag to the teacher.)
        Hij woont | niet ver van mijn huis.
   e.   Ik nam de nieuwe tas mee | naar de universiteit.
        Hij was | blauw met rode strepen.
        (He(it) was blue with red stripes.)
   f.   Ik nam de nieuwe tas mee | naar de docent.
        Hij was | blauw met rode strepen.

18.a.   Marijke las het boek | bij de haard.
        (Marijke read the book near the fire place.)
        Hij brandde | al een hele tijd.
        'He(it) burnt already a long time.'
        (He(it) was burning for some time already.)
   b.   Marijke las het boek | bij de kok.
        (Marijke read the book near the cook.)
        Hij vond het | niet zo gezellig.
        'He(it) found it not so sociable.'
        (He(it) didn't find that very sociable.)
   c.   Marijke las de krant | bij de haard.
        (Marijke read the newspaper near the fire place.)
        Hij brandde | al een hele tijd.
   d.   Marijke las de krant | bij de kok.
        (Marijke read the newspaper near the cook.)
        Hij vond het | niet zo gezellig.

   e.   Marijke las de krant I bij de haard.
       Hij was nog I van vorige week.
       'He(it) was still from last week.'
       (He(it) was from last week.)
   f.   Marijke las de krant I bij de kok.
       Hij was nog I van vorige week.

Appendix III.

Materials for Experiment 2b. The first sentence of each passage appears with a translation below it. The (a) and (b) second sentences appear indented underneath it. Beneath each of these sentences is a word-by-word gloss, and a translation. In cases where the gloss and translation are identical, the gloss is omitted. Each sentence was presented to the subjects in two frames, and a "I" indicates where a frame started / ended.

1. Susan stuurde het boek I naar de verkoper.
   (Susan sent the book to the bookseller.)
   a. Paul had haar I een verkeerd boek verkocht.
      'Paul had her a wrong book sold.'
      (Paul had sold her the wrong book.)
   b. Paul had er I al lang op zitten wachten.
      'Paul had it-ACC already long for sit wait.'
      (Paul had been waiting for it a long time.)

2. Anja gooide het colbert I naar haar vriend.
   (Anja threw the jacket to her (boy-)friend.)
   a/b.Henk stond I in een hoek van de zaal.
      'Henk stood in a corner of the hall.'
      (Henk was in a corner of the hall.)

3. De makelaars verhuurden het gebouw I aan de ondernemer.
   (The estate agents let the building to the business man.)
   a   Dirk wil I de concurrentie voorblijven.
      'Dirk wants the business rivals to-stay-ahead.'
      (Dirk wants to stay ahead of the business rivals.)
   b. Dirk wil I dichter bij zijn werk wonen.
      'Dirk wants closer to his work live.'
      (Dirk wants to live closer to his work.)

4. a. Anneke zag haar broer I vanmiddag voorbij fietsen.
      'Anneke saw her brother this-afternoon past cycle.'
      (Anneke saw her brother cycling past this afternoon.)
      Chris was I vlak bij haar woning.
      (Chris was close to her house.)
   b. Anneke zag haar broer I regelmatig voorbij fietsen.
      'Anneke saw her brother regularly past cycle.'
      (Anneke saw her brother cycle past regularly.)
      Chris woonde I vlak bij haar woning.
      (Chris lived close to her house.)

5. De eigenaars leenden het standbeeld I aan de kunstenaar.
   (The owners lent the statue to the artist.)
   a/b.Pieter organiseert I een grote tentoonstelling.
      (Pieter organises a large exhibition.)

6. De professoren beschreven het kasteel | aan de groep.
   (The professors described the castle to the group.)
   a. De Leidse studieclub bestond | uit geschiedenisstudenten.
       (The Leiden study club consisted of history-students.)
   b. De Leidse studieclub | was er erg in geinteresseerd.
       'The Leiden study club was it-ACC very in interested.'
       (The Leiden study club was very interested in it.)

7. Ik morste het biertje | over de jongen.
   (I spilled the beer over the boy.)
   a. Het kind | werd meteen weer schoongemaakt.
       'The child was immediately again cleaned.'
       (The child was cleaned immediately.)
   b. Het kind | werd er gelukkig niet boos om.
       'The child was it-ACC fortunately not angry about.'
       (The child wasn't angry about it, fortunately.)

8. Anna bracht de boodschap | over aan de anderen.
   (Anna brought the message over to the others.)
   a/b.Hein was | erg tevreden met het nieuws.
       (Hein was very content with the news.)

9. Wij declareerden het bedrag | bij de advocaat.
   (We claimed the amount from the solicitor.)
   a   Meneer Klein betaalde | alleen deze maand uit.
       'Mr. Klein paid only this month out.'
       (Mr. Klein would pay us only this month.)
   b. Meneer Klein zou het | verder voor ons regelen.
       'Mr. Klein would it further for us arrange.'
       (Mr. Klein would arrange the rest for us.)

10.De zangeres droeg het zangstuk | aan de directeur op.
   'The singer dedicated the song to the director on.'
   (The singer-FEM dedicated the song to the director.)
   a/b.Johan speelde | een grote rol in haar carriere.
       (Johan played a large role in her career.)

11.Wij betaalden het gebak | bij de kelner.
   'We paid the sweets at the waiter.'
   (We paid for the sweets at the waiter.)
   a/b.Bart had | geen wisselgeld meer.
       'Bart had no change anymore.'
       (Bart didn't have any change left.)

12.Mevrouw van Riemsdijk gaf het geld | aan de kerk.
   (Mrs. Van Riemsdijk gave the money to the church.)
   a/b.De dominee kon | iedere cent goed gebruiken.
       'The vicar could every cent well use.'
       (The vicar could use every cent very well.)

13.Wij vertaalden het verhaal | voor de krant.
   (We translated the story for the newspaper.)
   a. Frans accepteerde | het resultaat meteen.
       (Frans accepted the result immediately.)
   b. Frans was heel erg blij | met onze hulp.
       (Frans was very happy with our help.)

14. Thea vergeleek haar berekening I met die van haar man.
    (Thea compared her calculation with that of her husband.)
    a. Josef had I een heel verkeerd totaalbedrag.
        (Josef had a completely wrong total amount.)
    b. Josef had het I helemaal niet in de gaten.
        'Josef had it at-all not in the notice.'
        (Josef didn't notice it at all.)

15. De gastvrouw gaf het eten I door aan de Amerikaan.
    'The hostess gave the food through to the American.'
    (The hostess passed the food on to the American.)
    a. Patrick stond I het verst van de keuken.
        (Patrick was the farthest from the kitchen.)
    b. Patrick at I het meest van allemaal.
        (Patrick ate the most of everyone.)

16. a. Het boze meisje gooide het glas I naar buiten.
        'The angry girl threw the glass to outside.'
        (The angry girl threw the glass outside.)
        De deur stond open I en iedereen kon het zien.
        'The door stood open and everybody could it see.'
        (The door was ajar and everybody could see it.)
    b. Het boze meisje gooide het glas I naar de man.
        (The angry girl threw the glass to the man.)
        De chauffeur was dronken I en iedereen lachtte er om.
        'The chauffeur was drunk and everyone laughed it-ACC about.'
        (The chauffeur was drunk and everyone laughed about it.)

17. Ik nam het nieuwe boek mee I naar de docente.
    'I took the new book with to the teacher-FEM.'
    (I took the new book to the teacher-FEM.)
    a. Marie is I niet ver van mijn huis.
        (Marie is not far from my home.)
    b. Marie woont I niet ver van mijn huis.
        (Marie lives not far from my home.)

18. a. Marijke las het boek I bij de schoorsteen.
        (Marijke read the book near the chimney.)
        De haard brandde I al een hele tijd.
        'The fire-place burned already a long time.'
        (The fire place was burning for some time already.)
    b. Marijke las het boek I in keuken.
        (Marijke read the book in the kitchen.)
        De kok vond I dat niet zo gezellig.
        'The cook found that not so sociable.'
        (The cook didn't find that very sociable.)

Appendix IV

Materials for Experiment 3 appear below. The second sentence for each discourse was identical for the (a-f) sentences and so is given only in the (a) examples here. Beneath each sentence is a word-by-word gloss, and a translation. In cases where the gloss and translation are identical, the gloss is omitted. Each sentence was presented to the subjects in two frames, and a "|" indicates where a frame started / ended.

1. a. Deze schotel werd | door Anna gemaakt.
        'This saucer was by Anna made.'
        (This saucer was made by Anna.)
        Hij is | erg mooi geworden.
        'He(it) is very beautiful become.'
        (He(it) turned out very well.)
    b. Anna maakte | deze schotel.
        (Anna made this saucer.)
    c. Deze tafel werd | door Anna gemaakt.
        'This table was by Anna made.'
        (This table was made by Anna.)
    d. Anna maakte | deze tafel.
        (Anna made this table.)
    e. Deze schotel werd | door Henk gemaakt.
        'This saucer was by Henk made.'
        (This saucer was made by Henk.)
    f. Henk maakte | deze schotel.
        (Henk made this saucer.)

2. a. Die presentatie werd | door de studenten gehouden.
        'That presentation was by the students held.'
        (That presentation was given by the students.)
        Hij werd | erg goed gebracht.
        'He(it) was very well brought.'
        (He(it) was very well done.)
    b. De studenten hielden | die presentatie.
        (The students gave that presentation.)
    c. Die lezing werd | door de studenten gehouden.
        'That talk was by the students held.'
        (That talk was given by the students.)
    d. De studenten hielden | die lezing.
        (The students gave that talk.)
    e. Die presentatie werd | door de student gehouden.
        'That presentation was by the student held.'
        (That presentation was given by the student.)
    f. De student hield | die presentatie.
        (The student gave that presentation.)

3. a. De keuken werd | door het meisje schoongemaakt.
        'The kitchen was by the girl clean-made.'
        (The kitchen was cleaned by the girl.)
        Hij ziet er | nu heel schoon uit.
        'He(it) looks it-ACC now very clean out.'
        (He(it) looks very clean now.)
    b. Het meisje maakte | de keuken schoon.
        'The girl made the kitchen clean.'
        (The girl cleaned the kitchen.)

    c. De klok werd | door het meisje schoongemaakt.
        'The clock was by the girl clean-made.'
        (The clock was cleaned by the girl.)
    d. Het meisje maakte | de klok schoon.
        'The girl made the klok clean.'
        (The girl cleaned the clock.)
    e. De keuken werd | door de jongen schoongemaakt.
        'The kitchen was by the boy clean-made.'
        (The kitchen was cleaned by the boy.)
    f. De jongen maakte | de keuken schoon.
        'The boy made the kitchen clean.'
        (The boy cleaned the kitchen.)

4. a. De snelle auto werd | door de moeder gereden.
        'The fast car was by the mother driven.'
        (The fast car was driven by the mother.)
        Hij was | helder geel en ziet er niet zo mooi uit.
        'He(it) was bright yellow and saw it-ACC not so nice out.'
        (He(it) was bright yellow and didn't look too nice.)
    b. De moeder reed | de snelle auto.
        (The mother drove the fast car.)
    c. De schoolbus werd | door de moeder gereden.
        'The schoolbus was by the mother driven.'
        (The school bus was driven by the mother.)
    d. De moeder reed | de schoolbus.
        (The mother drove the schoolbus.)
    e. De snelle auto werd | door de vader gereden.
        'The fast car was by the father driven.'
        (The fast car was driven by the father.)
    f. De vader reed | de snelle auto.
        (The father drove the fast car.)

5. a. De koffie werd | door de tante betaald.
        'The coffee was by the aunt paid.'
        (The coffee was paid for by the aunt.)
        Hij was | niet zo lekker.
        'He(it) was not so tasteful.'
        (He(it) didn't taste that well.)
    b. De tante betaalde | de koffie.
        'The aunt paid the coffee.'
        (The aunt paid for the coffee.)
    c. De joghurt werd | door de tante betaald.
        'The yoghurt was by the aunt paid.'
        (The yoghurt was paid for by the aunt.)
    d. De tante betaalde | de joghurt.
        'The aunt paid the yoghurt.'
        (The aunt paid for the yoghurt.)
    e. De koffie werd | door de oom betaald.
        'The coffee was by the uncle paid.'
        (The coffee was paid for by the uncle.)
    f. De oom betaalde | de coffee.
        'The uncle paid the coffee.'
        (The uncle paid for the coffee.)

6. a. De krant werd | door Anneke meegenomen.
        'The newspaper was by Anneke with-taken.'
        (The newspaper was taken by Anneke.)
        Hij is niet | van vandaag.
        (He(it) is not from today.)

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    b. Anneke nam | de krant mee.
        'Anneke took the newspaper with.'
        (Anneke took the newspaper with her.)
    c. De notitie werd | door Anneke meegenomen.
        'The notice was by Anneke with-taken.'
        (The notice was taken by Anneke.)
    d. Anneke nam | de notitie mee.
        'Anneke took the notice with.'
        (Anneke took the notice with her.)
    e. De krant werd | door Pieter meegenomen.
        'The newspaper was by Pieter with-taken.'
        (The newspaper was taken by Pieter.)
    f. Pieter nam | de krant mee.
        'Pieter took the newspaper with.'
        (Pieter took the newspaper with him.)

7. a. De kaart werd | door Rita afgehaald.
        'The card was by Rita off-taken.'
        (The card was collected by Rita.)
        Hij was | helemaal volgeschreven.
        'He(it) was completely full-written.'
        (He(it) was crammed full with text.)
    b. Rita haalde | de kaart af.
        'Rita took the card off.'
        (Rita collected the card.)
    c. De agenda werd | door Rita afgehaald.
        'The agenda was by Rita off-taken.'
        (The agenda was collected by Rita.)
    d. Rita haalde | de agenda af.
        'Rita took the agenda off.'
        (Rita collected the agenda.)
    e. De kaart werd | door Kees afgehaald.
        'The card was by Kees off-taken.'
        (The card was collected by Kees.)
    f. Kees haalde | de kaart af.
        'Kees took the card off.'
        (Kees collected the card.)

8. a. De appel werd | door Lisa opgegeten.
        'The apple was by Lisa up-eaten.'
        (The apple was eaten by Lisa.)
        Hij smaakte | een beetje zuur.
        (He(it) tasted a bit sour.)
    b. Lisa at | de appel op.
        'Lisa ate the apple up.'
        (Lisa ate the apple.)
    c. De meloen werd | door Lisa opgegeten.
        'The melon was by Lisa up-eaten.'
        (The melon was eaten by Lisa.)
    d. Lisa at | de meloen op.
        'Lisa ate the melon up.'
        (Lisa ate the melon.)
    e. De appel werd | door Toon opgegeten.
        'The apple was by Toon up-eaten.'
        (The apple was eaten by Toon.)
    f. Toon at | de appel op.
        'Toon ate the apple up.'
        (Toon ate the apple.)

9. a. De taart werd | door Ina gesneden.
    'The cake was by Ina cut.'
    (The cake was cut by Ina.)
    Hij was | in de aanbieding bij de supermarkt.
    'He(it) was in the offer at the supermarket.'
    (He(it) was on a special offer at the supermarket.)
  b. Ina sneed | de taart.
    (Ina cut the cake.)
  c. De pudding werd | door Ina gesneden.
    'The pudding was by Ina cut.'
    (The pudding was cut by Ina.)
  d. Ina sneed | de pudding.
    (Ina cut the pudding.)
  e. De taart werd | door Bart gesneden.
    'The cake was by Bart cut.'
    (The cake was cut by Bart.)
  f. Bart sneed | de taart.
    (Bart cut the cake.)

10.a. De brandweer werd | door Marie opgebeld.
    'The fire-department was by Marie up-called.'
    (The fire department was called by Marie.)
    Hij had | zijn nummer veranderd.
    'He(it) had his(its) number changed.'
    (He(it) had changed his(its) number.)
  b. Marie belde | de brandweer op.
    'Marie called the fire-department up.'
    (Marie called the fire department.)
  c. De wegenwacht werd | door Marie opgebeld.
    'The breakdown-service was by Marie up-called.'
    (The breakdown service was called by Marie.)
  d. Marie belde | de wegenwacht op.
    'Marie called the breakdown-service up.'
    (Marie called the breakdown service.)
  e. De brandweer werd | door Chris opgebeld.
    'The fire-department was by Chris up-called.'
    (The fire department was called by Chris.)
  f. Chris belde | de brandweer op.
    'Chris called the fire-department up.'
    (Chris called the fire department.)

11.a. De inleiding werd | door de vrouw geschreven.
    'The introduction was by the woman written.'
    (The introduction was written by the woman.)
    Hij werd wel | iets te lang.
    'He(it) was however bit too long.'
    (He(it) was a bit too long.)
  b. De vrouw schreef | de inleiding.
    (The woman wrote the introduction.)
  c. De brochure werd | door de vrouw geschreven.
    'The brochure was by the woman written.'
    (The brochure was written by the woman.)
  d. De vrouw schreef | de brochure.
    (The woman wrote the brochure.)
  e. De inleiding werd | door de minister geschreven.
    'The introduction was by the minister written.'
    (The introduction was written by the minister.)
  f. De minister schreef | de inleiding.
    (The minister wrote the introduction.)

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12.a. De mantel werd | door Ineke gekocht.
        'The coat was by Ineke bought.'
        (The coat was bought by Ineke.)
        Hij was | in de uitverkoop.
        (He(it) was in the sales.)
    b. Ineke kocht | de mantel.
        (Ineke bought the coat.)
    c. De broekrok werd | door Ineke gekocht.
        'The culottes were by Ineke bought.'
        (The culottes were bought by Ineke.)
    d. Ineke kocht | de broekrok.
        (Ineke bought the culottes.)
    e. De mantel werd | door Hein gekocht.
        'The coat was by Hein bought.'
        (The coat was bought by Hein.)
    f. Hein kocht | de mantel.
        (Hein bought the coat.)

13.a. De sleutel werd | door Paula gevonden.
        'The key was by Paula found.'
        (The key was found by Paula.)
        Hij lag | op het dak van de auto.
        (He(it) lay on the roof of the car.)
    b. Paula vond | de sleutel.
        (Paula found the key.)
    c. De koffer werd | door Paula gevonden.
        'The suitcase was by Paula found.'
        (The suitcase was found by Paula.)
    d. Paula vond | de koffer.
        (Paula found the suitcase.)
    e. De sleutel werd | door Hans gevonden.
        'The key was by Hein found.'
        (The key was found by Hans.)
    f. Hans vond | de sleutel.
        (Hans found the key.)

14.a. De telefoon werd alleen | door de dame gehoord.
        'The telephone was only by the lady heard.'
        (The telephone was only heard by the lady.)
        Hij stond | in de eetkamer.
        (He(it) was in the dining-room.)
    b. Alleen de dame hoorde | de telefoon.
        (Only the lady heard the telephone.)
    c. De klok werd alleen | door de dame gehoord.
        'The clock was only by the lady heard.'
        (The clock was only heard by the lady.)
    d. Alleen de dame hoorde | de klok.
        (Only the lady heard the clock.)
    e. De telefoon werd alleen | door de bezoeker gehoord.
        'The telephone was only by the visitor heard.'
        (The telephone was only heard by the visitor.)
    f. Alleen de bezoeker hoorde | de telefoon.
        (Only the visitor heard the telephone.)

15.a. De rondleiding werd | door de hostess verzorgd.
  'The guided-tour was by the hostess organised.'
  (The guided tour was organised by the hostess.)
  Hij duurde | ruim twee uur.
  (He(it) lasted over two hours.)
  b. De hostess verzorgde | de rondleiding.
  (The hostess organised the guided tour.)
  c. De wandeling werd | door de hostess verzorgd.
  'The walk was by the hostess organised.'
  (The walk was organised by the hostess.)
  d. De hostess verzorgde | de wandeling.
  (The hostess organised the walk.)
  e. De rondleiding werd | door de gids verzorgd.
  'The guided-tour was by the guide organised.'
  (The guided tour was organised by the guide.)
  f. De gids verzorgde | de rondleiding.
  (The guide organised the guided tour.)

16.a. De voorstelling werd | door Anne bezocht.
  'The performance was by Anne attended.'
  (The performance was attended by Anne.)
  Hij vond | pas laat op de avond plaats.
  'He(it) took only late in the evening place.'
  (He(it) took place only late in the evening.)
  b. Anne bezocht | de voorstelling.
  (Anne attended the performance.)
  c. De receptie werd | door Anne bezocht.
  'The reception was by Anne attended.'
  (The reception was attended by Anne.)
  d. Anne bezocht | de receptie.
  (Anne attended the reception.)
  e. De voorstelling werd | door Klaas bezocht.
  'The performance was by Klaas attended.'
  (The performance was attended by Klaas.)
  f. Klaas bezocht | de voorstelling.
  (Klaas attended the performance.)

17.a. De kat werd | door Sylvia gevolgd.
  'The cat was by Sylvia followed.'
  (The cat was followed by Sylvia.)
  Hij kwam | uit het bos.
  (He(it) came from the woods.)
  b. Sylvia volgde | de kat.
  (Sylvia followed the cat.)
  c. De slang werd | door Sylvia gevolgd.
  'The snake was by Sylvia followed.'
  (The snake was followed by Sylvia.)
  d. Sylvia volgde | de slang.
  (Sylvia followed the snake.)
  e. De kat werd | door Wim gevolgd.
  'The cat was by Wim followed.'
  (The cat was followed by Wim.)
  f. Wim volgde | de kat.
  (Wim followed the cat.)

18.a. De documentaire wordt I door Marijke bekeken.
        'The documentary was by Marijke watched.'
        (The documentary was watched by Marijke.)
        Hij gaat I over de situatie in Roemenie.
        (He(it) is about the situation in Romania.)
   b. Marijke bekeek I de documentaire.
        (Marijke watched the documentary.)
   c. De uitzending wordt I door Marijke bekeken.
        'The broadcast was by Marijke watched.'
        (The broadcast was watched by Marijke.)
   d. Marijke bekeek I de uitzending.
        (Marijke watched the broadcast.)
   e. De documentaire wordt I door Pim bekeken.
        'The documentary was by Pim watched.'
        (The documentary was watched by Pim.)
   f. Pim bekeek I de documentaire.
        (Pim watched the documentary.)

Appendix V

Materials for Experiment 4. Beneath each sentence is a word-by-word gloss, and a translation. In cases where the gloss and translation are identical, the gloss is omitted.

1. a. De kleren bevielen de jongen niet.
         'The clothes pleased the boy not.'
         (The clothes didn't please the boy.)
         Het colbert was vuil.
         (The jacket was dirty.)
         Hij zag er graag verzorgd uit.
         'He(it) looked it-ACC preferably neat out.'
         (He(it) liked to look neat.)
    b. De kleren bevielen de jongen niet.
         De jas was vuil.
         (The coat was dirty.)
         Hij zag er graag verzorgd uit.
    c. De kleren bevielen de jongen niet.
         De jas was vuil.
         Hij zag er ook gekreukeld uit.
         'He(it) saw it-ACC also creased out.'
         (He(it) also looked creased.)
    d. De kleren bevielen de winkel niet.
         'The clothes pleased the shop not.'
         (The clothes didn't please the shop.)
         De jas was vuil.
         Hij zag er ook gekreukeld uit.

2   a. De opdracht ergerde de architect.
         (The assignment irritated the architect.)
         Het gebouw was niet erg mooi.
         (The building was not very beautiful.)
         Hij had geen zin eraan te werken.
         'He(it) had no pleasure on-it to work.'
         (He(it) didn't feel like working on it.)
    b. De opdracht ergerde de architect.
         De zolder was niet erg mooi.
         (The attic was not very beautiful.)
         Hij had geen zin eraan te werken.

    c. De opdracht ergerde de architect.
       De zolder was niet erg mooi.
       Hij had een opknapbeurt nodig.
       'He(it) had a redecoration necessary.'
       (He(it) needed to be redecorated.)
    d. De opdracht ergerde het architectenbureau.
       (The assignment irritated the architectural firm.)
       De zolder was niet erg mooi.
       Hij had een opknapbeurt nodig.

3   a. De baksels bevielen de bakker niet.
       'The baking-goods pleased the baker not.'
       (De baking-goods didn't please the baker.)
       Het brood was nogal droog.
       (The bread was rather dry.)
       Hij was er niet blij mee.
       'He(it) was it-ACC not happy with.'
       (He(it) wasn't happy with it.)
    b. De baksels bevielen de bakker niet.
       De cake was nogal droog.
       (The cake was rather dry.)
       Hij was er niet blij mee.
    c. De baksels bevielen de bakker niet.
       De cake was nogal droog.
       Hij was niet zo lekker.
       'He(it) was not so tasteful.'
       (He(it) didn't taste very well.)
    d. De baksels bevielen de bakkerij niet.
       'The baking goods pleased the bakery not.'
       (De baking goods didn't please the bakery.)
       De cake was nogal droog.
       Hij was niet zo lekker.

4   a. De slechte staat van de museumstukken was een groot probleem voor de curator.
       (The bad condition of the museum-pieces was a big problem for the curator.)
       Het standbeeld was gebroken.
       (The statue was broken.)
       Hij was heel erg kwaad.
       'He(it) was very much angry.'
       (He(it) was very angry.)
    b. De slechte staat van de museumstukken was een groot probleem voor de curator.
       De vaas was gebroken.
       (The vase was broken.)
       Hij was heel erg kwaad.
    c. De slechte staat van de museumstukken was een groot probleem voor de curator.
       De vaas was gebroken.
       Hij was heel erg oud.
       'He(it) was very much old.'
       (He(it) was very old.)
    d. De slechte staat van de museumstukken was een groot probleem voor de kunstgalerij.
       (The bad condition of the museum pieces was a big problem for the art-gallery.)
       De vaas was gebroken.
       Hij was heel erg oud.

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5   a. De omgeving maakte een grote indruk op de toerist.
         (The surroundings made a big impression on the tourist.)
         Het kasteel was uit de 17e eeuw.
         (The castle was from the 17th century.)
         Hij was erg enthousiast.
         (He(it) was very enthousiastic.)
     b. De omgeving maakte een grote indruk op de toerist.
         De gevangenis was uit de 17e eeuw.
         (The prison was from the 17th century.)
         Hij was erg enthousiast.
     c. De omgeving maakte een grote indruk op de toerist.
         De gevangenis was uit de 17e eeuw.
         Hij was mooi gerestaureerd.
         (He(it) was beautifully restored.)
     d. De omgeving maakte een grote indruk op de reisvereniging.
         (The surroundings made a big impression on the travel agency.)
         De gevangenis was uit 17e eeuw.
         Hij was mooi gerestaureerd.

6   a. De dranken waren van een hogere kwaliteit dan de buitenlander verwachtte.
         (The drinks were of a higher quality than the foreigner expected.)
         Het bier smaakte erg goed.
         (The beer tasted very good.)
         Hij was onder de indruk.
         'He(it) was under the impression.'
         (He(it) was impressed.)
     b. De dranken waren van een hogere kwaliteit dan de buitenlander verwachtte.
         De wijn smaakte erg goed.
         (The wine tasted very good.)
         Hij was onder de indruk.
     c. De dranken waren van een hogere kwaliteit dan de buitenlander verwachtte.
         De wijn smaakte erg goed.
         Hij was subtiel van smaak.
         'He(it) was subtle of taste.'
         (He(it) had a subtle taste.)
     d. De dranken waren van een hogere kwaliteit dan normaal was voor deze streek.
         'The drinks were of a higher quality than normal was for this region.'
         (The drinks were of a higher quality than was normal for this region.)
         De wijn smaakte erg goed.
         Hij was subtiel van smaak.

7   a. Het nieuws bracht de politieman in de war.
         'The news brought the policeman in the confuse.'
         (The news confused the policeman.)
         Het bericht was onduidelijk.
         (The message was incomprehensible.)
         Hij had moeite het te begrijpen.
         'He(it) had problems it to understand.'
         (He(it) had problems understanding it.)
     b. Het nieuws bracht de politieman in de war.
         De boodschap was onduidelijk.
         (The message was incomprehensible.)
         Hij had moeite het te begrijpen.
     c. Het nieuws bracht de politieman in de war.
         De boodschap was onduidelijk.
         Hij was slecht geformuleerd.
         (He(it) was badly formulated.)

   d. Het nieuws bracht de inlichtingendienst in de war.
'The news brought the information-bureau in the confuse.'
(The news confused the information bureau.)
De boodschap was onduidelijk.
Hij was slecht geformuleerd.

8 a. De computer kostte te veel voor de advocaat.
(The computer cost too much for the lawyer.)
Het bedrag was ongelofelijk hoog.
(The amount was incredibly high.)
Hij was er erg door verrast.
'He(it) was it-ACC very by surprised.'
(He(it) was very surprised about it.)
  b. De computer kostte te veel voor de advocaat.
De rekening was ongelofelijk hoog.
(The bill was incredibly high.)
Hij was er erg door verrast.
  c. De computer kostte te veel voor de advocaat.
De rekening was ongelofelijk hoog.
Hij was verkeerd berekend.
(He(it) was wrongly calculated.)
  d. De computer kostte te veel voor de organisatie.
(The computer cost too much for the organisation.)
De rekening was ongelofelijk hoog.
Hij was verkeerd berekend.

9 a. Mozart was de favoriet van de directeur.
(Mozart was the favorite of the director.)
Het zangstuk was erg mooi.
(The song was especially beautiful.)
Hij was zonder twijfel tevreden.
(He(it) was without question content.)
  b. Mozart was de favoriet van de directeur.
De opera was erg mooi.
(The opera was especially beautiful.)
Hij was zonder twijfel tevreden.
  c. Mozart was de favoriet van de directeur.
De opera was erg mooi.
Hij was schitterend om te zien.
'He(it) was impressive for to watch.'
(He(it) was impressive to watch.)
  d. Mozart was de favoriet van de muziekschool.
(Mozart was the favorite of the music-school.)
De opera was erg mooi.
Hij was schitterend om te zien.

10 a. Wij betaalden bij de kelner.
'We paid at the waiter.'
(We paid the waiter.)
Het gebak was niet vers.
(The cake was not fresh.)
Hij was ook erg onbeleefd.
(He(it) was also very rude.)
  b. Wij betaalden bij de kelner.
De taart was niet vers.
(The pie was not fresh.)
Hij was ook erg onbeleefd.

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   c. Wij betaalden bij de kelner.
     De taart was niet vers.
     Hij was eergisteren gemaakt.
     'He(it) was the-day-before-yesterday made.'
     (He(it) was from the day before yesterday.)
   d. Wij betaalden bij de kassa.
     (We paid at the cashregister.)
     De taart was niet vers.
     Hij was eergisteren gemaakt.

11 a. De kinderen gaven wat aan de bedelaar.
     (The children gave something to the beggar.)
     Het geld kwam van hun oma.
     (The money came from their grandmother.)
     Hij was verzwakt door de honger.
     'He(it) was weakened by the hunger.'
     (He(it) was weak with hunger.)
   b. De kinderen gaven wat aan de bedelaar.
     De gulden kwam van hun oma.
     (The guilder came from their grandmother.)
     Hij was verzwakt door de honger.
   c. De kinderen gaven wat aan de bedelaar.
     De gulden kwam van hun oma.
     Hij werd dankbaar geaccepteerd.
     (He(it) was gratefully accepted.)
   d. De kinderen gaven wat aan de kerk.
     (The children gave something to the church.)
     De gulden kwam van hun oma.
     Hij werd dankbaar geaccepteerd.

12 a. Ik stuurde de tekst naar mijn neef.
     (I sent the text to my cousin.)
     Het verhaal ging over mijn vakantie in Polen.
     (The story was about my vacation in Poland.)
     Hij was zeer geinteresseerd.
     (He(it) was very interested.)
   b. Ik stuurde de tekst naar mijn neef.
     De column ging over mijn vakantie in Polen.
     (The column was about my vacation in Poland.)
     Hij was zeer geinteresseerd.
   c. Ik stuurde de tekst naar mijn neef.
     De column ging over mijn vakantie in Polen.
     Hij was erg interessant.
     (He(it) was very interesting.)
   d. Ik stuurde de tekst naar de krant.
     (I sent the text to the newspaper.)
     De column ging over mijn vakantie in Polen.
     Hij was erg interessant.

13 a. Mevrouw Noorddijk legde wat munten bij de kelner neer.
     'Mrs. Noorddijk put some coins near the waiter down.'
     (Mrs. Noorddijk left a few coins near the waiter.)
     Het kleingeld kwam nog niet tot twintig cent.
     'The change made yet not to twenty cents.'
     (The change totalled less than twenty cents.)
     Hij was zwaar beledigd.
     (He(it) was very insulted.)

     b. Mevrouw Noorddijk legde wat munten bij de kelner neer.
       De kleine fooi kwam nog niet tot twintig cent.
       'The small tip made yet not to twenty cents.'
       (The small tip totalled less than twenty cents.)
       Hij was zwaar beledigd.
     c. Mevrouw Noorddijk legde wat munten bij de kelner neer.
       De kleine fooi kwam nog niet tot twintig cent.
       Hij werd niet geaccepteerd.
       (He(it) was not accepted.)
     d. Mevrouw Noorddijk legde wat munten op de tafel neer.
       'Mrs. Noorddijk put some coins on the table down.'
       (Mrs. Noorddijk left a few coins on the table.)
       De kleine fooi kwam nog niet tot twintig cent.
       Hij werd niet geaccepteerd.

14 a. De meisjes beschreven de reis naar Italie aan hun vader.
       (The girls described the trip to Italy to their father.)
       Het eten was er erg lekker.
       'The food was there very tasty.'
       (The food there was very tasty.)
       Hij was niet onder de indruk.
       'He(it) was not under the impression.'
       (He(it) wasn't impressed.)
     b. De meisjes beschreven de reis naar Italie aan hun vader.
       De kaas was er erg lekker.
       'The cheese was there very tasty.'
       (The cheese there was very tasty.)
       Hij was niet onder de indruk.
     c. De meisjes beschreven de reis naar Italie aan hun vader.
       De kaas was er erg lekker.
       Hij werd van verse melk gemaakt.
       'He(it) was from fresh milk made.'
       (He(it) was made from fresh milk.)
     d. De meisjes beschreven de reis naar Italie in de schoolkrant.
       (The girls described their trip to Italy in the school-paper.)
       De kaas was er erg lekker.
       Hij werd van verse melk gemaakt.

15 a. Wij hoorden iets breken in de buurt van de kok.
       'We heard something break in the neighborhood of the chef.'
       (We heard something break near the chef.)
       Het glas was kapot.
       (The glass was broken.)
       Hij had er tegenaan gestoten.
       'He(it) had it-ACC against hit.'
       (He(it) had hit it.)
     b. Wij hoorden iets breken in de buurt van de kok.
       De schaal was kapot.
       (The bowl was broken.)
       Hij had er tegenaan gestoten.
     c. Wij hoorden iets breken in de buurt van de kok.
       De schaal was kapot.
       Hij was vol met kersen.
       (He(it) was full of cherries.)
     d. Wij hoorden iets breken in de buurt van de oven.
       'We heard something break in the neighborhood of the oven.'
       (We heard something break near the oven.)
       De schaal was kapot.
       Hij was vol met kersen.

16 a. We moesten beslist in de boekwinkel gaan kijken, volgens Jan.
        'We must really in the bookstore go look, according-to Jan.'
        (We really should have a look in the bookstore, according to Jan.)
        Maar het nieuwe boek was niet te vinden.
        'But the new book was not to find.'
        (But the new book couldn't be found.)
        Hij kon dat niet begrijpen.
        'He(it) could that not understand.'
        (He(it) couldn't understand that.)
    b. We moesten beslist in de boekwinkel gaan kijken, volgens Jan.
        Maar de nieuwe reisgids was niet te vinden.
        'But the new travel-guide was not to find.'
        (But the new travel guide couldn't be found.)
        Hij kon dat niet begrijpen.
    c. We moesten beslist in de boekwinkel gaan kijken, volgens Jan.
        Maar de nieuwe reisgids was niet te vinden.
        Hij kon wel besteld worden.
        'He(it) could however ordered become.'
        (He(it) could be ordered.)
    d. We moesten beslist in de boekwinkel gaan kijken, volgens de krant.
        'We must really in the bookstore go look, according-to the newspaper.'
        (We really should have a look in the bookstore, according to the newspaper.)
        Maar de nieuwe reisgids was niet te vinden.
        Hij kon wel besteld worden.