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# Introducing a new entity into discourse: Comprehension and Production Evidence for the Status of Dutch *er* "there" as a Higher-level Expectancy Monitor

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Abstract

This paper reports on the ways in which new entities are introduced into discourse. First, we present the evidence in support of a model of indefinite reference processing based on 3 principles: the listener's ability to make *predictive inferences* in order to decrease the unexpectedness of upcoming words, the availability to the speaker of grammatical constructions that customize predictive inferences, and the use of "expectancy monitors" to signal and facilitate the introduction of highly unpredictable entities. We provide evidence that one of these expectancy monitors in Dutch is the post-verbal variant of existential *er* (the equivalent of the unstressed existential "there" in English). In an eye-tracking experiment we demonstrate that the presence of *er* decreases the processing difficulties caused by low subject expectancy. A corpus-based regression analysis subsequently confirms that the production of *er* is determined almost exclusively by 7 parameters of low subject expectancy. Together, the comprehension and production data suggest that while existential *er* functions as an expectancy monitor in much the same way as speech disfluencies (hesitations, pauses and filled pauses), *er* is a higher-level expectancy monitor because it is available in spoken *and* written discourse and because it is produced more systematically than any disfluency.

## Introduction

Many languages mark nominal referents as either *definite* – signalling that the referent is deemed accessible to the listener – or *indefinite*, indicating that the listener is not supposed to be able to retrieve the referent. Thus, referring to a discourse referent as *the/that cat* entails that the listener can recover that entity either from the foregoing linguistic context (the previous sentences in the text or conversation, as in *There is a cat and a dog for sale, but I suggest you take* THE CAT, *because* IT *is more respectful of my furniture*), from the physical context of the speech event (as in *Don't touch* THAT CAT*!*), or from the encyclopaedic context (as in *THE BLACK CAT WHICH HAS BEEN KILLING ALL THE BIRDS IN THE NEIGHBOURHOOD has finally been put down by a vet*). In the latter case, the intended referent need not be physically proximal or recently mentioned to be predictable.

Many linguists (see especially Ariel, 1990, 2001 for a full overview) have recognized that the form of definite referring expressions is not arbitrary: through their syntactic nature, their size, and their "informativity", definite NP-types signal very precisely in which context an entity can be found, and exactly how predictable it is. Whereas pronouns (cf. *it* in the first example in the previous paragraph) typically select their antecedents in the immediately foregoing linguistic context, NP's with demonstratives (*that cat* in the second example) characteristically refer to the physical context, and long definite descriptions such as *The black cat which has been killing all the birds in the neighbourhood* in the third example, retrieve unmentioned encyclopaedic entities. On the basis of such recurrent form-function correlations, the distribution of definite referring expressions has been adequately modelled linguistically and psycholinguistically (again, see Ariel, 1990 for an overview).

Much less attention has been devoted to indefinite reference – which signals the introduction of new information into the discourse (rare exceptions are Prince, 1981 and Sedivy, Tanenhaus, Chambers, & Carlson, 1999). The underlying rationale seems to have

been that indefinite NPs do not differ in accessibility status (they all introduce new information) and, hence, that there was nothing to understand or to model about the distribution of indefinite NP's.

Yet, the following examples demonstrate that new entities need not automatically be inaccessible. No-one will deny that in spite of its contextual newness, the indefinite entity *a worm* is progressively more predictable from the context in the following passages:

(1) When Hannah opened her lunch box, she did not find her favourite peanut butter sandwiches but *a worm*.

(2) After all the large animals had left Noah's arc, there was no other creature left but *a worm*.

(3) Everything was ready for fishing: the river was close, the angling rod was unpacked, and on the hook was *a worm*.

From (1)-(3), there is a gradual increase of the discourse-conditioned predictability of *a worm*. In (1), the hearer knows little more about the italicized constituent before its actual creation than that it is must refer to an object or creature which fits in a lunch box. In (2) the context raises the expectancy of small animals prior to the creation of *a worm*, whereas (3) increases the probability of fishing bait before *a worm* (a prototypical member of that category) is encountered. Key concepts in the analysis of (1)-(3) are "contextual constraint" (Rayner & Well, 1996, p. 504), "the degree to which a sentence constrains the reader's expectations for possible completions" (Schwanenflugel, 1986, p. 363), and "predictive inferencing" (Altmann & Kamide, 1999), the view that unfolding context functions as an incremental filter which reduces the post-verbal domain of reference on the basis of semantic, syntactic, and real-world knowledge. Although these concepts represent much-investigated research traditions (cf. below), few explicit proposals have been made about whether and how natural language optimizes the processing of new entities.

In previous work (see Grondelaers, Brysbaert, Speelman, & Geeraerts, 2002), we have suggested that processing efficiency in the creation of new entities is achieved by the interplay of three principles: the listener's inclination to project predictive inferences that enhance the contextual predictability of upcoming materials, and two ways in which the listener is assisted by the speaker when making these inferences. Let us first present the available evidence (some of which was previously published in Dutch).

## Ground-work and earlier analyses

There is an impressive body of experimental evidence in support of the hypothesis that comprehenders predict upcoming materials in advance of their actual linguistic realization. Altmann & Kamide (1999; for further elaborations see Kamide, Altmann, & Haywood, 2003; Kamide, Scheepers, & Altmann, 2003) found that unfolding context functions as an incremental *filter* which reduces the domain of reference on the basis of morpho-syntactic, semantic, and real-world knowledge emanating from the verb and initially realized arguments. On the basis of ERP-data, Van Berkum, Brown, Zwitserlood, Kooijman, and Hagoort (2005) argued, likewise, that predictions about how a sentence will continue can draw upon information from any relevant domain (…), "as long as this information is made relevant or recruited by locally unfolding constraints" (2005: 462; see also Delong, Urbach, & Kutas, 2005).

This ubiquitous inclination to identify entities in advance of their actual realization is the basic principle, we argue, which is exploited in the processing of new materials. Crucially, this resource is optimized by two additional strategies. Cooperative speakers, to begin with, have at their disposal *inference-boosters*, i.e., constructions which are syntactically and pragmatically tailored to maximize predictive inferences, as is shown in the following newspaper examples:

(4) De kerk van Kinrooi wordt vanaf 6 april gerestaureerd. Voor twee kerkgangers is deze restauratie echter slecht nieuws: *in de toren huist een stel kerkuilen*.

"The church in Kinrooi will be renovated from April 6 on. For two church goers, this restoration is bad news: *in the tower reside two church owls*."

(5) Het leger ondervond grote hinder van de onophoudelijke sneeuwstorm. *In de dalen rond Galtür woedde gisteren een allesvernietigende sneeuwstorm*.

"The army was greatly hindered by the continuing snow storm. In the valleys around Galtür raged a devastating blizzard."

In locative inversion constructions such as (4)-(5), thematic, syntactic, semantic, and real-world properties of an upcoming new entity are made available by the initial adjunct and verb. In combination with the verb (which is intransitive in 97 % of all relevant cases, cf. Grondelaers, 2000), the fronted locative thematically anticipates an upcoming "located" element, which syntactically agrees with the verb, so that number information is available prior to the actual realization of the subject. In addition, the adjunct and the verb function as powerful semantic filters, for the located subject referent must fit its location (physically and conceptually), as well as the selection restrictions imposed by the verb (e.g. Grondelaers & Brysbaert, 1996, p. 291 ff.). Since, in addition, the adjunct is definite in 95 % of all relevant cases (Grondelaers, 2000) – referring the listener to a linguistically, physically, or encyclopaedically available entity – the adjunct sentence is anchored in the context, as a result of which the number of predictive inferences with respect to the subject considerably increases. The cumulative effect of these constraints is that the italicized locative inversion constructions in (4)-(5) successfully restrict their subjects to respectively the category of "wild-life which resides in church towers" (for non-expert listeners, this set will include few other members than owls) and "storms", in advance of the actual realization of these constituents. In Grondelaers, Brysbaert, Speelman, and Geeraerts (2002), corpus evidence

was cited which showed that owing to this "high-constraint" syntax and semantics, locative inversion structures are used significantly more frequently than other constructions for the introduction of new information into the discourse.

However, the adjunct-initial sentence template sometimes raises the probability of subjects (or subject sets) which seem to be at odds with the actual subject selected by the speaker:

(6) [Following the explosion of a soft drink can]

Onder mijn polsbandje zit *er* Sprite!

"Under my wristband *there* is Sprite!"

(7) [from a young girl's new year's letter]

In mijn kleine kinderhand is *er* ook een wens beland.

"In my small children's hand *there* has landed a wish".

In (6) and (7), the adjunct raises the expectancy of respectively "materials typically contained under wristbands" and "objects typically held in small children's hands", but in neither of these sentences does the actual subject fit the expected category, as a result of which its integration in the context is hindered. We argue that the listener is sensitive to cues in the speech signal which indicate that the upcoming material is less predictable than expected. One of these cues is production fluency: in general it is easier for speakers to continue a discourse topic than to shift to a new topic (Arnold, Wasow, Ginstrom, & Losongco, 2000; Arnold, Fagnano, & Tanenhaus, 2003), and listeners are known to pick up the production difficulties engendered by such shifts. More particularly, recent research has suggested that speech disfluencies – such as pauses, filled pauses (*euh, uhm*), reduplications, etc. – have a beneficial effect on the comprehension of low predictability items (see Corley & Hartsuiker, 2003 for online evidence and Fox Tree & Clark, 1997 and Clark & Fox Tree, 2002 for corpus support). Particularly relevant for this paper is visual world evidence (Barr, 2001; Arnold et

al. 2003; Arnold, Tanenhaus, Altmann, & Fagnano, 2004) which demonstrates that listeners use disfluencies as a cue that the speaker is "less likely to be referring to something recently mentioned and more likely to be referring to an entity that is discourse-new or otherwise relatively unpredictable" (Arnold et al. 2003, p. 27). However, a possible criticism against Barr (2001) and Arnold et al. (2003, 2004) is that the limited number of candidate referents artificially boosts the predictive power of disfluency (participants always know that one of two items is likely to be mentioned). In order to address this critique, Corley, MacGregor, and Donaldson (2007) designed an ERP-experiment which did not artificially restrict the set of candidate referents. Focusing on the N400, which indexes problems with integrating a word into the preceding context (because, for instance, it is unpredictable), they found that hesitations preceding unpredictable words substantially reduced the N400 effect. In order to show that differences in the N400 were associated with consequences for the way the message is represented in memory, Corley et al. (2007) conducted a surprise recognition test which demonstrated that words preceded by disfluency in the listening test were more likely to be recognized in the recognition phase. In a follow-up ERP-experiment, Collard, Corley, MacGregor, and Donaldson (2008) replicated the memory effect on the basis of the P300-component, which indexes attention (re-)orientation. The absence of a P300-effect in the condition where a disfluency preceded a predictable but phonologically incongruous target lead them to claim that the listener's attention was already engaged in response to the disfluency, as a consequence of which no further attention reorientation (indexed by the P300) could be observed. And "because more attention was paid to the subsequent material, it was more easily recognized during the surprise recognition tests in this and Corley et al.'s (2007) study. Once attention was engaged, predictive processes (…) might be affected" (Corley & Stewart, 2008, p. 12).

In previous work (Grondelaers, 2000; Grondelaers et al., 2002; Grondelaers, Speelman, & Geeraerts, in press), we have collected on- and offline data in support of the claim that the existential *er* in sentences such as (6)-(7) – the Dutch equivalent of unstressed English *there* – has a function which is closely related to the facilitating effect of disfluency on the processing of unpredictable items. Before we discuss this research, it is important to note that there is no link whatsoever between the Dutch existential *er* and disfluency. Although *er* is often used in written English to indicate speech disfluency (cf. Corley et al., 2007), in Dutch it is never used in this capacity. Instead, the expressions "uh", "uhm", "euh", or "euhm" are used (see, e.g., the conventions used by the transcribers of of the *Corpus Gesproken Nederlands* "Corpus of Spoken Dutch"; p. 4 of the "Protocol voor Orthografische Transcriptie" on http://lands.let.kun.nl/cgn/doc_Dutch/topics/version_1.0/annot/orthography/ort_prot/pdf); or have a look at how disfluency is transcribed on Dutch internet pages).

Unlike speech disfluencies, the Dutch word *er* is not a side-effect of production difficulty restricted to spoken language, but a standardized word that diachronically goes back to the deictic locative adverb *daar* "there" (the same relation holds between locative and existential *there* in English), and which indisputably forms part of the lexicon and grammar of written and spoken Dutch (all dictionnaries and grammars of Dutch devote a separate lemma to *er*, cf. Haeseryn et al. 1997). Whereas disfluency can surface anywhere in a sentence, *er* is syntactically restricted in adjunct-initial sentences such as (6)-(7) to the position immediately following the main verb. Crucially, existential *er* is in many ways incompatible with the (filled) pauses and prolongations indexed by disfluency, as a result of which *er* could never occur as a hesitation signal. Being a non-stressed cliticized function word which is phonetically reduced and affixated onto the preceding verb, *er* does not afford any extra time to the speaker to plan the production of multiple-named and/or unpredictable materials.

In spite of these intrinsic differences between *er* and disfluencies, we have argued that they are functionally related because they are "inaccessibility markers" which signal that the upcoming subject is contextually less predictable than expected as a result of insufficient or misleading predictive inferences. This view of post-verbal *er* ("there") as an inaccessibility marker diverges significantly from traditional linguistic approaches which emphasize the *non-systematic* nature of *er's* distribution. The sporadic analyses devoted to *er*'s post-verbal distribution (Van Es & Van Caspel, 1971; De Rooij, 1991; Haeseryn, Romijn, Geerts, De Rooij, & Van den Toorn, 1997) invariable take the form of a list of contexts in which *er* can be deleted ("*is weglaatbaar*") or optional (*"facultatief"*), instead of an active search for factors which motivate why *er* is inserted in certain contexts. This negative approach, we have argued elsewhere (Grondelaers & Speelman, 2007, p. 187), reflects the popular view (inspired by generative thinking) that the existential *er* is a semantically empty dummy subject (see Grondelaers & Speelman, 2007, p. 164 for references) which cannot have a function in sentences in which the first position is occupied by another constituent (in this case the locative adjunct).

Our alternative analysis of post-verbal *er* as an inaccessibility marker was sparked off by Bolinger's (1977, pp. 92-93) observation that English *there* signals insufficient contextual anticipation in adjunct-initial existential clauses. According to Bolinger, in a general account of the history of the Hawaiian islands the sentence *In the first year of Kamehameha's II's reign occurred an eruption of Mauna Loa* would not be likely without *there*, unless "eruptions or disasters were already the general topic and one more occurred", as in *Mauna Loa erupted in 1856 but things remained more or less quiet until 1862; in that year occurred two eruptions of Kilauea, destroying several villages."*

We took up this suggestion in a series of online self-paced reading experiments, in which we first manipulated the adjunct to investigate whether *er* facilitates subject processing

in the context of abstract location adjuncts, which generate too few constraining inferences with respect to the subject. The experimental data revealed a significant interaction between Adjunct Concreteness x Presence of *er* (Grondelaers & Brysbaert, 1996; Grondelaers, 2000), to the extent that *er* facilitated subject processing in the context of abstract location adjuncts, but not in the context of concrete location adjuncts. In a second series of self-paced reading experiments (Grondelaers et al., 2002), we manipulated the subject to find out whether contextually predictable subjects such as *In het uitstalraam van de juwelier lag (er) een* ***halssnoer*** "In the jeweler's shop-window (there) was a necklace" were processed faster than contextually unpredictable subjects (*In het uitstalraam van de juwelier lag (er) een* ***sandwich*** "In the jeweler's shop-window (there) was a sandwich"), and whether *er* facilitated the processing of the unpredictable materials. Both expectations were confirmed, albeit that the interaction between Subject Predictability x Presence of *er* narrowly missed significance over participants (F1 $p < .06$; F2 $p < .04$).

In what follows we will capture the commonality inherent in disfluency and post-verbal *er* by analyzing them as "expectancy monitors", i.e., cues or strategies which reduce the processing costs associated with the integration in the preceding context of unpredictable targets. In addition we will argue that *er* represents a higher-level expectancy monitor than disfluency.

Our argument runs in two steps. In the next section we first have to find reliable evidence that *er* is indeed an expectancy monitoring. While Corley et al. (2007) contains ERP-evidence which supports the expectancy monitoring-function of some disfluent fillers, the available online evidence for *er's* expectancy monitoring-function raises concern because it is entirely based on self-paced reading. Although the latter is a reliable method which has provided useful information about sentence processing, it may be nevertheless be problematic for the validation of unaccented small words such as *er.* In the self-paced reading technique

sentences are divided in segments (typically words or phrases) that are presented one by one, as in *On the beach/there/was/a boat* (whereby "/" indicates the places where the sentence is split). The difficulty with postverbal *er* is how to present it in a self-paced reading design without artificially boosting its cueing potential. If *er* is presented as a separate segment, it may receive too much emphasis given that it is a cliticized function word (phonetically affixated to the preceding verb) and given that two-letter words are usually skipped in reading (Brysbaert, Drieghe, & Vitu, 2005). Since, however, both alternative presentation options (*er* together with the preceding verb or the following noun) are linguistically and methodologically unattractive, we have opted after all for separate presentation of *er* in the self-paced reading designs in Grondelaers & Brysbaert (1996) and Grondelaers et al. (2002). As a result, it cannot be ruled out that the on-line evidence presented in these papers is valid for self-paced reading conditions but has little relevance for normal reading. Therefore, we decided to check whether our previous findings hold out in an eye-tracking experiment with normally presented sentences. An additional advantage of eye-tracking is that it enables us to examine the timeline of the effect of *er*.

## Experiment

### Method

*Participants*

Thirty-two members of the Ghent University community participated in this experiment. All participants were native speakers of Dutch and had normal or corrected-to-normal vision. They were paid 10€ for their participation.

*Materials*

We constructed 40 quartets of sentences of the type illustrated in (8)-(11), in which two variables – Subject Predictability and Presence of *er* – were orthogonally varied:

(8) Alles was in gereedheid gebracht om te gaan vissen: de rivier was nabij, de hengel lag klaar, aan de haak hing **een worm** en die zag er zo lekker uit dat zelfs de visser ervan wou proeven. (predictable subject; -*er*)

"Everything was ready to go fishing: the river was close, the angling rod was ready, on the hook was **a worm**, and the latter looked so delicious that even the fisher was inclined to have a taste."

(9) Alles was in gereedheid gebracht om te gaan vissen: de rivier was nabij, de hengel lag klaar, aan de haak hing *er* **een worm** en die zag er zo lekker uit dat zelfs de visser ervan wou proeven. (predictable subject; +*er*)

"Everything was ready to go fishing: the river was close, the angling rod was ready, on the hook was *er* **a worm**, and the latter looked so delicious that even the fisher was inclined to have a taste."

(10) Alles was in gereedheid gebracht om te gaan vissen: de rivier was nabij, de hengel lag klaar, aan de haak hing **een peer** en die zag er zo lekker uit dat zelfs de visser ervan wou proeven. (unpredictable subject; -*er*)

"Everything was ready to go fishing: the river was close, the angling rod was ready, on the hook was **a pear**, and the latter looked so delicious that even the fisher was inclined to have a taste."

(11) Alles was in gereedheid gebracht om te gaan vissen: de rivier was nabij, de hengel lag klaar, aan de haak hing *er* **een peer** en die zag er zo lekker uit dat zelfs de visser ervan wou proeven. (unpredictable subject; +*er*)

"Everything was ready to go fishing: the river was close, the angling rod was ready, on the hook was *er* **a pear**, and the latter looked so delicious that even the fisher was inclined to have a taste."

To assess the predictability of the sentence subjects we ran a cloze task, in which 22 undergraduate students from the University of Leuven (all native speakers of Dutch) were asked to complete 60 sentence fragments such as *Ze kon haar ontroering moeilijk verbergen, haar stem trilde en over haar wang liep een* _____ ("she had difficulties hiding her emotion, her voice trembled, and over her cheek flowed a _____") with the most likely noun given the context. Participants reported the intended predictable subject in 93% of the trials for the 40 sentences that were selected for the present experiment (with one stimulus from the .70-.79-range, eight stimuli from the .80-.89-range, 18 stimuli from the .90-.99-range, and 13 stimuli with a Cloze Value of 1).

The retained sentences had subjects with an absolute frequency of at least 200 in the CELEX lexical frequency database (Baayen, Piepenbrock, & Van Rijn, 1993). For these stimuli, unpredictable control subjects were selected. The unpredictable subjects had never been mentioned in the cloze task and they were matched on length (in terms of characters) and frequency ($p = 0.82$ in a two-tailed paired t-test).

In addition, unpredictable sentence subjects were carefully considered in terms of real-world plausibility, to counter the possibility that the interaction between Subject Predictability x Presence of *er* could be due to a (too) deliberate violation of the real-world properties of adjunct sentence subjects. In order to deal with this critique, all unpredictable subjects in the experiment obeyed the basic selection restrictions imposed by the verb: while unexpected in the context of fishing bait, pears *can* be suspended from fishing hooks in (10)-(11). Likewise, children can have *een mier* "an ant" on their head (instead of *een muts* "a hat"), and reading rooms of libraries can contain *een forel* "a trout", instead of *een atlas* "an atlas".

*Apparatus*

Eye movements were recorded by a Senso-Motoric Instruments (SMI Eyelink) video-based pupil tracking system. Viewing was binocular but eye movements were recorded from the right eye only. A high speed video camera was used for recording. It was positioned underneath the monitored eye and held in place by head-mounted gear. The system has a visual resolution of 20 seconds of arc. Fixation locations were sampled every 4 ms and these raw data were used to determine the different measures of oculomotor activity during reading. The display was 69 cm from the subject's eye and three characters equalled 1° of visual angle. A chin rest was used to reduce head movements during the experiment.

*Procedure.*

Before the experiment started, participants were informed that the study was about the comprehension of sentences that were displayed on a computer screen. Sentence administration was self-paced: Participants started and stopped sentence presentation by pressing on a button. Each sentence was presented as a whole. Participants were asked to read at their speed, and to answer any comprehension question that would follow the sentence. Questions, which were simple true/false statements, followed on one fourth of the trials. The participants had no difficulty answering these questions (the overall question answering accuracy rate was 96 %). The initial calibration of the eye-tracking system generally took approximately 10 min and consisted of a standard nine-point grid. Following the initial calibration the participant was given 10 practice trials to become familiar with the procedure before reading the experimental sentences. The 40 experimental sentences were embedded in a pseudo-random order in 102 filler texts. These filler texts were part of other reading experiments (cf. Drieghe, Desmet, & Brysbaert, 2007) and could either consist of a single sentence or a fragment of text. The fragments of text were always presented as a whole. Each participant was presented with one of the four possible variants of the critical text fragments

according to a Latin square design. Participants completed a single session lasting about 50 min, containing 142 text fragments to read.

*Results*

All the eye-tracking data reported in this section were recorded in the subject region of the target sentences, corresponding to the bold-faced strings in (8)-(11). In Table 1, the following measures are reported: *first fixation latency* (the first fixation in the subject region), *gaze duration* (the sum of all fixation durations in the subject region during first pass) and *total reading time* (sum of all the fixation durations in the subject region during first and consecutive passes, following regressions). The last column of Table 1 contains probability estimates for regressive saccades launched from the subject region.

Because a Latin square design was used with relatively few observations in the various cells, the group variable was included in all analyses reported below. If this is not done, the power of the design may be deflated because of random fluctuations between the participants or between the stimuli allocated to the different cells (Pollatsek & Well, 1995). All analyses were run over participants (F1-analyses) and stimulus materials (F2-analyses).

Table 1

*Subject Reading Times in ms. and Regression Probabilities (from the Subject Region) as a Function of Subject Predictability and Presence of* er

| | | Reading Time Measures | | | Regression |
|---|---|---|---|---|---|
| Subject | *Er* | First Fixation | Gaze Duration | Total Readtime | probability |
| Predictable | - | 231 | 281 | 319 | .06 |
| Predictable | + | 227 | 273 | 325 | .10 |
| Unpredictable | - | 249 | 334 | 541 | .13 |
| Unpredictable | + | 239 | 314 | 471 | .12 |

If contextual predictability is a factor which determines subject processing, we should find faster reading times for sentence subjects that match the predictive inferences projected by the adjunct and verb than for subjects which do not. This expectation was confirmed in all three measures: first fixation, $F1(1, 28) = 11.92$, $p < .01$; $F2(1, 36) = 12.60$, $p < .01$; gaze duration, $F1(1, 28) = 38.15$, $p < .001$; $F2(1, 36) = 17.16$, $p < .001$; total reading time, $F1(1, 28) = 57.47$, $p < .001$; $F2(1, 36) = 76.96$, $p < .001$. The main effect of *er*, by contrast, was not significant in first fixation ($F1(1, 28) = 2.30$, $p > .10$; $F2(1, 36) = 2.32$, $p > .10$) and marginally significant in gaze duration ($F1(1,28) = 3.13$, $p < .10$; $F2(1, 36) = 4.01$, $p = .053$). In the total reading time data, the main effect of *er* was significant by participants, while narrowly missing significance in the by-items analysis: $F1(1, 28) = 7.19$, $p < .05$; $F2(1, 36) = 3.49$, $p = .07$). The interaction between Subject Predictability x Presence of *er* was not significant for the first fixation durations (all $F$'s < 1, n. s.) or the gaze durations (all $F$'s < 1, n. s.), but it was significant for the total fixation durations [$F1(1, 28) = 7.86$ , $p < .01$; $F2(1, 36) = 5.12$, $p < .05$]. Planned comparisons show that the interaction is entirely due to the fact that whereas there is no difference between the presence or absence of *er* for the predictable condition (all $F$'s < 1, n. s.), there clearly is one for the unpredictable condition [$F1(1,28) = 9.77$, $p < .01$; $F2(1,36) = 4.90$, $p < .05$]. The data in the rightmost column indicate that unpredictable sentence subjects elicited more regressions than predictable subjects ($F1(1,31) = 5.02$, $p < .05$; $F2(1,39) = 12.98$, $p < .001$), but regression probabilities do not interact significantly with the presence of *er*. There is no main effect of *er* (all $F$'s < 1, n. s.), nor an interaction between Subject Predictability and Presence of *er* ($F1(1, 31) = 1.99$, $p > .10$; $F2(1, 39) = 1.60$, $p > .10$).

*Discussion*

The eye-tracking data confirm previous work with demonstrated that listeners make intensive use of predictive inferences made available by the foregoing context. Already within the first 250 ms, there is a difference between words that were expected on the basis of the preceding sentence context and words that were not. In addition, the data confirm the interaction reported by Grondelaers et al. (2002) between Subject Predictability x Presence of *er*: The presence of a postverbal *er* is only helpful when the sentence subject diverges from what was expected. The fact that the reported interaction was found most clearly in total reading times (a relatively late measure) is in line with the hypothesis that the presence of *er* helps with the integration of unexpected information within the context rather than with word recognition (remember that the predictable and unpredictable words were matched on length and frequency).

In our view, the processing of unpredictable materials in ongoing text can be conceived of as a three-stage process. First the new word must be identified. Second, when an integration problem is encountered the source of the incompatibility between the old and the new information is checked by regressing to earlier parts of the sentence. Finally, an attempt is made to contextualize the new information, i. e. to find a reasonable interpretation for it within the larger context. We argue that the presence of *er* reduces this costly and possibly ineffective (re-)contextualization stage, as a result of which the sentence subject receives a "de-contextualized" processing. *Er*'s facilitation, in other words, pertains to reducing the costs associated with integrating the subject in the foregoing context.

Now that we have shown that readers do indeed make use of *er* to manage the processing costs involved in the processing of unpredictable information, we can justifiably refer to it as an expectancy monitor. In the remainder of the paper we will demonstrate that *er* is a higher-level expectancy monitor than disfluency. Not only because it forms part of the lexicon and grammar of Dutch and can be deliberately selected by the speaker/writer in the

spoken *and* written register, but also because it is used *systematically* as an expectancy-monitor whereas disfluency does not exclusively index low expectancy (but also other production difficulties triggered by, for instance, long and complex words, multi-named objects, as well as "floor holding strategies", see Corley & Stewart, 2008). Next on the agenda, therefore, is a regression-based corpus investigation into the factors which trigger *er*-insertion.

## Corpus analysis

### Method

#### *Materials*

To investigate the distribution of post-verbal *er* in written Dutch, we made use of the ConDiv corpus (Grondelaers, Deygers, Van Aken, Van Den Heede, & Speelman, 2000) which contains different language registers, going from reasonably informal language to highly edited text. Informal Belgian Dutch was represented by language data attested on *UseNet* (an Internet forum on which users debate in newsgroups), whereas more formal Belgian Dutch was included in the form of newspaper materials. *Het Belang van Limburg* (HBVL) and *Het Laatste Nieuws* (HLN) are popular newspapers containing informal written Dutch, whereas *De Standaard* (STA) is a quality newspaper geared towards an educated audience (STA).

From this corpus, we extracted all tokens of the construction type on which the eye-tracking experiment was based, viz. the locative-initial template which introduces a new entity into discourse and which may or may not contain existential *er*. In order to ensure maximal compatibility between the processing and the production data, we excluded (1) so-called impersonal passives such as *Er wordt gedanst* ("there is dancing") which need not contain a subject, (2) *er*-initial sentences such as *Er staat een schoorsteen op het dak* "There

is a chimney on the roof", in which *er* is oligatory and does not contrast with its absence, and (3) subordinate clauses as *Ik weet dat op het dak er een schoorsteen staat* "I know there is a chimney on the roof", in which the verb – a major expectancy predictor (cf. infra) – follows the subject in Dutch instead of preceding it, as in the main clause. The dataset on which the eventual regression analysis was performed totalled 804 attestations (UseNet n = 146; HBVL n = 255; HLN n = 115; STA n = 288).

*Dependent and independent variables*

The dependent variable in this study is the presence or absence of *er* in the attested locative inversion-constructions. All attestations were hand-coded for eight independent variables hypothesized to affect the contextual integration of the subject. The first three of those, Adjunct Concreteness, Adjunct Topicality, and Verb Specificity, have been shown in a number of previous studies (Grondelaers, Speelman, & Geeraerts, 2002; Grondelaers & Speelman, 2007) to increase the *contextual* predictability of the subject; these factors were implemented in this study as in the cited analyses. The next four predictor variables are hypothesized to affect the subject's *intrinsic* predictability, which depends on syntactic, semantic, and real-world properties of the subject NP.

It has been suggested, first, that a referent's degree of Boundedness is among the crucial parameters of its intrinsic accessibility. Cognitive Psychology confirms the pervasiveness of the figure/ground gestalt in human perception, viz. the fact that some component of a heterogeneous visual field ("the figure") automatically and distinctively stands out from the other parts ("the ground") because of its higher visual predictability. Among the properties Reinhart (1984) and Wallace (1982), both cited in Chen (2003, pp. 46-47), list for prototypical figures are "closure" and "continuation in shape": closed areas with continuous contours are much more likely to be selected as figures. Given that the centrality

of the figure/ground gestalt is not restricted to vision, but extends to cognition (see Chen 2003, p. 44 for an overview), we coded all subjects for Boundedness, operationalized as the opposition between observations containing a mass noun subject (mass nouns such as *regen* "rain" or *vrede* "peace" can be constructed without an indefinite determiner, and they do not take a plural) and observations containing a count noun subject such as *table* "table" or *waarschuwing* "warning".

In addition, we anticipated that "inherently non-salient" entities (Deane, 1992, pp. 194-195; Taylor, 1996, pp. 219-220), that is referents which are "non-human, non-animate, non-concrete, non-manipulated, non-individuated" (Taylor, 1996, p. 220), are inherently less accessible than concrete, human, manipulated, individuated entities. All subject entities were accordingly tagged for Subject Concreteness, implemented as the distinction between "animate entities", "sharply bounded physical entities", "fuzzily bounded physical entities", and "abstract entities" (Grondelaers, 2000).

Given the well-known observation that negation blocks the introduction of new entities in discourse (Kirsner, 1979, p. 139; MacDonald & Just, 1989; Kuschert & Konieczny, 1997; Grondelaers et al. 2002), we also coded subject NP's for Subject Quantification, distinguishing between negatively quantified NP's such as *niemand* "nobody" or *geen verkeer* "no traffic" and positively quantified NP's, such as *twee meisjes* "two girls" or *iemand* "somebody".

The last intrinsic subject variable we coded was Modification, to gauge the impact of adjectival modification in the subject-NP on subject predictability. In view of the function we propose for locative inversion, it is plausible that the use of adjectival modification in the subject NP (such as *een platina ring* "a platinum band" or *een klapperend zeil* "a flapping sail") reveals the speaker's concern to facilitate the hearer's identification of the subject type as much as possible. In a sentence such as *In de slaapkamerkasten lagen bergen linnen*

*lakens* "In the bedroom cupboards lay piles of linen sheets", the adjunct and the main verb reduce the set of possible subject referents to the class of sleeping accessories contained in cupboards, but it is the qualification *linnen* which raises the expectancy of sheets. We therefore expected that modified subjects may code predictability enhancement strategies on the part of the speaker which are incompatible with expectancy monitors such as *er*.

Finally, we also entered the Language Register factor in the regression, i. e. the distinction between internet language, popular newspaper language and quality newspaper language. If it is context which determines the expectancy of upcoming words, then "context quality" may be a pivotal variable. Whereas formal newspaper language can be carefully planned and edited to *maximize* contextual access into new materials (for instance through appropriate lexical choices), the internet materials included in the analysis represent a comparatively messy data source featuring a fragmentary context interspersed with abundant quoting from previous messages for the sake of clarity (unexperienced usenetters often report great trouble following the argument). The fact that usenetters cannot rely on context as much as in newspapers is compensated by a significantly higher number of explicit "stage directions": participants are continuously asked to scroll back to (much) earlier submissions for topic background or reference resolution (Grondelaers et al. ,2000).

*Procedure and results*

The corpus data were analyzed with a stepwise forward logistic regression (which selects and orders factors as a function of their contribution to model fit). This retained the factors listed in table 2; the order of the factors mirrors the order of selection by the stepwise regression. All factors were statistically significant determinants of *er*-production, except for Subject Quantification, which narrowly missed significance ($p = 0.065$). The fitted model accounted significantly better for the observed frequencies of *er* than an intercept only model

(unexplained variance in the intercept only model, -2 log likelihood = 1016.443; unexplained variance in the fitted model, -2 log likelihood = 615.6114; improvement of the fitted model, chi-square = 400.83; df = 6; $p < 0.0001$). The fitted model correctly predicted *er*-production in 682 out of the 804 attestations, which amounts to a success rate of 85 % (the success rate of the intercept-only model was 67 %).

Table 2

*Forward stepwise regression model with p-values and Odds Ratios for 6 determinants of the distribution of* er *in locative-initial existential sentences*

| | P | O.R. |
|---|---|---|
| Verbal Specificity | 0.000 | 7.302 |
| Adjunct Newness | 0.000 | 1.653 |
| Register | 0.000 | 1.914 |
| Subject Boundedness | 0.002 | 2.19 |
| Adjunct Concreteness | 0.004 | 1.396 |
| Subject Quantification | 0.065 | 1.926 |

*Discussion*

The regression analysis demonstrates that a model which contains six parameters of low subject predictability correctly predicts the distribution of *er* in up to 85 % of the locative inversion attestations in the dataset. In these sentences *er* is less likely with a specific verb, an adjunct that has been mentioned before and/or that is concrete, a more formal text, and a bounded and/or positively quantified subject. This predictive success confirms that *er* is produced systematically in contexts where the sentence subject is relatively unpredictable.

The Odds Ratios in table 2, which reflect the relative importance of each factor's impact on the variation at issue, reveal that the choice of a taxonomically vague verb is the major determinant of low subject predictability (and, hence, *er*-insertion). The Odds Ratio of "7.302" for Verbal Specificity indicates that the odds for *er*-insertion increase 7.302 times

with decreasing taxonomical specificity of the verb. While the analysis confirms the significance and impact of the previously tested contextual factors Adjunct Concreteness, Adjunct Newness, and Verbal specificity, it retains only two subject factors, namely Subject Boundedness and Subject Quantification. No effect was found of Subject Modification or Subject Concreteness. It appears that a subject's intrinsic accessibility is not determined by the "domain" (concrete or abstract, cf. Langacker 1990, p. 61 ff.) against which it is characterized, but by its degree of boundedness in that domain ("bounding" is used here in the technical sense of Langacker 1990, p. 63 ff.). Count nouns such as *cirkel* "circle" and *cylinder* "cylinder", which select bounded regions in two- and three-dimensional space respectively, are inherently more accessible than mass nouns such as *milk* or *peace*.

## General discussion

In this paper we set out to present a model of how new entities coded by indefinite noun phrases are introduced in discourse. Whereas the introduction and coding of new information has attracted much less theoretical attention than the distribution of definite determiners, we have shown that both can be modelled along similar lines because in definite as well as indefinite reference, speakers and listeners assist and support eachother. While the listener/reader uses the unfolding text/conversation to make predictive inferences about upcoming materials (so that new information can be integrated more easily), the speaker helps the listener/reader by using a conventionalized grammatical format which has an adjunct (*On the hook*, *In the cupboard*) and (especially in Dutch) a specific verb in first and second position which strongly constrain the range of possible continuations. This helps the listener to predict new information and to integrate it in the existing context.

In addition, the listener is sensitive to cues in the signal which indicate that upcoming materials are incompatible with those whose expectancy was raised contextually. The

presence of disfluencies – hesitations or filled hesitations –, for instance, may inform the listener that the speaker is experiencing production difficulties as a result of the low expectancy of a continuation (although, of course, it can also index other production problems). In this paper, we have presented evidence that the post-verbal variant of existential *er* represents a higher-level expectancy marker in Dutch which has the advantage that it can be used in spoken *and* written discourse.

In Experiment 1, we demonstrated that readers make use of *er* to streamline the processing of unexpected sentence subjects. In particular, we argued that the presence of *er* signals that no integration effort should be made (yet). Crucially, the presence of *er* does not seem to affect the recognition of the word target word itself. This would have been the case if we had found clear effects of *er* on early eye movement measures (such as the first fixation duration), and/or if we had found that the presence of *er* interferes with the recognition of expected words. The latter could have been the case had the presence of *er* inhibited the activation level of words in line with the unfolding sentence context.

Next, we demonstrated that *er* is a valid expectancy monitor in written texts because variables which affect the predictability of the subject in a sentence also predict whether or not a post-verbal *er* will be included in the sentence. This, in turn, proves that *er*-use is motivated and systematic, which goes against the standard view (as expressed in the Standard Grammar of Dutch; Haeseryn et al. 1997) that the distribution of *er* cannot adequately be predicted.

It should be noted in this respect that the data reported here are not only relevant for our understanding of indefinite reference. They also contribute to the "audience-design" debate which figures prominently in current experimental work. Does the fact that *er* is systematically inserted in contexts in which it is most needed entail that it is produced by the speaker with specific intent to inform the addressee? While there is some evidence for such

audience-design in the literature (Lockridge & Brennan, 2002; Metzing & Brennan, 2003; Haywood, Pickering & Branigan, 2005), most authors converge on the view that speakers do *not* consider their addressees' needs during language production (see Ferreira & Dell, 2000 and especially Kraljic & Brennan, 2005). The most explicit account of what constitutes valid evidence for audience-design is the three criterion-approach pioneered in Brennan & Williams (2005) but applied most explicitly in Kraljic & Brennan's (2005) study of the distribution of prosodic cues in potentially ambiguous sentences. Kraljic & Brennan (2005: 196-197) argue that in order to be responsive to the needs of an addressee in spontaneous spoken dialogue, cues must be (1) "produced reliably and spontaneously by speakers in dialogue", (2) "interpretable by addressees", and (3), "vary depending on speakers' intentions in the situation or toward addressees". Although neither the processing nor the production evidence cited in this paper pertains to spontaneous dialogue (but see Grondelaers, Speelman, & Geeraerts, 2003 for converging evidence on the basis of dialogue data), these criteria are arguably valid for detecting audience design in non-interactive language materials. Observe first that there is no reason to question the spontaneity and reliability of *er*-production in the written materials included in the analysis. In contrast to online internet dialogue (the "chat" materials which also form part of the ConDiv-corpus), there is no production pressure in UseNet which could affect the frequency with which *er* is used (Grondelaers, Speelman, & Geeraerts, 2002). In addition, no materials were included from newspapers which testified to have editing policies or style sheets for journalists with directions on how to use *er*. Second, and more importantly, the eye-tracking data indicate that addressees make use of post-verbal *er* to facilitate contextual integration of low-expectancy subjects. Third, the regression analysis confirms that *er* is systematically produced in those contexts in which it is picked up as an expectancy monitor, i.e., contexts which reduce the expectancy of upcoming subjects.

Although these data would seem to suggest that *er*'s distribution is audience-designed, carefully designed experimental evidence – involving speech and text production in various registers and conditions – is needed to exclude the possibility that what is easiest for the addressee to understand may also turn out to be what is easiest for the speaker to say "because speakers and addressees happen to share the same environment and because there is parallelism between the human production and comprehension systems" (Kraljic & Brennan, 2005, p. 196).

Pending such evidence, we will refrain from any definitive claims beyond the production and processing of *er* as an expectancy monitor. What we hope to have shown in this paper is that the latter can be modelled, just like indefinite reference, which was also thought to be beyond systematic investigation. We also hope to have shown that substantial progress can be made in our understanding of sentence processing by investigating expectancy monitors. Speech disfluencies and existential *er* in Dutch need not be the only ones.

## References

Altmann, G. T. M., & Kamide, Y. (1999). Incremental interpretation at verbs: Restricting the domain of subsequent reference. *Cognition, 73,* 247-264.

Ariel, M. (1990). *Accessing noun-phrase antecedents*. London & New York: Routledge.

Ariel, M. (2001). Predictability theory: An overview. In T. Sanders, J. Schilperoord, & W. Spooren (Eds.), *Text representation: Linguistic and psycholinguistic aspects* (pp. 29-89). Amsterdam & Philadelphia: Benjamins.

Arnold, J. E., Fagnano, M., & Tanenhaus, M. K. (2003). Disfluencies signal theee, um, new information. *Journal of Psycholinguistic Research, 32,* 25-36.

Arnold, J. E., Tanenhaus, M. K., Altmann, R. J., & Fagnano, M. (2004). The old and thee, uh, new: Disfluency and reference resolution. *Psychological Science, 15,* 578-582.

Arnold, J. E., Wasow, T, Ginstrom, R., & Losongco, T. (2000). Heaviness vs. newness: The effects of structural complexity and discourse status on constituent ordering. *Language, 76,* 28-55.

Barr, D. J. (2001). Trouble in mind: Paralinguistic indices of effort and uncertainty in communication. In C. Cavé, I. Guaïtella, & S. Santi (Eds.), *Oralité et gestualité: Interactions et comportements multimodaux dans la communication* (pp. 597–600). Paris: L'Harmattan.

Baayen, R. H., Piepenbrock, R., Van Rijn, H. (1993). *The CELEX Lexical Database (Release 1) [CD-ROM]*. Philadelphia: Linguistic Data Consortium, University of Pennsylvania.

Bolinger, D. (1977). *Meaning and form*. London: Longman.

Brennan, S. E. & Williams, M. (1995). The feeling of another' knowing: Prosody and filled pauses as cues to listeners about the metacognitive states of speakers. *Journal of Memory and Language, 34,* 383-398.

Brysbaert, M., Drieghe, D., & Vitu, F. (2005). Word skipping: Implications for theories of eye movement control in reading. In G. Underwood (Ed.), *Cognitive processes in eye guidance* (pp. 53-77). Oxford: Oxford University Press.

Chen, R. (2003). *English inversion. A ground-before-figure construction*. Berlin: Mouton de Gruyter.

Clark, H. H., & Fox Tree, J. E. (2002). Using *uh* and *um* in spontaneous speaking. *Cognition, 84,* 73-111.

Collard, P., Corley, M., MacGregor, L. J., & Donaldson, D. I. (2008). Attention orienting effects of hesitations in speech: Evidence from ERPs. *Journal of Experimental Psychology: Learning, Memory and Cognition, 34,* 696-702.

Corley, M., MacGregor, L. J., & Donaldson, D. I. (2007). It's the way that you, er, say it: Hesitations in speech affect language comprehension. *Cognition, 105,* 658-668

Corley, M., & Hartsuiker, R. (2003). Hesitation in speech can ... um ... help a listener understand. Proceedings of the Cognitive Science Society.

Corley, M., & Stewart, O. W. (2008). Hesitation disfluencies in spontaneous speech. *Language and Linguistics Compass, 4,* 589-602.

Deane, P. D. (1992). *Grammar in mind and brain. Explorations in cognitive syntax*. Berlin: Mouton de Gruyter.

Delong, K. A., Urbach, T. P., & Kutas, M. (2005). Probabilistic word pre-activation during language comprehension inferred from electrical brain activity. *Nature Neuroscience, 8,* 1117-1121.

De Rooij, J. (1991). Regionale variatie in het gebruik van er III. *Taal en Tongval, 43,* 113-136.

Drieghe, D., Brysbaert, M., Desmet, T., De Baecke, C. (2004). Word skipping in reading: On the interplay of linguistic and visual factors. *European Journal of Cognitive Psychology, 16,* 79-103.

Drieghe, D., Desmet, T., & Brysbaert, M. (2007). How important are linguistic factors in word skipping during reading? *British Journal of Psychology, 98,* 157 - 171.

Ferreira, V. S., & Dell, G. S. (2000). Effect of ambiguity and lexical availability on syntactic and lexical production. *Cognitive Psychology, 40,* 296-340.

Fox Tree, J. E., & Clark, H. H. (1997). Pronouncing “the” as “thee” to signal problems in speaking. *Cognition, 62,* 151-167.

Fox Tree, J. E. (2001). Listeners’ uses of *um* and *uh* in speech comprehension. *Memory & Cognition, 29,* 320-326.

Grondelaers, S. (2000). *De distributie van niet-anaforisch* er *buiten de eerste zinsplaats. Sociolexicologische, functionele en psycholinguïstische aspecten van* er*'s status als presentatief signaal.* Unpublished doctoral dissertation, University of Leuven, Belgium.

Grondelaers, S., & Brysbaert, M. (1996). De distributie van het presentatieve *er* buiten de eerste zinsplaats. *Nederlandse Taalkunde, 1,* 280-305.

Grondelaers, S., Brysbaert, M., Speelman, D., Geeraerts, D. (2002). *Er* als accessibility marker: On- en offline evidentie voor een procedurele interpretatie van presentatieve zinnen. *Gramma/TTT, 9,* 1-22.

Grondelaers, S., Deygers, K., Van Aken, H., Van den Heede, V., & Speelman, D. (2000). Het CONDIV-corpus geschreven Nederlands. *Nederlandse Taalkunde, 5,* 356-363.

Grondelaers, S., & Speelman, D. (2007). A variationist account of constituent ordering in presentative sentences in Belgian Dutch. *Corpus Linguistics and Linguistic Theory, 3,* 161-193.

Grondelaers, S., Speelman, D., & Geeraerts, D. (2002). Regressing on *er*. Statistical analysis of texts and language variation. In A. Morin & P. Sébillot (Eds.), *6ièmes Journées internationales d'Analyse statistique des Données Textuelles — 6th International Conference on Textual Data Statistical Analysis* (pp. 335-346). Rennes: Institut National de Recherche en Informatique et en Automatique.

Grondelaers, S., Speelman, D., & Geeraerts, D. (2003, May). *De distributie van* er *in het gesproken Nederlands.* Paper presented at the workshop Spraakmakende Spraak (Corpus Gesproken Nederlands), Nijmegen, The Netherlands.

Grondelaers, S., Speelman, D., & Geeraerts, D. (2008). National variation in the use of *er* "there". Regional and diachronic constraints on cognitive explanations. In G.

Kristiansen & R. Dirven (Eds.), *Cognitive sociolinguistics: Language variation, cultural models, social systems* (pp. 153-204). Berlin: Mouton de Gruyter.

Haeseryn, W., Romijn, K., Geerts, G., De Rooij, J. & Van den Toorn, M. C. (1997). *Algemene Nederlandse Spraakkunst*. Groningen & Deurne: Martinus Nijhoff – Wolters Plantyn.

Haywood, S. L., Pickering, M. J., & Branigan, H. (2005). Do speakers avoid ambiguity during dialogue? *Psychological Science, 16,* 362-366.

Hyönä, J. (1993). Effects of thematic and lexical priming on readers' eye movements. *Scandinavian Journal of Psychology, 34,* 293-304.

Kamide, Y., Altmann, G. T. M., & Haywood, S. L. (2003). The time-course of prediction in incremental sentence processing: Evidence from anticipatory eye movement. *Journal of Memory and Language, 49,* 133-156.

Kamide, Y., Scheepers, C., & Altmann, G. T. M. (2003). Integration of syntactic and semantic information in predictive processing: Cross-linguistic evidence from German and English. *Journal of Psycholinguistic Research, 32,* 37-55.

Kirsner, R. S. (1979). *The problem of existential sentences in Modern Dutch*. Amsterdam : North Holland Publishing Company.

Kraljic, T., & Brennan, S. E. (2005). Prosodic disambiguation of syntactic structure : For the speaker or for the addressee? *Cognitive Psychology, 50,* 194-231.

Kuschert, S., & Koniecsny, L. (1997, September). *You don't have no chance. Use it. Predictability of double-negated referents.* Paper presented at the Architecture and Mechanisms of Language Processing conference, Edinburgh, Scotland.

Langacker, R. W. (1990). *Concept, image, and symbol. The cognitive basis of grammar*. Berlin: Mouton de Gruyter.

Lockridge, C., & Brennan, S. E. (2002). Addressees' needs influence speakers' early syntactic choices. *Psychonomic Bulletin & Review, 9,* 550-557.

MacDonald, M. C., & Just, P. (1989). Changes in activation levels with negation. *Journal of Experimental Psychology: Learning, Memory and Cognition, 15,* 633-642.

Metzing, C., & Brennan, S. E. (2003). When conceptual paths are broken: Partner-specific effects on the comprehension of referring expressions. *Journal of Memory and Language, 49,* 201-213.

Pollatsek, A., & Well, A. D. (1995). On the use of counterbalanced designs in cognitive research: A suggestion for a better and more powerful analysis. *Journal of Experimental Psychology: Learning, Memory and Cognition, 21,* 785-794.

Prince, E. (1981). Towards a taxonomy of given-new information. In P. Cole (Ed.), *Radical pragmatics* (pp. 223-255). New York: Academic.

Rayner, K., & Well, A. (1996). Effects of contextual constraint on eye movements in reading: A further examination. *Psychonomic Bulletin & Review, 3,* 504-509.

Reinhart, T. (1984). Principles of gestalt perception in the temporal organization of narrative text. *Linguistics, 22,* 779-809.

Schwanenflugel, P. J. (1986). Completion norms for final words of sentences using a multiple production measure. *Behavior Research Methods, Instruments, & Computers, 18,* 363-371.

Sedivy, J. C., Tanenhaus, M. K., Chambers, C. G, & Carlson, G. N. (1999). Achieving incremental semantic interpretation through contextual representation. *Cognition, 71,* 109-147.

Taylor, J. (1996). *Possessives in English. An exploration in cognitive grammar*. Oxford: Clarendon.

Van Berkum, J. J. A., Brown, C. M., Zwitserlood, P., Kooijman, V., & Hagoort, P. (2005). Anticipating upcoming words in discourse: Evidence from ERPs and reading times. *Journal of Experimental Psychology: Learning, Memory, & Cognition* 31, 443-467.

Van Es, G. A., & Van Caspel, P. P. J. (1971). *De patronen van de zinspotente groepen; grondtype A en zijn varianten II. Publicaties van het archief voor de Nederlandse syntaxis*. Groningen: Rijksuniversiteit.

Wallace, S. (1982). Figure and ground: The interrelationships of linguistic categories. In P. Hopper (Ed.), *Tense-aspect: Between semantics and pragmatics* (pp. 201-223). Amsterdam: Benjamins.