

The influence of information structure on lexical activation in British English

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Previous psycholinguistic studies demonstrated that focus leads to numerous processing advantages (Benatar & Clifton 2014, Birch & Rayner 2010). In the present study, we aimed to investigate the lexico-semantic activation of focused material. Our experiment employed an adaptation of the word change-detection paradigm (Ward & Sturt 2007), in which the properties of focus and change (i.e., semantic synonyms) were manipulated. It is a central claim of Information structure theory that focus denotes the existence of alternatives (Rooth 1985). We observed a tendency of the changed words introduced in focus to elicit faster reaction times. We regard our results as experimental evidence of this claim and we propose that the present results support the idea that focus activates alternatives. When a word is introduced in focus, the focus feature activates alternative items, which elicit faster reaction times for the changed items. Similar results were obtained in two recent lexical decision task studies (Braun & Tagliapietra 2010; Husband & Ferreira 2015).

1 Introduction

The present study investigated the influence of linguistic focus on lexical activation in sentence reading in order to yield insights into the processing benefits of focus. Previous psycholinguistic studies demonstrated that focus leads to enhanced lexical activation. These studies concluded that the same word is activated differently when in a focused than when in a not-focused position (Ward & Sturt 2007; Benatar & Clifton 2014, Birch & Rayner 2010). Ward and Sturt

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(2007) employed a word change-detection paradigm (CDP) to examine how readers detect lexical alterations (*backpack* – *rucksack*) in focused and not-focused positions. The CDP has been employed to investigate lexical activation in sentence reading. In this paradigm, participants read an almost identical passage twice (i.e., one word is changed in the second reading) and try to identify the changed word. Ward and Sturt (2007) found that changes of focused words resulted in a processing slow-down. Readers in their experiment were more likely to detect the fact that the word *rucksack* was replaced by the word *backpack* later in the story, if the word *rucksack* was initially introduced in a focused position. One methodological caveat is that readers were explicitly instructed to detect word-changes. In addition, the experimental stimuli in Ward and Sturt (2007) raise concerns over their adequacy in capturing the distinction between focused and not-focused material. This study partially replicates the research by Ward and Sturt (2007) but departed from the original methodology.

We aimed to examine whether the effect of enhanced lexical activation would be observed in uninstructed sentence reading with more appropriate stimuli. Eighteen British native participants completed a self-paced reading task, in which the properties of focus (focused versus not-focused) and change (changed versus unchanged) were manipulated. Our results did not confirm the predictions from Ward and Sturt, which arguably reflects differences in experimental design and the involvement of non-linguistic cognitive functions, such as attention or working memory.

Relevantly, our study delivered an unexpected result, namely, a tendency of the changed words in focus to receive a processing privilege, rather than the hypothesized processing slow-down. This result rendered our original assumptions incorrect and lead us to reassess our testing paradigm and propose the *Alternatives' hypothesis*. We postulate that reaction times of Changed focused words (*backpack* – *rucksack*) are shorter because focused words (*backpack*) activate lexical alternatives (*luggage*, *valet*, ***backpack***). Most reasonable avenues for future research that could conclusively confirm our hypothesis and contribute to current understanding of linguistic focus are introduced.

2. Background

2.1 Information structure and processing

Information structure is a study of the manner in which information is structured and packaged in utterances in order to reflect communicative aims of speakers (Krifka 2008; Lambrecht 1994). A structure in focus denotes the existence of alternatives, is often new to discourse and not part of the common ground (Krifka 2008). In psycholinguistics, a broader definition of focus is operationalized (Birch

& Rayner 1997), with focus used to refer to the most prominent and usually new information (Halliday 1967).

2.1.1 *Processing benefits of focus*

Three decades of offline studies examined processing benefits associated with linguistic focus, such as faster retrieval of focused material (Birch & Garnsey 1995), inference facilitation (Gergely 1992), enhanced memory of focused material (Birch & Garsney 1995), or the *Moses illusion* detection (Bredart & Modolo 1988).¹ Offline methods provide information about the post-task interpretation of linguistic material but conceal moment-by-moment processing (Paterson, Liversedge, Filik, Juhasz, White & Rayner 2007).

In recent years, a breadth of online methodologies has been used in the investigation of processing benefits associated with linguistic focus. These studies examined the effect of focus on parsing processes (Filik, Paterson & Liversedge 2005; Liversedge, Paterson & Clayes 2002; Ni, Crain & Shankweiler 1996) or anaphora resolution (Almor & Eimas 2008) and attested that online methods contribute to the field of information structure. For instance, studies observed that focus sensitive particles facilitate syntactic parsing in syntactically ambiguous sentences under specific circumstances (for a review see Filik, Paterson & Sauermann 2011 or Bornkessel-Schlesewsky & Schumacher 2016). However, the development of appropriate stimuli and the choice of testing paradigms have proven difficult as it remains ambitious to isolate the effects of linguistic focus from other lexical, semantic or syntactic processes (Filik, Paterson & Sauermann 2011).

2.1.2 *Lexical processing of focused words*

Several studies have investigated how the status of focus influences lexical processing of single words (for a review, see Filik et al. 2011). Initial studies examined eye movements when participants read the same word (i.e., *suburb*) in focused and not-focused position (e.g. Birch & Rayner 1997). Consecutive studies have attempted to replicate and improve the stimuli, as it became apparent that the position of the word in the sentence had an influence on its processing, such that reading times of words decrease as the sentence progresses (Birch & Rayner 2010, Benatar & Clifton 2014; Lowder & Gordon 2015). Studies in this field have

¹ The semantic illusion often referred to as *Moses illusion* refers to the tendency of participants to answer the question “How many animals of each type did Moses bring onto the ark?” with “Two” (not detecting the Moses/Noah anomaly). Off-line experiments demonstrated that linguistic focus (i.e., clefts: “It was Moses who brought animals onto the ark”) successfully manipulated the answers provided by speakers and lead to a higher detection of the semantic anomaly (Bredart & Modolo 1988). Authors concluded that the IS status of the word *Moses* played a role in the depth of processing.

investigated whether words in focus are read faster or slower than words that are not in focus. There is currently no consensus as to the total reading time influence of focus (for a recent review, see Lowder & Gordon 2015). The remainder of this chapter is devoted to a detailed evaluation of one of the testing paradigms, the change-detection paradigm.

2.2 *Change-detection paradigm (CDP)*

The change-detection paradigm is one of the methods employed to investigate lexical processing of focused material. Having originated in the visual perception field, it was later adapted by Sanford and Sturt (2002) to investigate how readers detect a change of the previously presented material in written language. In this type of experiment, the participant is informed that she will read two identical text passages, but in the second passage some linguistic feature (depending on the exact research question) may be changed. After the second passage, the participant is asked whether any change occurred. Several studies examined whether linguistic focus leads to higher rates of detection of changed words (Ward & Sturt 2007). Ward and Sturt (2007) wanted to investigate how linguistic focus influences memory representation and retrieval. The aim of this study was to correlate the offline change detection to the eye movement patterns in reading.

2.2.1 *Ward and Sturt (2007): Focus and memory*

Researchers manipulated focus in the stimuli in such a way that sometimes the changed word appeared in focused, and sometimes in a not-focused position, see Table 1 for an example. The arrow indicates the change occurring in the second display.

Table 1: Focused and not-focused condition in Ward & Sturt (2007: 84)

Focus condition altered	Not-focus condition altered
Simon really needed to decide which job to apply for.	Simon really needed to decide what to do with his life.
He said the job advertised in the <i>magazine</i> → <i>newspaper</i> had looked interesting.	He said the job advertised in the <i>magazine</i> → <i>newspaper</i> had looked interesting.
He really wanted something that would challenge him.	He really wanted something that would challenge him.

The authors hypothesized that if a change occurred in a focused position, participants would be more likely to detect it as a result of deeper lexical activation of focused material. We observe that the first sentence varies across the focused and not-focused condition to modulate focus, while the second and

third sentence remain identical. Two other conditions were included, the *no-change conditions*. Ward and Sturt examined the interaction between the condition change and focus, and supported their hypothesis that linguistic focus lead to a higher detection of changed words.

Their eye-tracking results demonstrated that two out of four measurements were significantly affected by the interaction of focus and change. When words from focused position changed, both first pass reading and regressions increased on the target region. The similarity of the offline and online measurement increased the robustness of their findings. The authors interpreted these results as evidence of differential lexical activation of focused and not-focused material.

This paradigm was later replicated with identical stimuli in the auditory domain, that is, where participants listened to the passages instead of reading them. The results likewise confirmed the original hypothesis, namely that lexical alterations of words that are introduced in focus are more likely to be detected by participants (Sanford, Molle & Emmott 2006). Additionally, Kennette et al. (2010) carried out the same experiment in a two-language setting, where participants read the first sentence in English and the second sentence in French

- (1) a. It was the flower that was left on the window sill.
- b. C'était la plante qui a été laissée sur le seuil de la fenetre.

While their design included adapted stimuli and controlled for other lexical properties of the changed-words, their findings were identical. These three studies converge on the finding, that across modalities and across languages, focus enhances the memory representation of lexical items.

2.2.2 Limitations of CDP

While we consider the change-detection paradigm a productive way of investigating the effects of linguistic focus, there are potential theoretical and methodological caveats that impede wider generalization of the research results. Firstly, close examination of the stimuli in (1) reveals that the *focus* and *not-focus conditions* do not constitute minimal pairs. As (1) illustrates, the target region in the second sentence is always at least partially focused. The focus in the target sentence was manipulated by the structure of the pre-target sentence. The pre-target sentence either contained the word later focused (focus condition) or it did not contain that word (no-focus condition), see Table 1. Nonetheless, the target sentence (He said that *the job advertised in the newspaper* had looked interesting) could be considered to focus the same constituent in both condition (*the job advertised in the newspaper*), as the default focus in English falls on the object of the sentence. It is possible that such focus manipulation is vague and does not meet the linguistic criteria of focus and no-focus condition. Therefore, it cannot

be ruled out that Ward and Sturt (2007), Kennette et al. (2010) and Sanford et al. (2006) confound the effects of focus and discourse salience. Secondly, the high repetitiveness of stimuli may have induced undesirable effects on processing. It is arguably possible that other cognitive functions, such as visual working memory were used when identifying changes across identical texts. Most importantly, Ward and Sturt (2007) and researchers in subsequent studies, explicitly instructed readers/listeners to identify changed words. Ward and Sturt (2007) appear to recognize this weakness and acknowledge that the explicit instruction had an effect on the results. In order to evaluate the full effect of the explicit instruction, the researchers analyzed the eye-tracking data from the cases when the word-change was undetected. While this type of data was marginal and lead to reduced statistical power, it revealed that participants fixated longer on changed words, even when the change was not explicitly detected. Nevertheless, the eye fixations were longer on all changed words, both focused and not-focused. This result was surprising and the authors state that “the role of focus in such implicit detection of change remains unclear” (Ward & Sturt 2007: 81).² The explicit instruction, paired with high repetitiveness renders the findings inconclusive in regard to the purely linguistic and lexical effects of focus.

2.3 Present study

The aim of the present study is to further investigate the effects of linguistic focus on lexical activation. As noted, psycholinguistic research can contribute to current understanding of Information structure. While Ward and Sturt (2007)’s study yielded promising findings about memory representation, they employed a highly unnatural task which forced readers to recruit numerous other cognitive functions. Their findings point towards memory and attention representations, but we argue that it is not a foregone conclusion of their study that focus leads to enhanced lexical activation. Such account must be supported by evidence that readers implicitly encode and activate focused material more deeply.

We aim to investigate lexical activation of focused and not focused material. In order to circumvent the theoretical and methodological shortcomings and isolate the effects of focus in natural language processing, we opted for a design of new stimuli and an adapted procedure. We argue that such adaptation

² There has been an increased interest in examining the implicit detection of change, and both eye-tracking and ERP studies have been conducted. Nevertheless, the ERP studies have focused on semantic anomalies and not semantic change, and hence the results do not translate well. Furthermore, a study by Daneman, Lennertz and Hannon (2007) did not instruct the readers about upcoming changes. However, their main research question was whether participants that did later report a change (in a debriefing) did so by post-task memory retrieval or whether they identified changes on-line. The authors did not report the results of eye-fixations of the participants that did not detect a change when change occurred.

and partial replication is warranted in order to evaluate the involvement of purely linguistic functions in change detection and to separate the effects of linguistic focus and discourse salience.

3 Research question, hypothesis & predictions

3.1 Research question

In a change-detection reading task without an explicit announcement of word change, do lexical alterations of focused material lead to increased reaction times compared to lexical alterations of not-focused material?

3.2 Hypotheses

H₀: We find no evidence that focus influences lexical activation in uninstructed sentence reading. There is no activation difference of focused and not-focused material

H₁: Focus influences lexical activation of words in uninstructed sentence reading. Specifically, linguistic focus leads to higher lexical activation of a word.

3.2 Predictions

If the null hypothesis (H₀) is true, we predict either no reaction time differences across conditions or reaction time differences on all changed words, irrespective of their Information structure status. In both cases, we would conclude that there is no evidence of linguistic focus influencing lexical activation. The second prediction for the null hypothesis is included because it is possible that the language processor is sensitive to lexical changes but does not interact with Information structure; see Table 2.

By considering recent research into the processing benefits of focus (e.g. Birch & Rayner 2010; Benatar & Clifton 2014; Lowder & Gordon 2015) and more specifically change-detection paradigm studies (Sturt et al. 2004; Ward & Sturt 2007; Kenneth et al. 2010), we expect to support H₁ in that words on focus are lexically activated to a higher degree. Returning to the Table 2, to verify this hypothesis, we expect to detect longer reaction times on changed words in the focused condition than in the not-focused condition (Possible outcome 3). We would conclude that Information structure influences lexical activation of words.

Table 2: Summary of possible outcomes and their relationship to formulated hypotheses

Possible outcome	Interpretation	Conclusion regarding Information structure and activation advantage	Relates to
1. No reaction time differences across conditions	Without explicit instruction, readers do not perceive lexical changes in any position	There is no evidence that linguistic focus influences lexical activation of words at the implicit level	H ₀
2. Reaction time differences at all changed words	Without explicit instruction, readers implicitly register lexical changes irrespective of Information structure status		
3. Reaction time differences at changed focused words only	Without explicit instruction, readers implicitly register lexical changes depending on Information structure status	Information structure leads to higher lexical activation of words at the implicit level	H ₁

4 Methodology

4.1 Participants

Eighteen adult British English native speakers (9 men, 9 women, mean age = 24 y. o.) were tested. All participants were expected to have non-impaired language comprehension, or report to the researchers if they had dyslexia or any specific language disorder; additionally, they had uncorrected normal vision, otherwise wore glasses. Each subject signed an informed consent according to the Declaration of Helsinki under a procedure approved by the Ethics Committee of the University of Amsterdam.

4.2 Materials

There were 32 experimental sets developed from 16 word pairs (i.e., *truck – lorry*, *magazine – newspaper*) from the original study of Ward & Sturt (2007). As it was considered that the stimuli in Ward and Sturt (2007) did not adequately capture focused and not-focused condition, a new set of stimuli was designed. The syntactic format was inspired by the ones used in Birch & Garnsey (1995) and Birch and Rayner (1997). We acknowledge that some of the experimental stimuli and fillers were partially built on the material from Birch & Garnsey (1995).

Each experimental set contained an introduction, a pre-target segment and a target segment, see Table 3. The properties of focus and change were manipulated with 2x2 design, yielding four experimental conditions: focused changed, focused unchanged, non-focused changed and non-focused unchanged. The introduction segment was identical across conditions. In the pre-target

segment, we manipulated the focus status of a target word: the focused condition always featured an *it*-cleft, followed by the first mention of the target word, while in the not-focused condition, the target word was placed in an adjunct (i.e., object of a prepositional phrase). The target segment was identical across focused/not-focused conditions, however here the target word that appeared a second time was changed to a close semantic substitute. Another two experimental conditions (the unchanged conditions), contained the same target word in the target segment. It was intended to keep the ordinal position of the target word as similar as possible (6th–9th word in the sentence) across all conditions. The whole set of experimental trials can be found in Appendix A. Eighteen participants were divided into two lists: the odd participants read the focused condition of the pairs 1–8 and the not-focused conditions of pairs 9–16 (following Ward & Sturt 2007). This pattern was reversed for the even participants. Additionally, 37 fillers were designed to balance the design (for the whole list see Appendix A). We included 17 fillers that closely resemble the experimental materials, see Table 4. They consisted of text passages where one word changed within the passage. Another 20 fillers displayed the opposite pattern: they contained no changes, but displayed similar syntactic structure *it*-clefts or adjuncts. It is believed that this variation within the fillers guaranteed that readers did not become aware of target manipulations.

Table 3: Example of experimental items; pair *rucksack* – *backpack*

	Focused & changed	Not-focused & changed
Introduction	John had been planning his camping holiday for months. He knew he would arrive late at night and had to prepare for it.	John had been planning his camping holiday for months. He knew he would arrive late at night and had to prepare for it.
Pre-target sentence	It was his <i>rucksack</i> that contained all the lanterns and equipment.	The lantern that he packed in the <i>rucksack</i> was brand new.
Target sentence	When he arrived, he realized that the <i>backpack</i> was empty.	When he arrived, he realized that the <i>backpack</i> was empty.
	Focused & unchanged	Not-focused & unchanged
Introduction	John had been planning his camping holiday for months. He knew he would arrive late at night and had to prepare for it.	John had been planning his camping holiday for months. He knew he would arrive late at night and had to prepare for it.
Pre-target sentence	It was his <i>rucksack</i> that contained all the lanterns and equipment.	The lantern that he packed in the <i>rucksack</i> was brand new.
Target sentence	When he arrived, he realized that the <i>rucksack</i> was empty.	When he arrived, he realized that the <i>rucksack</i> was empty.

Table 4: Example of filler item

Changed	Unchanged
My neighbors visited Helen in the hospital. She had a car accident last week. The doctor said that she was lucky to have ended up with only a few scratches. Vehicle accidents often have severe consequences.	My neighbors visited Helen in the hospital. She had a car accident last week. The doctor said that she was lucky to have ended up with only a few scratches. Car accidents often have severe consequences.

Given that it was of prime importance that readers carefully read each passage without any explicit instruction of changed words, 16 yes/no experimental questions were designed to motivate readers' attention. The questions never emphasized the target word.

4.3 Procedure

Participants were tested at the Speech Lab at the University of Amsterdam or their preferred location. Prior to the experiment the subjects were instructed and asked to sign an informed consent. The whole experiment was designed using E-Prime software which was used also for data collection. E-Prime software allows to measure reading times between each key press. Each participant was seated in front of a laptop with the experiment on it and was asked to complete a self-paced reading task. All stimuli were presented on the screen on the white background. Each participant was seated in front of the laptop with the experiment on it. All stimuli were presented on the laptop's screen on a white background. The participants read the introduction, where they were asked simply to read a set of short stories, followed by two masked sentences (the pre-target segment and the target segment). After completing three practice trials they were instructed again if the task was unclear to them.

After they read the short story, they were instructed to press the «enter» key to proceed to the first masked sentence and to avoid accidental skipping of the stories throughout the whole procedure. In order to unmask each constituent in the two sentences they were asked to use the «space» key. Sometimes there were yes/no questions after fillers and experimental items, and the participants could answer 'no' by pressing «m» and 'yes' by pressing «z» on the keyboard.

In the end, there were 72 items per participant: 3 practice trials, 32 experimental items and 37 fillers. All experimental trials were randomized in such way that every item could not be immediately followed by another item from this pair. Each session lasted approximately 20 minutes per participant including instruction.

4.4 Analysis

We analyzed participants' reading times for both target region and post-target region. Within the second masked sentence each word was regarded as a separate area of interest (AOI). The target AOI was the target word (e.g. *rucksack*); the post-target region was the sum of all consecutive AOIs after the target AOI, see (2).

(2) **AOI segmentation:**

[When]₁ [he]₂ [arrived,]₃ [he]₄ [realized]₅ [that]₆ [the]₇ [rucksack]_{TARGET}
[[was]₉ [empty]₁₀]_{POST-TARGET}

To analyze reading times of the target region, we used linear mixed-effects regression models and the *lmer* function of the *lme4* package (Bates, Maechler, Bolker & Walker 2015) in R (R Core Team 2017). In regression models we included fixed factors of Focus (between-participant predictor), Change (within-participant predictor) and random intercepts per Subject and Item with random slopes for Focus and Change. Moreover, we added the number of letters in the Target AOI as a counterbalancing predictor to account for variation across length of the target words (the target words varied from four to nine letters). Focus and Change were contrasted using backwards difference coding: Focus was coded with the contrast +0.5 for Focused and -0.5 for Not-focused; Change was coded with the contrast +0.5 for Changed and -0.5 for Unchanged. In the analysis of reading times of the target word eight models starting from the minimal one were compared on the basis of Akaike Information Criterion (AIC) and the one with the lowest AIC and the interaction between Focus and Change was chosen. The significance of *t*-value was set at >1.96. The same approach was applied to the post-target region. The best-fitting model was the same as for target region.

5 Results

5.1 Target region

The mean reading times across four conditions are shown in Figure 1. For more details see Appendix B. Appendix C contains the table with relevant coefficients for optimal model used in the analysis of reading times.

What we were interested in was the interaction between Focus and Change. Our predictions were that focused changed items would be read the slowest, but as it can be seen from Figure 3, the outcome is different from what was expected. There was a non-significant effect of Focus found ($\beta = -1.7$ ms, 95% CI [-23.2 19.8 ms], $t = -0.15$). The analysis revealed that there was also non-significant effect of Change ($\beta = 5.69$ ms, 95% CI [-11.4, 22.8 ms], $t = 0.65$).

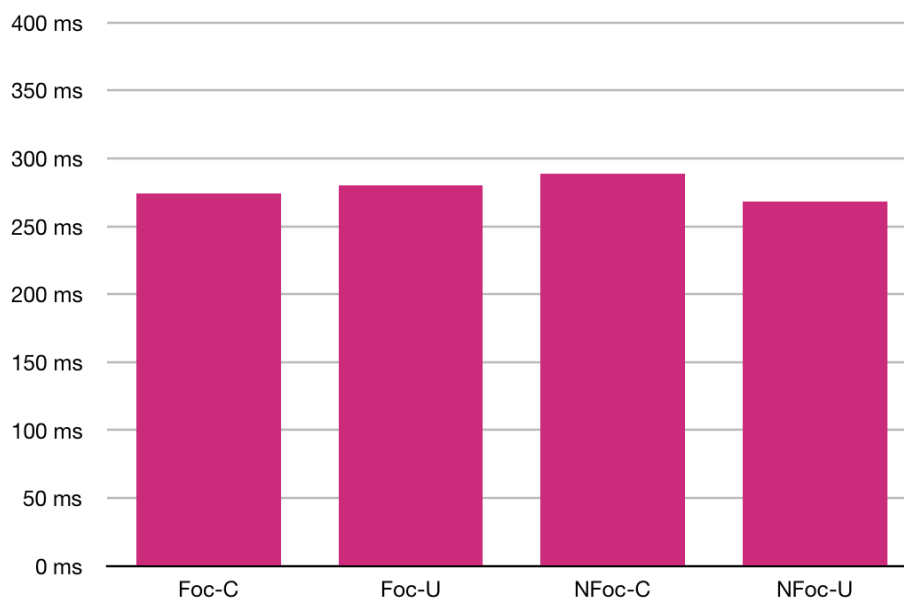


Figure 1: Mean reading times of the target regions across four conditions

As expected, a significant effect of the length of target words was found ($\beta = 4.88$, standard error = 2.37, 95% CI [0.24, 9.51], $t = 2.06$), confirming that long words take longer to read. The interaction between Focus and Change did not reach significance ($\beta = -25.95$ ms, 95% CI [-55.85, 3.94 ms], $t = -1.7$).

5.2 *Post-target region*

The mean reading times of post-target AOI across four conditions are shown in Figure 2. Appendix E contains the table with relevant coefficients for optimal model used in the analysis.

The analysis revealed that the effect of Focus was again non-significant ($\beta = -86.52$ ms, 95% CI [-205.37, 32.32 ms], $t = -1.42$). Additionally, we have found no significant interaction between Focus and Change ($\beta = -86.51$ ms, 95% CI [-287.84, 114.81 ms], $t = -0.84$). As in the analysis of the reading times in Target AOIs a significant effect of the length was found ($\beta = 40.16$, standard error = 3.71, 95% CI [32.89, 47.43], $t = 10.83$). The only significant effect we have found given our research concerns was the effect of Change ($\beta = -179.13$ ms, 95% CI [16.76, 341.5 ms], $t = 2.16$). This means that the information in the post-target region was read significantly slower when it was preceded by a changed word irrespective of its focus status.

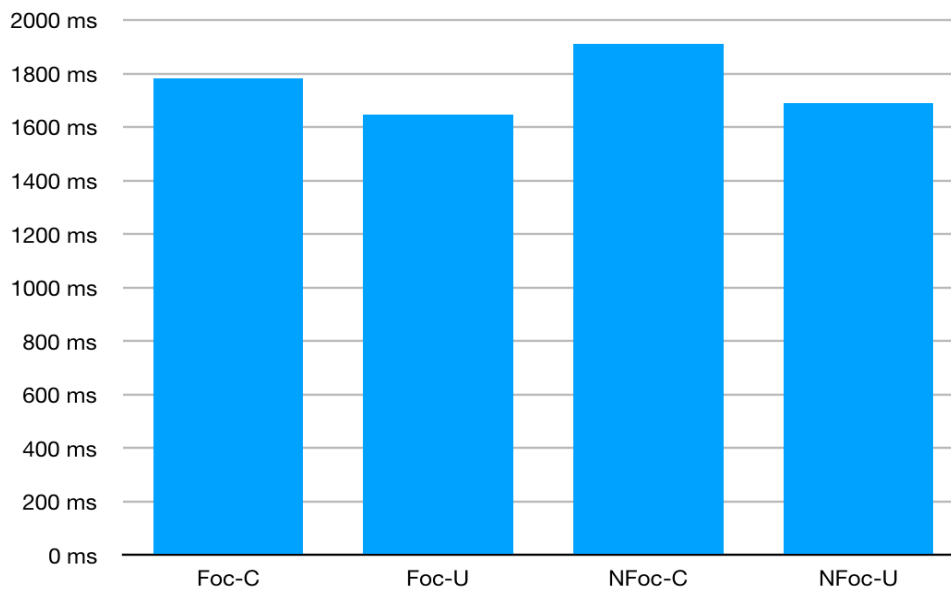


Figure 2: Mean reading times of the post-target regions across four conditions

5.3 Summary of the results

Both effects of focus and change did not reach significance level. However, despite the non-significant interaction in the target region, the approaching *t*-value has to be taken into consideration, because of an unexpected pattern: we could conclude that focused changed items were actually read faster than not-focused changed items (and not vice versa as predicted).

The post-target region analysis was of exploratory nature and no clear predictions could be derived from previous literature. The significant effect of change might point towards specific parsing strategies. We elaborate on our findings further in the Discussion section below.

6 Discussion

We begin the discussion with the evaluation of the target region. Given the absence of anticipated results, we propose a novel explanation of the influence of focus on lexical activation (*'The Alternatives hypothesis'*), which constitutes a departure from the theoretical account introduced in the background section. This is followed by reasonable suggestions for future research. Subsequently, the exploratory results of post-target region are assessed. Lastly, a brief comparison of Ward and Sturt's (2007) study and the present research is outlined and justified where appropriate.

6.1 *Target region: Interpretation*

Examination of the results obtained in our model for target region reaction times reveals that the null hypothesis H_0 was partially supported. The null hypothesis H_0 predicted that reaction times would either be equal across all the conditions or that reaction times would be longer on all changed words, irrespective of their information structure status. We found no statistically significant differences across the experimental conditions. The alternative hypothesis H_1 postulated that reaction times would be slower on focused changed words only.

An unexpected pattern was nonetheless observed in the data. While we acknowledge that this result is not statistically significant and should not be interpreted as such ($p < 0.1$), we consider this pattern unusual and contrary to the expectations derived from the literature and previous studies. We predicted, based on the study by Ward and Sturt (2007) that focused & changed condition would be read the slowest. Participants in Ward and Sturt's study (2007) find it particularly 'halting' for processing if a word introduced on focus changes later on in the discourse. This would constitute evidence of higher lexical activation of focused words. Our results reveal that focused changed words are read faster than not-focused changed words. This indicates that later change of words that were originally introduced on focus led to a processing advantage in a self-paced reading task.

This puzzling tendency leads us to consider and review the literature on lexical-semantic priming and alternatives' activation in relation to information structure. As a result, we reinterpret our result and will subsequently postulate two competing hypotheses to explain our data.

6.1.1 *Focus and lexical activation of alternatives*

Studies in formal semantics argue that focus denotes the existence of alternatives (Krifka 2008; Rooth 1985) and that these alternatives are contrastive to the focused element (Husband & Ferreira 2015). This section chronologically reviews two studies that examined the lexical activation of focus alternatives. Among the first studies into this subject, Braun and Tagliapietra (2009) investigated how intonation contours in Dutch influence lexical activation in speakers and the later study by Husband and Ferreira (2015) explored the parameters that influence the duration of the lexical activation.

Braun and Tagliapietra (2010) conducted two lexical decision experiments to investigate how intonational contours influence lexical recognition in Dutch. The first experiment exposed listeners to two versions of the same sentence (with either narrow focus or neutral intonation) and measured how fast listeners reacted to associated alternatives or unrelated words. To illustrate their experiment, the participant listened to a sentence such as *In Florida he photographed a flamingo*

(with narrow focus on *flamingo* or neutral prosody), and later responded to a contrastive alternative *pelican* or an unrelated word *celebrity*. If focus does activate lexical alternatives, the reaction to words such as *pelican* should be faster than the reaction to unrelated words like *celebrity* in the narrow focus condition. The results supported this prediction. The second experiment examined how fast listeners react to semantically associated words that can nonetheless not be considered alternatives to the word *flamingo*, such as *pink*. Braun and Tagliapietra (2010) found that listeners reacted faster to the word *pink* than the unrelated word *celebrity*, but not as fast as to the focus alternative *pelican*. While the design was innovative, it did not allow the authors to compare the different types of primes (focus alternative: *pelican* and semantic associate: *pink*), because they were examined in two separate experiments and the words *pelican/pink* do not have the same frequency in the corpus nor the same length. In conclusion, this study ascertained that narrow focus leads to higher activation of alternatives than neutral (broad) focus.

A later study by Husband and Ferreira (2015) investigated two issues; firstly, what is included in the set of alternatives, and secondly, what is the duration (and trajectory) of the activation. Listeners in their experiment listened to sentences such as *The museum thrilled the sculptor* (with neutral prosody or narrow focus on *sculptor*) and were asked to perform a lexical decision task on three types of targets: focus alternatives (*the painter*), semantic associates (*the statue*) and unrelated word (*register*). The experiment was designed in such a way that it would reveal whether all semantic associates get activated with narrow focus or whether this only happens for the focus alternatives. Husband and Ferreira (2015) later hypothesized that the onset of the lexical decision task would be relevant. In experiment 1, the listeners performed a lexical decision task immediately after they heard the sentence (onset: 0 msec), and in experiment 2, listeners performed the lexical decision task with a delay (onset: 750 msec). The results obtained in experiment 1 demonstrated that there was no significant difference in reaction times between the focus alternative (*painter*) and the semantic associate (*statue*) and as a result, the authors concluded that initially, all types of associated words get activated. In experiment 2, a significant difference was found between the focus alternative (*painter*) and the semantic associate (*statue*). The focus alternative words were reacted to faster. Based on these results, the authors concluded that initially all associated words get activated, but only the focus alternatives remain activated with narrow focus and all other

semantic associates become deactivated (or their activation decays). This is a pertinent finding, but it rests upon a potentially incorrect experimental design.³

To summarize, these two studies attempted to answer what is included in the alternative sets and what the duration of the activation is. The results of Braun and Tagliapietra (2010) indicate that narrow focus leads to faster reaction times to alternatives than unrelated words. Husband and Ferreira conclusively showed that at the delayed onset, narrow focus leads to lexical activation of alternatives (*painter*) but not to the activation of semantic associates (*statue*). In a relatively recent area of research, the results appear to indicate that focus alternatives are not merely lexical-semantic associates. The theoretical assumptions that focus denotes alternatives (Rooth 1985; Krifka 2008) has received first experimental evidence of their cognitive existence.

6.1.2 *The Alternatives' hypothesis*

In light of new information presented above, we reinterpret our results as caused by the activation of focus alternatives. While our experimental pairs were synonyms and not designed with the property of 'alternatives' in mind, we argue that most pairs can be considered alternatives (i.e., *lake – pond*, *stream – canal*, *martians – aliens*, etc.). No literature has been identified on the subject of the exact composition of the focus alternatives' set and therefore more research is required to fill this theoretical gap.

Assuming our hypothesis is correct, the faster reading times of changed focused words may be caused by higher lexical activation of focus alternatives. Similar to Braun and Tagliapietra (2010), our data contained narrow focus condition (*it*-clefts), and as in Husband and Ferreira (2015), the stimuli contained longer intervening distance between the two appearances of the target word (such as the delayed onset condition in their study).

If the *Alternatives' hypothesis* is correct, in the focused pre-target segment (Table 5) alternatives of *rucksack* become lexically activated (among them the word *backpack*) and as a result, the reaction time to the word *backpack* receives a processing advantage in the target segment. Such lexical activation does not occur in the not-focused pre-target segment.

However, all our experimental pairs were strong semantic associates and thus, we cannot disentangle between the effect of activation of focus alternatives and enhanced lexical-semantic priming. Since this was not our research question, we have not controlled for this property of the experimental pairs. Arguably, we have inadvertently discovered a new way of investigating the activation of focus

³ In order to answer the research question about the duration of the activation, a single experiment must be designed in such a way that sometimes the participant performs the lexical decision task immediately and sometimes with a delay.

alternatives, and below, we outline two proposals for future research. We do not currently see how the notion of ‘change’ could reveal any lexical activation without being confounded with the effect of priming, and therefore we have completely discarded it from the design of the future study.

Table 5: Focus alternatives’ activation in focused & changed condition (underlined)

Condition	Focused changed	Not-focused changed
Pre-target segment (target word: rucksack)	It was his <i>rucksack</i> that contained all the lanterns and equipment.	The lantern that he packed in the <i>rucksack</i> was brand new.
Alternatives activated	Luggage, carrier, <u>backpack</u> , handbag.	None
Target segment	When he arrived, he realized that the <u>backpack</u> was empty.	When he arrived, he realized that the <i>backpack</i> was empty.

What is included in the set of alternatives?

The means by which the activation of focus alternatives occurs are still largely unknown (Husband & Ferreira 2015). The difficulty lies in isolating the effects of lexical-semantic priming and alternatives activation. In the case of our design (Table 5), pairs could be manipulated in such a way that some target sentences would include the word *traveller*; this word is a semantic associate of *rucksack*, but it is not an alternative. Thus, we predict (based on Husband & Ferreira 2015) that the word *traveller* would be moderately primed by the previous mention of *rucksack* but it should not receive an advantage of focus (no reaction times difference between focused and not-focused condition).

Table 6: Our predictions regarding the differential priming effect for semantic associates and Focus alternatives in Focused and Not-focused conditions.

Condition	Focus			Not-focused		
Introduction	Target word: <i>backpack</i>			Target words: <i>backpack</i>		
Target sentence(s)	Semantic associate: <i>traveller</i>	Focus alternative: <i>luggage</i>	Unrelated word: <i>celebrity</i>	Semantic associate: <i>traveller</i>	Focus alternative: <i>luggage</i>	Unrelated word: <i>celebrity</i>
Priming	Moderate	Strong	None	Moderate	Moderate	None

A focus alternative such as *luggage*, should receive the processing advantage of focus (and thus reaction times would differ between focused and not-focused

If the results of Husband and Ferreira are taken into account, a new possibility of investigation becomes available. The authors found, in a lexical decision task, that the time-lapse between hearing an utterance and the lexical decision task had a large effect. If this is so, the distance between the first mention of the target word and the second mention should be controlled for.⁴

John had been planning his camping holiday for months. He knew he would arrive late at night and had to prepare for it. It was his ***rucksack*** that contained all the lanterns and equipment. When he arrived, he realized that the ***backpack*** was empty.

[illegible]

Linguistics in Amsterdam 13,1 (2020)

As outlined before, numerous research opportunities are available in this area. Two questions remain, namely, what is included in the set of alternatives and what is the duration of the alternatives' activation.

6.2 *Post-target: Interpretation*

Since the analysis of reading times in the post-target region was carried out for exploratory purposes, there were no clear predictions about the resulting effects. Yet the significant effect of change was to some extent unexpected, especially in the light of the absence of the change effect in the target region.

As noted, our changed words in focus position were more advantageous in comparison to changed items in non-focus position because of an interplay between either alternatives activation or enhanced lexical-semantic priming. However, it might be that if the words were not semantically related, our results could also reveal the effect of change on the target region, since focused changed items would be no more beneficial for processing, and they would be read slower due to change detection and attention shift which result in longer response latencies (Parmentier 2008); in other words, we hypothesize that the beneficiary effect of focus cancelled out the expected slow-down in processing of changed items in the target region. Unfortunately, the design of the present study does not allow to draw any straightforward conclusions. Linguistic change detection is a cognitively driven process and in order to filter out all secondary effects and to measure, for instance, only selective attention, a more sensitive and precise method should be used (e.g. eye-tracking or the MMN paradigm). In fact, it has been argued that when the parser detects a change, it results in an attention shift followed by an involuntary semantic evaluation, and this leads to a processing delay (Parmentier & Kefauver 2015). This could explain why subsequent information is read slower.

Nevertheless, the duration and the exact location of the slow-down cannot be detected with our data.⁵ In this regard, we consider our finding as a first approximation towards understanding the effect of change on processing in sentence reading. In order to examine the detailed effect of change, each constituent of the post-target region must be examined separately.

6.3 *Comparison: Ward & Sturt (2007) and present study*

In this section, we briefly consider the reasons for our failure to replicate the findings of Ward and Sturt (2007). Arguably, our study has several limitations. Firstly, a self-paced reading task can provide limited (quantitative) information

⁵ The Post-target regions across our stimuli were too heterogeneous, both syntactically and lexically. A design with more homogeneous post-target regions would be more appropriate to identify the exact location and duration of the change effect.

about language processing. A more precise technique, paired with a more sophisticated design would reveal more about the processing of linguistic information. Secondly, we acknowledge that the inconsistent and non-significant results could arise from low statistical power of our experiment (only 18 participants, compared to 32 in Ward & Sturt 2007).

Lastly, Ward and Sturt employed a task that forced readers to exploit several non-linguistic & cognitive functions. We argue that while their study provides essential insight into the interaction of language processing and memory representation (and possibly attention and visual working memory), the findings are somewhat noisy for the linguistic theory of information structure.

This finding is tantamount to the development in the field of psycholinguistics (Filik et al. 2011). For instance, in the last decade three studies investigated whether focus leads to faster reading times. Each study contradicts previous findings (Birch & Rayner 2010; Benatar & Clifton 2014; for a review, see Gordon & Lowder 2015) and a constant improvement of stimuli and study design have proved essential. We believe that our study follows a similar pattern and hope that future research will identify flaws in our design that may well be concealing pertinent outcomes.

7 Conclusion

The concerted effort of psycholinguistic research in this area is to identify the processing benefits associated with focus. The present study attempted to replicate the results of Ward and Sturt (2007) and confirm that change of focused words is more halting from processing as a result of enhanced lexical activation of focused material. This hypothesis remained unconfirmed. Accordingly, we emphasize the importance of isolating linguistic processing from other cognitive functions, as the possible influence on findings is large.

We regard our results as evidence of the psycholinguistic reality for the theoretical claim that focus activates alternatives (*The Alternatives' hypothesis*). Our findings can be correlated with other studies of this nature (Braun & Tagliepietra 2010; Husband & Ferreira 2015) that employed the lexical decision task. The main contribution of this study lies in a discovery of a new testing paradigm of focus alternatives, natural discourse reading (all previous studies used a listening task followed by a lexical decision task). Future research resources should be allocated towards conclusively isolating the effects of focus alternatives and lexical priming, and examining the exact composition of the alternatives' sets.

Regarding the post-target region, we hypothesize that the significant effect of change is, in reality, an effect of change on the target region, that has been concealed by the processing advantage of focus alternatives' activation. A more

nuanced and systematic investigation of the effects of change would unearth how semantic relatedness affects implicit change detection in reading.

To conclude, we believe that our results are representative of many previous studies that examined the effect of focus on language processing (e.g. Bornkessel-Schlesewsky & Schumacher 2016). Indisputably, a processing advantage of focused material was identified, but it is not yet clear how this advantage is executed and whether it interacts with other linguistic modules.

8 References

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Appendix A

A.1 Experimental items: 17 target pairs (34 items)

<i>1. rucksack – backpack</i>	
<i>Focused:</i> John had been planning his camping holiday for months. He knew he would arrive late at night and had to prepare for it.	<i>Not-focused:</i> John had been planning his camping holiday for months. He knew he would arrive late at night and had to prepare for it.
It was his rucksack that contained all the lanterns and equipment.	The lantern that he packed in the rucksack was brand new.
When he arrived, he realized that the backpack (rucksack) was empty.	When he arrived, he realized that his backpack (rucksack) was empty.
<i>2. client – customer</i>	
<i>Focused:</i> Sue has worked for a charity for over ten years. She recognized the name in the newspaper headlines that morning.	<i>Not-focused:</i> Sue has worked for a charity for over ten years. She recognized the name in the newspaper headlines that morning.
It was the client that made the most generous donations.	The donations by this client were considered the most generous.
Sue was shocked to discover that the customer (client) was arrested for illegal activities.	Sue was shocked to discover that the customer (client) was arrested for illegal activities.
<i>3. tiger – lion</i>	
<i>Focused:</i> The zookeeper had a long day ahead of him. He was on his way to the feline pavilion that had been neglected for days.	<i>Not-focused:</i> The zookeeper had a long day ahead of him. He was on his way to the feline pavilion that had been neglected for days.
It was the tiger that made the most mess of his cage.	The unbelievable mess done by a tiger was a whole day's job.
The zookeeper got alarmed when he found the lion (tiger) looking sick and injured.	The zookeeper got alarmed when he found the lion (tiger) looking sick and injured.
<i>4. kitten – puppy</i>	
<i>Focused:</i> The advertising executive explained that cute animals were known to attract attention and engender positive feelings in readers.	<i>Not-focused:</i> The advertising executive explained that cute animals were known to attract attention and engender positive feelings in readers.
It was a kitten that was featured on the cover of the magazine that month.	The magazine cover of a kitten went into print early that month.
It was an advertising success and the puppy (kitten) became a star overnight.	It was an advertising success and the puppy (kitten) became a star overnight.

5. *canal – stream*

Focused: A major railway company developed a new construction plan. An unexpected problem arose last week.

It was a **canal** whose water was becoming intoxicated.

The CEO appealed to local government to ignore the **stream (canal)** and proceed with the construction.

Not-focused: A major railway company developed a new construction plan. An unexpected problem arose last week.

The water that flew in a small **canal** became intoxicated.

The CEO appealed to local government to ignore the **stream (canal)** and proceed with the construction.

6. *policeman – detective*

Focused: A terrible crime occurred last year in one of the disadvantaged suburbs. The murder happened under mysterious circumstances.

It was a **policeman** that discovered the body of a missing woman.

During the court hearing, the **detective (policeman)** gave several inconsistent accounts of the discovery.

Not-focused: A terrible crime occurred last week in one of the disadvantaged suburbs. The murder happened under mysterious circumstances.

The investigations by a **policeman** lead to a discovery of a woman's body.

During the court hearing, the **detective (policeman)** gave several inconsistent accounts of the discovery.

7. *package – parcel*

Focused: Mary was anxiously looking out the window. She hoped that the postman would appear on their street any minute with the post.

It was a mysterious **package** that she was awaiting for days.

When the postman arrived, Mary noticed that the **parcel (package)** was damaged.

Not-focused: Mary was anxiously looking out the window. She hoped that the postman would appear on their street any minute with the post.

A mysterious object contained in a **package** was due to arrive today.

When the postman arrived, Mary noticed that the **parcel (package)** was damaged.

8. *aliens – martians*

Focused: Last night we all went to the cinema. A science fiction movie was released last week and received great reviews.

It was the **aliens** that attacked the planet Earth in the movie.

It was about an interstellar war and the **martians (aliens)** were attempting to control the universe.

Not-focused: Last night we all went to the cinema. A science fiction movie was released last week and received great reviews.

The attack by the **aliens** on planet Earth was very vicious.

It was about an interstellar war and **the martians (aliens)** were attempting to control the universe.

9. *burglary – robbery*

Focused: Hettington was a small, uneventful town and its people usually minded their own business. Until the night of the crime.

It was the unsolved **burglary** that kept the town inhabitants gossiping for weeks.

Months later, the police announced that the **robbery (burglary)** was done by local troubled youth.

Not-focused: Hettington was a small, uneventful town and its people usually minded their own business. Until the night of the crime.

The details of the burglary weren't released to the public for weeks.

Months later, the police announced that the **robbery (burglary)** was done by local troubled youth.

10. *leg – paw*

Focused: Sam had to take his dog to the veterinary. Last month, his pet was bitten by a wild, stray cat.

It was his **leg** that was injured and bleeding heavily.

The veterinary looked at the **paw (leg)** and decided to perform a surgery.

Not-focused: Sam had to take his dog to the veterinary. Last month, his pet was bitten by a wild, stray cat.

The injury on the **leg** was serious and bleeding heavily.

The veterinary looked at the **paw (leg)** and decided to perform a surgery.

11. *virus – infection*

Focused: Kamila had to take a day off work. She was feeling very sick.

It was a **virus** that caused her to stay home that day.

Next day, she complained of the **infection (virus)** to her doctor.

Not-focused: Kamila had to take a day off work. She was feeling very sick.

The symptoms of the **virus** include nausea and weakness, among others.

Next day, she complained of the **infection (virus)** to her doctor.

12. *exit – door*

Focused: At a recent gallery opening, one of the installations caught on fire. Visitors became hysterical and started running.

It was the exit that everyone was frantically looking for.

Fortunately, all visitors were able to find the **door (exit)** and nobody was injured in the fire.

Not-focused: At a recent gallery opening, one of the installations caught on fire. Visitors became hysterical and started running.

The light symbol of the **exit** was very visible from distance.

Fortunately, all visitors were able to find the **door (exit)** and nobody was injured in the fire.

13. truck – lorry

Focused: Mr Smith had to make sure that the shipment was ready. His business registered increased demand from other states in recent months.

It was a **truck** that transported all their goods across the country.

When the final destination was reached, the **lorry (truck)** was unloaded by several employees and returned.

Not-focused: Mr Smith had to make sure that the shipment was ready. His business registered increased demand from other states in recent months.

The goods on that **truck** were to be transported all around the country.

When the final destination was reached, the **lorry (truck)** was unloaded by several employees and returned.

14. building – property

Focused: His lawyer wondered which document would be most helpful. He knew that all of the inheritance had to be in order.

It was the **building** that required all legal documentation for successful transaction.

The lawyers of the opposite side saw the **property (building)** as a great weakness of the negotiations.

Not-focused: His lawyer wondered which document would be most helpful. He knew that all of the inheritance had to be in order.

The documentation of the **building** was extremely important for the transaction.

The lawyers of the opposite side saw the **property (building)** as a great weakness of the negotiations.

15. magazine – newspaper

Focused: Carl had been unemployed for months. He applied for many journalistic positions.

It was a **magazine** that offered him a job in the end.

He could not decline and called the **newspaper (magazine)** immediately to accept their generous offer.

Not-focused: Carl had been unemployed for months. He applied for many journalistic positions.

The job in the **magazine** was a sensational offer.

He could not decline and called the **newspaper (magazine)** immediately to accept their generous offer.

16. sweater – jumper

Focused: Jenny was invited to a fabulous party. She picked the perfect outfit in her head with blue skirt and those black heels.

But it was a **sweater** that she needed to wash for that party.

When she opened the washing machine, she realized the **jumper (sweater)** has shrank.

Not-focused: Jenny was invited to a fabulous party. She picked the perfect outfit in her head with blue skirt and those black heels.

The stain on the **sweater** was too big and had to be washed.

When she opened the washing machine, she realized the **jumper (sweater)** has shrank.

17. *pond – lake*

<i>Focused:</i> Helen inherited a beautiful house estate from her late father. The inheritance was obscured by inheritance battles between family members.	<i>Not-focused:</i> Helen inherited a beautiful house estate from her late father. The inheritance was obscured by inheritance battles between family members.
It was the pond nearby that was disputed during the testimony reading.	The ownership of a nearby pond was disputed during the testimony reading.
Eventually, Helen was able to win the lake (pond) and so the estate remained in one piece.	Eventually, Helen was able to win the lake (pond) and so the estate remained in one piece.

A.2 Fillers: 20 fillers with change, but similar syntactic structure

Changed	Not-changed
My neighbors visited Helen in the hospital. She had a car accident last week. The doctor said that she was lucky to have ended up with only a few scratches. Vehicle accidents often have severe consequences.	My neighbors visited Helen in the hospital. She had a car accident last week. The doctor said that she was lucky to have ended up with only a few scratched. Car accidents often have severe consequences.
Sally's grandmother used to live in a beautiful, old house by the main river. An old oak tree stood right in front of the house. After her decease, the new family cut out the bush .	Sally's grandmother used to live in a beautiful, old house by the main river. An old oak tree stood right in front of the house. After her decease, the new family cut out the tree .
The doctor checked to see which patient was next. He was feeling tired and ready to call it a day. A young boy was sitting in the waiting room. The nurse was relieved to see that there were no more people.	The doctor checked to see which patient was next. He was feeling tired and ready to call it a day. A young boy was sitting in the waiting room. The doctor was relieved to see that there were no more people.
Marry and John wanted to see the new movie in the cinema on the night of the release. First, they had a romantic dinner and only after went to the theater .	Marry and John wanted to see the new movie in the cinema on the night of the release. First, they had a romantic dinner and only after went to the theater .
It became clear which reports had affected attitudes in the city . Newspapers were filled with crime and violence stories. The village suddenly felt like a dangerous place.	It became clear which reports had affected attitudes in the city . Newspapers were filled with crime and violence stories. The city suddenly felt like a dangerous place.
During a childhood game my cousin asked me whether I had ever seen a ghost . I had to admit that I had never seen or felt the presence of a spirit .	During a childhood game my cousin asked me whether I had ever seen a ghost . I had to admit that I had never seen or felt the presence of a ghost .

The student needed to study for his exam. He asked the <i>librarian</i> whether the library was open overnight. The <i>guard</i> replied that the library was closing in two hours.	The student needed to study for his exam. He asked the <i>librarian</i> whether the library was open overnight. The <i>guard</i> replied that the library was closing in two hours.
The <i>Goya</i> exhibit just opened in our gallery. It was a grand occasion. It was the first time that a <i>Monet</i> exhibit came to town.	The <i>Goya</i> exhibit just opened in our gallery. It was a grand occasion. It was the first time that a <i>Goya</i> exhibit came to town.
<i>Air-traffic controllers</i> work in the airport. It is a very stressful and well remunerated job. Not everyone can work as a <i>pilot</i> .	<i>Air-traffic controllers</i> work in the airport. It is a very stressful and well remunerated job. Not everyone can work as an <i>air-traffic controller</i> .
The <i>secretary</i> worked in a prestigious law firm. It was owned by a tycoon, famous for the mistreatment of his employees. The <i>assistant</i> was considering filing a law suit against him.	The <i>secretary</i> worked in a prestigious law firm. It was owned by a tycoon, famous for the mistreatment of his employees. The <i>secretary</i> was considering filing a law suit against him.

A.3 Other fillers

The tomatoes have been rotting in the fridge for a week. Mom will be really angry when she returns from holiday and sees that. She always asks us to be careful with food.
The casualties in that battle reached two hundred thousand. My uncle Joe was very lucky to have survived. He tells that story every Thanksgiving.
The inscription for the conference closed last night. I am afraid that Simone will be very disappointed. She had been talking about it for weeks. Perhaps she can pull some strings to get a ticket.
Several ships at the dock had been badly hurt by a hurricane. The hurricane Betty was not as strong as expected but nonetheless, it caused severe economic damage.
The donation of the actor was unexpected. He was very reclusive and never donated to charity. Everyone found it surprising.
My grandfather was an avid hunter. He spent most winters in his winter cottage alone. As he got older, he had to abandon his hobby. Now he spends most of his days watching daytime television.
The Farmer grabbed his cap and ran to the barn. The storm frightened all the animals and they were now confused and violent.
The power went down in our suburb three times this month. We have complained to the electricity provider but to no avail. If the situation does not improve, we will have to contact the authorities.
My fiancé organized a surprise picnic for me this past weekend. It was very romantic. He took me to the Granter park and served a delicious meal.
Anger over the argument was making Karen's blood boil. It was the problems with their daughter again. She had decided to leave college several months ago. Karen disagreed profoundly but was incapable to changer her daughter's opinion.

The monkey was entertaining the visitors. It was an Ecuadorian brown monkey. The guide explained that it is a rare and endangered species.

The cathedral was built almost four centuries ago. It was the maire of Paris that ordered its construction. It was designed by a very famous Italian architect.

The table in the living room had to be changed. Jerry inherited the table from his late grand-father and was reluctant to get rid of it. But the time has come and it had to go.

Cameron wanted to switch jobs for years. He felt undepreciated at work. It was the safety and financial remuneration that kept him in that place all those years.

The remarks of that letter were very hurtful to Mary. She knew that Emilie was always opposed to the marriage but this was the first time that she realized he really hated her. Without his blessing, the marriage would hardly succeed.

My niece was deciding on how to spend his graduation money. He received a substantial amount from his grandparents and was hesitant between a new car and a summer trip to Europe. In the end, his girlfriend persuaded him to do the trip.

The labor protests were beginning to worry the prime minister. He was aware that longer they went on, more difficult it would to ignore them. Two weeks ago, he thought that it would just blow off, but today it was clear that he had to act.

The clowns in the parade entertained all the children. It was Tommy's birthday party and his parents promised him a clown show and a trampoline. Unfortunately, the weather was bad that day and it did not stop raining for hours. They had to cancel the trampoline and asked the clowns for a longer show.

The basketball game last night lasted three hours. It was unusually long. I am not an avid sport fan but my boyfriend enjoys the occasional game. It was impossible to convince him to turn it off.

Ned knew for quite some time that he needed a surgery. The problem was that his medical insurance would not cover the costs. It was a risky procedure and uncertain for a person his age. He would have to ask his son for a big loan.

A.4 Filler questions

Questions experimental items	Questions fillers
Did John spend his holiday in a seaside hotel?	Did Helen suffer severe injury during the accident?
Was the zookeeper off work that day?	Was a young girl waiting to see the doctor?
Did the railway company respect the location of the canal?	Was there a lot of crime in the city?
Was Mary nervous about the postman's delivery?	Was it unusual for the gallery to host an important exhibition?
Did the aliens attack Mars?	Did uncle Joe die in the battle?

Was jenny invited to an amazing party?	Did Cameron feel appreciated at work?
Did Helen inherit large horse stables from her father?	Was it a sunny day on Tommy's birthday?
Was Kamila feeling good that day?	

Appendix B

Means per condition in milliseconds.

	Target AOI	Post-target AOI
Focused changed	274.01	1782.47
Focused unchanged	279.47	1646.60
Non-focused changed	288.69	1912.25
Non-focused unchanged	268.19	1689.86

Appendix C

Coefficients for the most optimal model used in the analysis or reading times of the Target AOIs.

	Estimate	SE	<i>t</i> -value	Lower CI	Upper CI
F_status+F-N	-1.698	10.967	-0.155	-23.1927459	19.796913
CH_status+C-U	5.695	8.715	0.653	-11.3857765	22.774950
Characters	4.879	2.366	2.063	0.2427585	9.515742
F_status+F-	-25.951	15.255	-1.701	-55.8503981	3.947620

Appendix D

Coefficients for the most optimal model used in the analysis of reading times of the Post-target AOIs.

	Estimate	SE	<i>t</i>-value	Lower CI	Upper CI
F_status+F-N	-86.521	60.636	-1.427	-205.36538	32.32372
CH_status+C-U	179.132	82.844	2.162	16.76153	341.50235
Post_characrets	40.161	3.708	10.832	32.89383	47.42772