The Intervention effect*

Focus alternatives or indefinite alternatives? Experimental evidence

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Abstract

In many languages, quantificational and focusing elements may not intervene between a *wh*-phrase and the interrogative complementizer by which it is licensed. Among the semantic approaches to explaining this phenomenon, there are two that make different predictions as to the intervener status of focus particles. According to the first approach, all focus particles are interveners. According to the second approach, *only* and *even* are interveners while *also* is not. We present evidence from two speeded-acceptability judgement experiments and a self-paced reading experiment in German which tested the acceptability and online processing of intervention sentences with *only* and *also* with regard to the predictions of the two theories. The results of the three experiments converge in showing that *also* is not an intervener in German. We argue that this can be taken as evidence for theories where focus is not the key property in the emergence of the intervention effect, at least for German.

1 Introduction: the intervention effect

In many languages, we find paradigms such as (1) and (2), see [2].

(1) a. *Minsu-man nuku-lûl po-ass-ni?
Minsu-only who-ACC see-PAST-Q
exp: 'Who did only Minsu see?'
b. Minsu-nun nuku-lûl po-ass-ni?
Minsu-TOP who-ACC see-PAST-Q
'Who did Minsu see?'

(2) a. *Wer hat niemand wo gesehen?
who has no one where seen
exp: 'Where did no one see whom?'
b. Wer hat Luise wo gesehen?
who has Luise where seen
'Where did Luise see whom?'

The Korean data in (1) show that the focus particle *-man* 'only' may not precede the *wh*-word *nuku-lûl* 'who-ACC'. The German data in (2) show the same phenomenon with the negative quantifier *niemand* 'nobody' relative to the *wh*-word *wo* 'where'.[1] Observations like these have led to the generalization in (3), cf. [7, 2].

(3) *[Q_i [... [intervener [... *wh*-phrase$_i$ ...]] ...]]
Certain elements may not intervene between a *wh*-phrase and the interrogative complementizer by which it is licensed.

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[1] Since German is a *wh*-ex-situ language, the phenomenon under consideration can only be evoked with multiple *wh*-questions. When discussing the different theories, we only consider structures with a single *wh*-phrase. However, the results readily translate to multiple *wh*-questions.

The emergence of deviance in (3) is called the intervention effect.[2] The semantic approaches to explaining the intervention effect share a line of thinking going back to [6]: *wh*-words induce semantic alternatives, a proper question denotation can be derived only if these alternatives are visible to the question operator, and an intervener renders the alternatives invisible to the question operator. The approaches differ with regard to the source of the alternatives: (i) *Wh*-words induce alternatives by being focused, see [2]. (ii) *Wh*-words induce alternatives by being indefinites, see [3, 5, 8]. Correspondingly, the list of interveners proposed by Beck can be divided into two classes: (i) focusing elements such as *only*, *even*, and *also*, (ii) the sentence negation *not*, nominal quantifiers such as (*almost*) *every*, *most* and *few*, and adverbial quantifiers such as *always*, *often* and *never*. Furthermore, the approaches differ with regard to the way the deviance is explained, as will be shown for [2] and [5] in section 2.

2 The theories

BECK'S FOCUS APPROACH in [2] is based on Rooth's focus semantics [10].[3] Every structure has two semantic values, viz. an ordinary semantic value ('o-value' for short) and a focus semantic value ('f-value'). These values are given by the (partial) interpretation functions $[\![\cdot]\!]^{\mathrm{o}}$ and $[\![\cdot]\!]^{\mathrm{f}}$, respectively. The way Beck derives the truth conditions of the LF-structure of the sentence *Only John left* in (4) is completely standard. The o-value of a syntactic atom is its usual denotation, see (5a) and (6a). The f-value of the F-marked proper name $John_{\mathrm{F}}$ is a set of individual alternatives, see (5b). The f-value of a non-F-marked atom is the singleton set of its o-value, see (6b). The semantic values of the phrase α are derived by (pointwise) function application, see (7).

(4) [*only* C [∼ C [$_{\alpha}$ $John_{\mathrm{F}}$ *left*]]]

(5) a. $[\![John_{\mathrm{F}}]\!]^{\mathrm{o}} = \mathrm{J}$
b. $[\![John_{\mathrm{F}}]\!]^{\mathrm{f}} = \{\mathrm{J}, \mathrm{M}, \ldots\}$

(6) a. $[\![left]\!]^{\mathrm{o}} = \lambda x \lambda w.\, x$ left in w
b. $[\![left]\!]^{\mathrm{f}} = \{\lambda x \lambda w.\, x$ left in $w\}$

(7) a. $[\![\alpha]\!]^{\mathrm{o}} = \lambda w.\, \mathrm{J}$ left in w b. $[\![\alpha]\!]^{\mathrm{f}} = \{\lambda w.\, \mathrm{J}$ left in $w, \lambda w.\, \mathrm{M}$ left in $w, \ldots\}$

Next, the $\sim$ operator passes on the o-value of its complement, see (8a), it valuates the focus anaphor C with a subset of the f-value of its complement (by means of a definedness condition), see (8a,b), and it resets the f-value to the singleton set of the o-value, see (8b).

(8) a. $[\![\, [\sim \mathrm{C}\ \alpha]\,]\!]^{\mathrm{o}}_{g} = \lambda w.\, \mathrm{J}$ left in w, if $g(\mathrm{C}) \subseteq [\![\alpha]\!]^{\mathrm{f}}$, undefined otherwise
b. $[\![\, [\sim \mathrm{C}\ \alpha]\,]\!]^{\mathrm{f}}_{g} = \{\lambda w.\, \mathrm{J}$ left in $w\}$, if ... (same as above)

The reset is the root cause of the intervention effect in Beck's account: the $\sim$ operator renders the focus alternatives invisible to operators outside its c-command domain. Outside this domain, they can only be accessed via the focus anaphor C. Of course, *only* comes with C so that it can express truth conditions relative to the focus alternatives induced by $John_{\mathrm{F}}$, see (9).

(9) $[\![\, (4)\,]\!]^{\mathrm{o}}_{g} = \lambda w. \forall p \in g(\mathrm{C}) : p(w) = 1 \rightarrow p = [\lambda w'.\, \mathrm{J}$ left in $w']$, if $g(\mathrm{C}) \subseteq [\![\, [John_{\mathrm{F}}\ left]\,]\!]^{\mathrm{f}}$

The answer set of the *wh*-question *Who left?*, i.e. the o-value of (10), is derived as follows.[4]

(10) [Q [$_{\alpha}$ who_{F} *left*]]

[2] Intervention effects also arise in other environments than *wh*-questions, see [11].

[3] Beck uses syntactic variables for deriving focus semantic values but for convenience we specify the usual alternative sets. Alternative sets can be readily derived from Beck's interpretation function $[\![\cdot]\!]^{g,h}$. The alternative set of a structure $\alpha = \{[\![\alpha]\!]^{g,h'} \mid h'$ is a total f-variable assignment function in $\mathcal{D}_e\}$, where g is an o-variable assignment function.

[4] In (10), we ignore the coindexation of Q and the *wh*-phrase. This simplification leaves Beck's analysis intact.

Beck assumes that *wh*-words are inherently focused (i.e. F-marked). Thus who_{F} induces a set of individual alternatives, see (11a), and the f-value of α is a proposition set which is the Hamblin denotation of the question under consideration, see (11b).

(11) a. $[\![who_{\mathrm{F}}]\!]^{\mathrm{f}} = \{\mathrm{J}, \mathrm{M}, \ldots\}$ b. $[\![\alpha]\!]^{\mathrm{f}} = \{\lambda w.\,\mathrm{J}\text{ left in }w, \lambda w.\,\mathrm{M}\text{ left in }w, \ldots\}$

The Q operator promotes the f-value of its complement to the o-value of the overall structure:

(12) $[\![\,[\,\mathrm{Q}\ \alpha\,]\,]\!]^{\mathrm{o}} = [\![\alpha]\!]^{\mathrm{f}} = \{\lambda w.\,\mathrm{J}\text{ left in }w, \lambda w.\,\mathrm{M}\text{ left in }w, \ldots\}$

On these assumptions, the deviant string **Only John saw who?* (Korean with English lexemes) cannot be assigned a *wh*-question meaning. Consider the LF of this string in (13).[5]

(13) $[\,\mathrm{Q}\ [_{\gamma}\ \textit{only}\ \mathrm{C}\ [_{\beta} \sim \mathrm{C}\ [_{\alpha}\ \textit{John}_{\mathrm{F}}\ \textit{saw}\ \textit{who}_{\mathrm{F}}\,]]]]$

The f-value of α still captures the focus alternatives induced by who_{F}, see (14). But since the $\sim$ operator resets the f-value of β to the singleton set of the o-value of α, see (15), the focus alternatives induced by who_{F} are invisible to Q.

(14) $[\![\,[_{\alpha}\ \textit{John}_{\mathrm{F}}\ \textit{saw}\ \textit{who}_{\mathrm{F}}\,]\,]\!]^{\mathrm{f}} = \{\lambda w.\,\mathrm{J}\text{ saw }\mathrm{M}\text{ in }w, \lambda w.\,\mathrm{M}\text{ saw }\mathrm{J}\text{ in }w, \ldots\}$

(15) $[\![\,[_{\beta} \sim \mathrm{C}\ [_{\alpha}\ \textit{John}_{\mathrm{F}}\ \textit{saw}\ \textit{who}_{\mathrm{F}}\,]\,]\,]\!]^{\mathrm{f}} = \{[\![\alpha]\!]^{\mathrm{o}}\}$, if $g(\mathrm{C}) \subseteq [\![\alpha]\!]^{\mathrm{f}}$, undefined otherwise

This means that even if the o-value of (13) was defined (it is not, see below), it would not be the answer set of a *wh*-question. Thus, in Beck's account the distribution of the $\sim$ operator explains the distribution of the intervention effect.

So far, (13) seems to have an o-value (albeit not the o-value of a *wh*-question). To rule out any meaning assignment, Beck stipulates that *wh*-words do not have an o-value:

(16) $[\![who]\!]^{\mathrm{o}}$ is undefined

(16) does not do harm to 'normal' *wh*-questions but it crashes the meaning assignment to structures like (13): Because of (16), the o-value of α is undefined and hence the f-value of β is too, see (15). But then the f-value of γ is undefined, too, and so is the o-value of the overall structure. This explains the deviance of the string **Only John saw who?*.

HAIDA'S INDEFINITES APPROACH in [5] is a dynamic semantic analysis. Dynamic semantic frameworks serve to explain anaphoric binding such as the relation indicated in (17).[6]

(17) Someone$_i$ left. He$_i$ closed the door.

Following [9], Haida assumes that [*someone*$_1$ *left*] denotes (18).

(18) $[\lambda k \lambda k' \lambda w.\,k$ and k' differ at most in the content of r_1,
and in k' the individual in r_1 left in $w]$

(18) is the intension of a relation between input contexts k and output contexts k'. Contexts can be thought of as inventories of the content of an array of registers $\langle r_1, r_2, \ldots\rangle$. An indefinite deposits an individual in a register (thereby pushing out any old content), i.e., it has context change potential. The condition in the first line of (18) states that the context change potential of *someone*$_1$ is limited to r_1: *someone*$_1$ deposits individuals in r_1 and in no other register (and the

[5] Recall that in Beck's analysis f-values are derived by means of (indexed) variables. This means that the question operator can selectively bind F-marked *wh*-phrases (with which Q is coindexed) and ignore F-marked non-*wh*-phrases. The simplified structure in (13) is not rich enough to enable selective binding. Still, since Beck assumes that the $\sim$ operator is an unselective binder our discussion still conveys the gist of her explanation.

[6] There are four reasons for a dynamic semantic analysis of *wh*-questions: 1. Questions words are anaphoric binders, see (i). 2. In many languages, unfocused *wh*-words are indefinites, see [5]. 3. Anaphoric binding is prone to intervention, see (21) below. 4. In the partition theory of questions, anaphoric binding potential can be seen as the defining semantic property of question words [4, 5].

(i) Who$_i$ won the women's high jump? What height did she$_i$ jump?

same for any other index). The condition in the second line states that any deposited individual is an individual that left in the evaluation world w. Any output context k' of [*someone*$_1$ *left*] can be passed on as input context for the interpretation of the subsequent sentence [*he*$_1$ *closed the door*]. The pronoun *he*$_1$ looks up the content of register r_1, and the sentence adds to the input-output relation in (18) the condition that in k' the individual in r_1 closed the door in w. This explains the possibility of anaphoric binding.

The input-output relation in (18) can be translated into a set of propositional alternatives. The function in (19) takes a sentence structure α and translates its context change potential with respect to the register r_i into an alternative set. The alternative set of [*someone*$_1$ *left*] for r_1 is derived in (20). It is the same set as the one specified by [*who*$_F$ *left*] in Beck's approach.

(19) $\mathcal{A}lt_i(\alpha) = \{[\![\alpha]\!](k)(k') \mid k \text{ and } k' \text{ differ at most in } r_i\}$

(20) $$\begin{aligned}\mathcal{A}lt_1([\,\textit{someone}_1\ \textit{left}\,]) &= \{[\![\,[\,\textit{someone}_1\ \textit{left}\,]\,]\!](k)(k') \mid k \text{ and } k' \text{ differ at most in } r_1\}\\ &= \{\lambda w.\,\text{in } k' \text{ the individual in } r_1 \text{ left in } w \mid k' \text{ is a context}\}\\ &= \{\lambda w.\,x \text{ left in } w \mid x \text{ is an individual}\}\end{aligned}$$

Anaphoric binding is prone to intervention:[7]

(21) a. John didn't consider buying a car$_i$. *It$_i$ was too expensive.
b. Most students considered buying a car$_i$. *It$_i$ was very cheap.
c. John often considered buying a car$_i$. *It$_i$ was very cheap.

Interveners for anaphoric binding do not pass on the context change specified by indefinites in their scope, and this follows from their meaning. For example, *not* expresses that the context change specified by its complement is incompatible with the facts in the evaluation world. Therefore, the alternative set of [*not*[*someone*$_1$ *left*]] for r_1 is the singleton set of the proposition that no one left, see (22). This is the root cause of the intervention effect in the indefinites approach.

(22) $$\begin{aligned}\mathcal{A}lt_1([\,\textit{not}[\,\textit{someone}_1\ \textit{left}]\,]) =\\ &= \{\lambda w.\neg\exists k'.[\![\,[\,\textit{someone}_1\ \textit{left}]\,]\!](k)(k')(w) = 1 \mid k \text{ is a context}\}\\ &= \{\lambda w.\neg\exists k'.\,\text{in } k' \text{ the individual in } r_1 \text{ left in } w\}\\ &= \{\lambda w.\neg\exists x.\,x \text{ left in } w\}\end{aligned}$$

Haida assumes that *wh*-words are indefinites. Thus the question *Who left?* has the denotation in (23). Note that the question operator in (23) defines a partition from the alternative set specified by its complement.

(23) $$\begin{aligned}[\![\,[\,\mathrm{Q}_1\ [_\alpha\ \textit{who}_1\ \textit{left}]]\,]\!] &= [\lambda w\lambda w'.\,\forall p \in \mathcal{A}lt_1(\alpha) :\ p(w) = 1 \leftrightarrow p(w') = 1] =\\ &= [\lambda w\lambda w'.\,\forall p \in \{\lambda w''.\,x \text{ left in } w'' \mid x \text{ is an individual}\} :\ p(w) = 1 \leftrightarrow p(w') = 1]\end{aligned}$$

The string **Not John saw who?* (Hindi with English lexemes) has the denotation in (24), i.e., it is not assigned a *wh*-question meaning but the *yes/no*-question meaning 'Did John see anyone?'. According to [5] it is deviant because *wh*-questions come with an existence presupposition. So the string presupposes a complete answer to the question it expresses, see (25) (recall that *not* is a presupposition hole). That is, it defines a trivial partition of the logical space. This explains the deviance.

(24) $$\begin{aligned}[\![\,[\,\mathrm{Q}_1\ [_\alpha\ \textit{not}\ [\textit{John saw who}_1\,]]]\,]\!] &= [\lambda w\lambda w'.\,\forall p \in \mathcal{A}lt_1(\alpha) :\ p(w) = 1 \leftrightarrow p(w') = 1]\\ &= [\lambda w\lambda w'.\,\exists x(\text{J saw } x \text{ in } w) \leftrightarrow \exists x(\text{J saw } x \text{ in } w')]\end{aligned}$$

(25) *Not John saw who?
derived meaning: 'Did John see anyone?' *presupposition:* 'John saw someone.'

[7] We discuss focus particles in the next section.

3 The intervener status of focus particles

The focus approach of [2] readily predicts that focus particles such as *only*, *even*, and *also* are interveners. For interveners like *not*, *most*, and *often*, [2] assumes that they always come with a $\sim$ operator. This makes the prediction that focus association across these elements is impossible. In German, this prediction is wrong, see [5]. Therefore, we hold that the focus approach cannot be maintained for these elements in German.
The indefinites approach of [5] readily predicts that expressions like **not**, **most**, and **often**, which are interveners for anaphoric binding, are interveners in *wh*-questions. However, the approach does not predict that focus particles are interveners in *wh*-questions since they are not interveners for anaphoric binding:

(26) a. {Only | Even} John considered buying a car$_i$. It$_i$ was very {expensive | cheap}.
b. Auch Anna erwog, einen Wagen$_i$ zu kaufen. Er$_i$ war sehr billig.
'It is also the case that Anna$_F$ considered buying a car$_i$. It$_i$ was very cheap.'

However, [5] gives independent reasons for the observations that question words cannot occur in the scope of *only* and *even*. We illustrate for *only* (for *even*, see [5]). Recall that Haida assumes that *wh*-questions have an existence presupposition. This means that the question in (27) has the content given underneath, which is either trivial or contradictory or it forces a presupposition violation.[8]

(27) *Only Ann saw who?
'For which x: only Ann$_i$ saw x where x is a person that she$_i$ saw?'

Thus (27) does not partition the logical space in a non-trivial way. Hence, it is deviant. The meaning of *also* does not clash with the existence presupposition.

4 The experiments

EXPERIMENT 1 tested the predictions of [2] and of [5] in a speeded-acceptability task with word-by-word presentation. We tested if the focus particles (FPs) *nur* and *auch* have differential effects on the acceptability of multiple *wh*-questions in German where the FP asymmetrically c-commands the *in-situ wh*-word, i.e. where there is an intervention constellation (+INT), or where the *in-situ wh*-word asymmetrically c-commands the FP, i.e. where there is no intervention constellation (−INT). An example set of the test sentences is given below.

Context: Nachher auf dem Hinterhof wird der Deutschlehrer {auch | nur} die Austauschschüler streng rügen. 'Later in the backyard, the.NOM German teacher will sternly scold {also | only} the exchange students.'

(1) −INT *auch* Welcher Lehrer wird wo auch die Austauschschüler streng rügen?
which.NOM teacher will where also the exchange students sternly scold
(2) −INT *nur* Welcher Lehrer wird wo nur die Austauschschüler streng rügen?
(3) +INT *auch* Welcher Lehrer wird auch die Austauschschüler wo streng rügen?
(4) +INT *nur* Welcher Lehrer wird nur die Austauschschüler wo streng rügen?

The two theories make the following predictions for these test sentences. Both [2] and [5] predict that there should not be a difference in acceptability between the −INT conditions, i.e. between

[8] To see this more clearly, consider the bound reading of the sentence in (i). If there is no $y \neq$ Ann, (i) is a tautology. Otherwise, (i) is a contradiction.

(i) #Only Ann$_i$ saw someone she$_i$ saw. 'For all $y \neq$ Ann, y did not see someone y saw.'

(1) and (2). For the +Int conditions (3) and (4), the theories make differential predictions. If [5] is correct about *auch* not being an intervener and *nur* being an intervener, condition (3) with *auch* should be more acceptable than condition (4) with *nur*. Overall, [5] predicts a drop in acceptability for the +Int conditions vs. the −Int conditions because of the expected drop in acceptance for condition (4). [2], in contrast, predicts only one difference: −Int should be better than +Int.

Method. ***Participants.*** 40 native speakers of German from the Berlin-Brandenburg region took part in the experiment after giving informed consent. They received 7 Euros in return. ***Design and materials***. The design was a 2×2 within-subject design with the factors FP (*auch* vs. *nur*) and Int (intervention configuration or not), yielding the four conditions given above. There were 4*10=40 experimental items per participant and condition, which were distributed over lists in a Latin square design, including 88 unrelated fillers. Each experimental item included a context sentence and the critical *wh*-question, which asked for information that was given in the context sentence. All subject *wh*-phrases in the experiment had masculine gender so that the first *wh*-phrase was unambiguously marked for nominative. ***Procedure***. Participants were tested individually by using the software DMDX.[9] The items were randomly presented in the centre of the screen, word-by-word with 400 milliseconds per word plus 100 ms between words, and 200 ms after the last word of each item. Participants judged the well-formedness of the question - whether it sounded *natürlich* 'natural' or not - within a maximal interval of 3000 ms by pressing one of two buttons. 1000 milliseconds after the response, the next trial began. Prior to the experimental session, participants were told that the term *natürlich* meant that they were to judge the question using their own intuitions rather than prescriptive grammar rules, i.e. that they were to judge for grammaticality. For illustration, they were given some unrelated examples for grammatical and ungrammatical sentences with and without syntactic and semantic violations. They received practice trials in order to ensure that they had understood the task.

Results. A statistical analysis of the acceptance rates was performed by fitting a generalized linear mixed model [1] with a logistic link function, for planned comparisons. We coded contrasts for the factor Int (+1 for conditions (1) and (2), −1 for (3) and (4)), for the FP in the non-intervention constellation (+1 for *auch*, −1 for *nur*), and for the FP in the intervention constellation (+1 for *auch*, −1 for *nur*). Participants and items were random factors. Figure 1 illustrates the mean acceptance proportions for conditions (1) through (4).

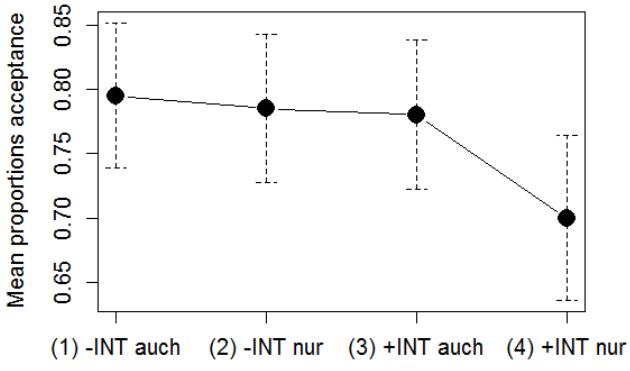

Figure 1: Mean proportions of acceptance with 95% CI in experiment 1

The comparison of the intervention constellation vs. the non-intervention constellation yielded a marginally significant effect (*estimate* = 0.168, *se* = 0.098, $z = 1.718$). −Int was accepted more often than +Int. The comparison of conditions (1) and (2) yielded no difference between these conditions (*estimate* = 0.043, *se* = 0.142, $z = 0.300$). The comparison of conditions (3) and (4) yielded a significant effect (*estimate* = 0.271, *se* = 0.135, $z = 2.009$). Condition (3) with the FP *auch* was accepted more often than condition (4) with the FP *nur*.

[9] http://www.u.arizona.edu/~jforster/dmdx.htm

Discussion. These results fit the predictions of the approach of [5], suggesting that *auch* and *nur* differ in their intervener status, i.e. *auch* does not function as an intervener between the question operator and an *in-situ wh*-word whereas *nur* does.

EXPERIMENT 2 was designed to investigate the online processing of *auch* vs. *nur* as potential interveners. It was a self-paced reading study where participants read the same experimental items as in experiment 1 but only in conditions (3) and (4), i.e. in the +INT configuration. A direct comparison with (1) and (2) is not meaningful due to the different positions of the *in-situ wh*-phrase. For the conditions tested in this experiment, [5] predicts an increase in reading time for questions with *nur* compared to questions with *auch* when, or shortly after, the reader reads the *in-situ wh*-word because this is where the problematic semantic integration is expected to be carried out. [2] predicts no difference between questions with *auch* vs. questions with *nur*.

Method. 40 native speakers of German from the Berlin-Brandenburg region took part in the experiment after giving informed consent. They received 7 Euros in return. ***Design and materials***. The design was a one-factorial within subjects-design with the two-level factor FP (*auch* vs. *nur*). There were 2*10=20 experimental items, which were distributed over two lists, including 112 fillers from other experiments. The items were the same as in experiment 1, conditions (3) and (4). ***Procedure***. Participants were tested individually by using the software *Presentation*. They read the items at their own pace. The items were randomly presented word-by-word non-cumulatively in a stationary window in the centre of the screen. Participants pressed the space bar to proceed from word to word. After each item, they answered the question by choosing one of three answers as the correct one, which ensured that they read the discourses for their meaning.

Results. The statistical analysis (linear mixed effect model with contrasts +1 for *auch* and -1 for *nur*), was conducted over residual reading times (RRTs), which were calculated per participant on the basis of test & filler items.

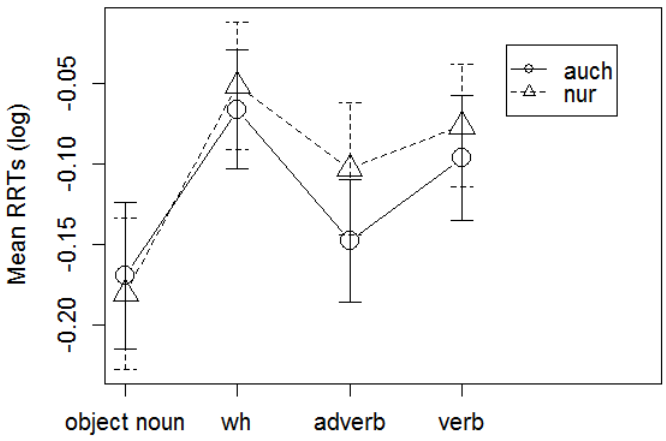

Figure 2: Mean RRTs for the clause-final region with 95% CI in experiment 2

The mean RRTs for the clause-final region are given in figure 2. There was a weak effect on the adverb after the *in-situ wh*-word (*estimate* = -0.022, *se* = 0.012, $t = -1.828$, *p (MCMC-estimated)* = 0.068) but not in any other position. RRTs were higher in questions with *nur* than in questions with *auch*. There were no effects on the accuracy or speed in the answer task. The mean answer accuracy was 88%.

Discussion. These results again support the approach of [5]. The observed effect in the reading times arises at a moment during processing when this is expected if *nur* is an intervener whereas *auch* is not – right after the *in-situ wh*-word, when we would expect interpretation difficulties to arise.

EXPERIMENT 3 was a speeded acceptability study which used the same method as exper-

iment 1 but tested object questions rather than subject questions as in experiment 1. There was an additional control condition with a non-focused DP (*der Deutschlehrer* 'the German teacher') as potential intervener. For reasons of space we only sketch the most important results here. There were reduced acceptance proportions for questions with *nur* in the +INT condition compared to the −INT condition. There were no effects of the factor INT for conditions with a non-focussed DP and for conditions with *auch*. Overall, the results of experiment 3 corroborate the findings of experiments 1 and 2, again supporting [5].

5 Conclusion

The results of the three experiments converge in confirming the predictions of the indefinites approach of [5] and in disconfirming the predictions of the focus approach of [2] for German. This suggests that, at least in German, there are two types of interveners: those that block the question operator from accessing the context alternatives induced by the *wh*-phrase, i.e. interveners in the literal sense. In addition, there are operators that must not have a *wh*-phrase in their scope as this leads to a semantic clash with the meaning of the operator. The focus particle *nur* is among them but *auch* is not. This raises the question of why German seems to be different from Korean and Malayalam with respect to the intervention status of *also*, see [2]. The most obvious difference between these languages are the *wh-ex-situ* vs. *wh-in-situ* question formation strategies. However, it is not quite clear how this would have a bearing on the compositional semantics of *wh*-questions. This requires further empirical work in other languages.

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