



# The German additive particle *noch*: Testing the role of topic situations

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## Abstract

The particle *noch* ('still') can have an additive reading similar to *auch* ('also'). We argue that both particles indicate that a previously partially answered QUD is re-opened to add a further answer. The particles differ in that the QUD, in the case of *auch*, can be re-opened with respect to the same topic situation, whereas *noch* indicates that the QUD is re-opened with respect to a new topic situation. This account predicts a difference in the accommodation behavior of the two particles. We present an experiment whose results are in line with this prediction.

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We report the result of an experiment testing the difference in meaning between German *auch* ('also') vs. *noch* ('in addition', 'still'). Both can be used as additive particles (Eckardt 2007; Umbach 2012), cf. Umbach's examples in (1).

- (1) (Otto hat ein Bier getrunken. 'Otto had a beer.')
- Otto hat **auch/noch** einen SCHNAPS getrunken.  
 Otto has also/still a schnaps drunk  
 'Otto also had a schnaps.'/'Otto had a schnaps in addition.'

Grubic (2018), following Eckardt (2007); Umbach (2012), proposed that both additive particles indicate that a previously answered question under discussion (QUD) (*What did Otto drink?*) is re-opened in order to add a further answer. Grubic proposed they differ in that with *auch*, the two QUDs are usually about the same topic situation, whereas in the case of *noch*, the QUDs are obligatorily about a different topic situation. When the topic situation is overtly shifted using a temporal adverbial such as *last year* in (2), this account predicts a difference in accommodation behavior: for *auch*, which can relate propositions about the same topic situation, it is expected that hearers can accommodate that the prementioned proposition (*Bertha walked the first 11 stages*) is true in the second topic situation, too. Thus with *auch*, (2) is predicted to suggest that Bertha walked all 32 stages last year. For *noch*, which relates propositions about different topic situations, no accommodation of this kind is predicted.

- (2) (Five years ago, Bertha walked the first eleven stages of the Way of St. James.  
 Then she unfortunately had to discontinue her pilgrimage because of an injury.)  
 Letztes Jahr ist sie **auch/noch** die letzten 21 Etappen gelaufen.  
 last year is she also/still the last 21 stages walked  
 'Last year, she (also) walked the last 21 stages.'  
 AUCH → she walked 11 stages five years ago and **all 32 stages last year**  
 NOCH → she walked 11 stages five years ago and **21 stages last year**

We report the results of an experiment testing this intuition. §2 summarizes the previous literature concerning the difference between *auch* and *noch*. The results of a pre-experiment (testing the plausibility of the presupposition to be accommodated) and our main experiment are reported in §3. Grubic's (2018) account predicts, first, that *noch* should be degraded in items where accommodation is most plausible. Second, *auch* should be felicitous in all items, but its interpretation (accommodation/non-accommodation) should change depending on the plausibility of accommodation. Both hypotheses were confirmed in our experiment, suggesting that *noch*, but not *auch*, requires a change in topic situation. In §4, we provide a QUD account capturing this generalization. In §5, we discuss some open issues. §6 provides a summary.

## 2 Literature overview

### 2.1 A first QUD account for *auch* ('also')

Under a QUD account of focus, focus indicates alternatives which are distinct possible answers to a salient question under discussion (Roberts 2012: i.a.), cf. e.g., (3), where the focus accent is indicated using small caps.

- (3) a. OTTO had a beer.  
 b. { Otto had a beer, Paula had a beer, Quentin had a beer, ... }  
 c. QUD: Who had a beer?

This accounts for the intuition that (3a) can be used in contexts where the addressee knows (or considers expectable) that somebody had a beer, but does not know who, e.g., in answers to an overt question or in corrections of statements like *Paula had a beer*. When the placement of the focus accent changes, the alternatives and QUD change, too (4).

- (4) a. Otto had a BEER.  
 b. { Otto had a beer, Otto had a schnaps, Otto had a cocktail, ... }  
 c. QUD: What did Otto have?

*Auch* ('also', 'too') does not change the truth-conditions of the sentence, it merely introduces a presupposition. Unstressed *auch* is focus-sensitive: the presupposition contributed by *auch* changes when the location of the focus accent changes (5).<sup>1</sup>

- (5) a. Otto hat **auch** ALTE Bücher gekauft.  
 Otto has also old books bought  
 'Otto also bought OLD books.'  
 PRESUPP ≈ Otto bought other kinds of books (e.g., new books).
- b. Otto hat **auch** alte BÜCHER gekauft.  
 Otto has also old books bought  
 'Otto also bought old BOOKS.'  
 PRESUPP ≈ Otto bought other old things (e.g., old furniture).

Under a QUD account, additive particles associating with focus indicate that a previously answered question is re-opened in order to add a further answer, thereby marking the previous answer as partial (Beaver & Clark 2008; Jasinskaja & Zeevat 2009), see (6).

- (6)
- ...  
 /                    \  
 What did Otto have?    What did Otto have?  
 |                            |  
 Otto had a SCHNAPS.    Otto also had a BEER.

In the following, such an account will be adopted for both *auch* and *noch*, and will be refined in order to account for the differences between the two particles.

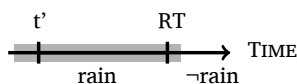
## 2.2 Previous QUD accounts of additive *noch*

Additive *noch* is assumed to be very similar to *auch*: First, it merely contributes a presupposition and has no effect on the truth conditions. Second, it is focus-sensitive (7).<sup>2</sup>

- (7) a. Dann hat Otto **noch** ALTE Bücher gekauft.  
 Then has Otto still old books bought  
 'Otto bought OLD books in addition.'  
 PRESUPP ≈ Otto bought other kinds of books (e.g., new books).
- b. Dann hat Otto **noch** alte BÜCHER gekauft.  
 Then has Otto still old books bought  
 'Otto bought old BOOKS in addition.'  
 PRESUPP ≈ Otto bought other old things (e.g., old furniture).

*Noch* has a variety of uses, e.g., as a *scale alignment* particle corresponding to *still* in English (e.g. Löbner 1989; Krifka 2000; Ippolito 2007; Beck 2020). The basic reading of *noch* is temporal, indicating that an eventuality continues to hold at the reference time (8).

- (8) *Imperfective reading*  
 Es regnet **noch**.  
 it rains still  
 'It is still raining.'
- a. Assertion: it is raining  
 b. Presupposition: it rained before  
 c. Possible implicature: it will stop raining soon



Other readings of *noch* involve different scales and different entities ranked on these scales, e.g. (9), where individuals are ranked on a scale of locations (a path).

<sup>1</sup> Stressed *AUCH*, in contrast, is argued to be topic-sensitive (Krifka 1998).

<sup>2</sup> There is also a stressed variant of *NOCH*—see (20) below—but it is arguably not topic-sensitive.

- (9) Basel liegt **noch** in der Schweiz.  
 Basel lies still in the Switzerland  
 ‘Basel is still in Switzerland.’

Beck (2020) proposes the unified lexical entry in (10a) (see also Klein 2007; Beck 2016). Thereby, *S* is a salient scale, and *x* and *x\** are entities ranked on this scale (*x\** is salient). The semantic types of *x*, *x\** and *P* and the nature of *S* vary across readings.

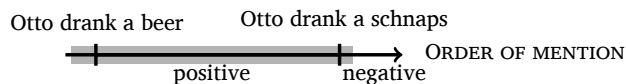
- (10) [[noch/still]] =  $\lambda S.\lambda x^*.\lambda x.\lambda P\langle x,t \rangle: x^* \prec_S x \ \& \ P(x^*), P(x)$

The next sections discuss how this account has been adopted for additive *noch*.

### 2.2.1 Eckardt (2007)

Regine Eckardt (2007) adopts the account discussed above for additive *noch*, the scale *S* being the order of mention, and the entities ranked on the scale being answers to the QUD:

- (11) Otto hat **noch** einen SCHNAPSgetrunken.  
 Otto has still a Schnaps drunk.  
 ‘Otto also drank a SCHNAPS.’
- ASSERTION: Otto drank a schnaps
  - PRESUPP.: there is an earlier-mentioned “positive” alternative
  - IMPLICATURE: later-mentioned alternatives are “negative”



Eckardt reports two main differences between *auch* and *noch*: First, only *noch* gives rise to expectations about a following *negative phase*. Consider (12) (Eckardt 2007: p. 80): If the focus alternatives are contextually restricted to Tick, Trick and Track (Donald Duck’s nephews), (12a) is odd—according to Eckardt—because all answers are positive. (12b) is ideal because the host sentence of *noch* (*Trick kann noch schwimmen*) is followed by a negated sentence (*Track kann nicht schwimmen*).

- (12) (Tick kann schwimmen, und TRICK kann noch schwimmen, .../‘Huey can swim, and Dewey can *noch* swim...’)
- #und TRACKkann **noch** schwimmen.  
 and Louie can still swim  
 ‘and Louie can ‘noch’ swim.’
  - aber Track kann **nicht** schwimmen.  
 but Louie can not swim  
 ‘but Louie can’t swim.’

Second, Eckardt notes that *noch*—in contrast to *auch*—requires a “fixed and stable” domain of alternatives. For example, (13) gets odd as soon as it becomes clear that the speaker is randomly listing even numbers (Eckardt 2007: p. 81).

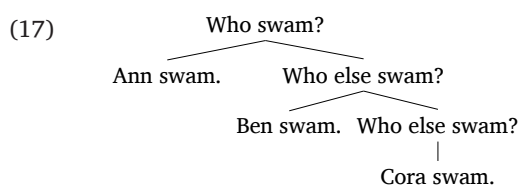
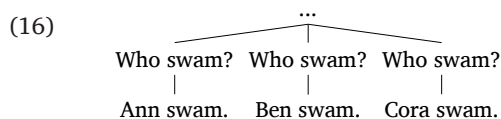
- (13) (2 is an even number...)  
 4 ist **noch** gerade, 6 ist **noch** gerade, #78 ist **noch** gerade...  
 4 is still even 6 is still even 78 is still even  
 ‘4 is *noch* even, 6 is *noch* even, 78 is *noch* even...’

The first difference in (12) is due to the implicature involved with *noch* (11c). The second difference in (13) however needs to be accounted for independently. Eckardt suggests that *auch* indicates that a QUD is re-opened with respect to new alternatives, whereas *noch* indicates that a QUD is re-opened with respect to a subset of the previous alternatives. For example, the initial QUD in (13) might felicitously involve all numbers from 1–10, and each successive QUD then involves a subset of the alternatives in the preceding QUD (e.g., numbers from 1–10 excluding 2, numbers from 1–10 excluding {2,4}, etc.). As soon as it becomes clear that this domain is very large, possibly infinite, *noch* is infelicitous.

Eckardt's proposal for *noch* is shown in (14), based on the definitions in (15) (Eckardt 2007: p. 87–89).

- (14) a. Use of *noch* in questions: A question *q* in a QAD ['Question Answer Discourse'] licenses *noch* iff
- (i) it is a remnant question
  - (ii) it is dominated by a question *Q* such that there are assertions between *Q* and *q*, and all assertions between *Q* and *q* are positive answers to *Q*.
- b. Use of *noch* in assertions: An assertion *u* in a QAD licenses *noch* iff *u* is a positive answer to its dominating question *q*, and *q* licenses *noch*.
- (15) a. **Answerhood** in a given context: An assertion *S* constitutes an answer to a question  $\langle P, A \rangle$  in a given discourse context *C* iff for at least one  $a \in A$ , the augmented context  $C + [[S]] \models P(a)$  or  $C + [[S]] \models \neg P(a)$
- b. **Complete answer** to question  $\langle P, A \rangle$  in context *C*: An assertion *S* is a complete answer to  $\langle P, A \rangle$  in *C* iff for all  $a$  in *A*,  $C + [[S]] \models P(a)$  or  $C + [[S]] \models \neg P(a)$
- c. **Partial answer**: An assertion *S* is a partial answer to  $Q = \langle P, A \rangle$  in *C* iff *S* is an answer, but not a complete answer to *Q*.
- d. **Subquestion** of a question *Q* in context *C*: A question *Q'* is a subquestion of *Q* in context *C* iff a complete answer to *Q'* in *C* is a partial answer to *Q* in *C*. Specifically, the following types of question-subquestion relation hold against the empty context:  
 If  $\langle P, A \rangle$  is a question and  $A' \subset A$ , then  $\langle P, A' \rangle$  is a subquestion of  $\langle P, A \rangle$  against the empty context  
 If *Q* is a Wh-question  $\langle P, A \rangle$  and *Q'* is a yes-no question for *P* about one  $a \in A$ :  $Q' = \langle \lambda F.F(\neg P(a)), \{\lambda p.p, \lambda p.\neg p\} \rangle$ , then *Q'* is a subquestion of *Q* in the empty context.
- e. **Remnant question**: A question *R* is the remnant question to a question *Q* in context *C* iff *R* is a subquestion to *Q* in the empty context, and a complete answer to *R* in context *C* is a complete answer to *Q* in *C*.
- f. **Question Answer Discourse**: An ordered binary tree represents a coherent QAD iff
- (i) Its root is a question
  - (ii) No assertion dominates a question
  - (iii) For all questions *Q* in a QAD with local context *C*: The daughters of *Q* are either
    - two partial questions that together are equivalent to *Q* or
    - an answer *S* plus the remnant question to *Q* in context  $C + [[S]]$ . (If the answer is complete, then the remnant question may be empty.)

Note first that questions are represented as structured meanings (von Stechow 1990), i.e., as a pair  $\langle P, A \rangle$ , whereby *A* is a set of alternatives, and *P* a property. For example, the meaning of *Who swam?* is represented as  $\langle \lambda x. \text{Swam}(x), \text{HUMAN} \cap C \rangle$ , whereby *C* contextually restricts the domain of individuals under consideration. Second, note that discourse trees are assumed to be binary in Eckardt's account, i.e., in contrast to the proposal sketched in §2.1 above, where re-opened questions are sister questions as in (16), they are often subquestions in Eckardt's account (17).



Under Eckardt's account, *noch* thus differs from *auch* in that (i) it involves a restricted and fixed domain of focus alternatives, modelled via the restriction that *noch*-answers can only answer a remnant question, and (ii) in that it indicates a following negative phase.

## 2.2.2 Umbach (2012)

Carla Umbach adopts Eckardt's QUD account, but argues that the domain of alternatives is *extended* with *noch*, too.<sup>3</sup> Umbach argues that this can be seen in questions (Umbach 2012: p. 1847). In *wh*-questions, *noch* is the standard additive particle, i.e., it involves new, previously unconsidered alternatives, whereas *auch* is marked: it suggests that the questioner already knows the answer. For example, in (18) (adapted from Umbach 2012: p. 1845), the mother, who doesn't know what happened, can ask the neutral question (18a), but not (18b), because the latter is a request for a specific answer.

- (18) (Little Lisa tells her mother what happened when she visited the zoo with Auntie.)
- a. Mother:  
 Und was ist im Zoo **NOCH** passiert?  
 and what is in.the zoo still happened  
 'What else happened at the zoo?'
- b. Auntie/# Mother:  
 Und was ist im Zoo **AUCH** passiert?  
 and what is in.the zoo also happened  
 'What happened at the zoo, too?'

Umbach proposes that both *auch* and *noch* indicate that a QUD is re-opened with respect to an extended domain of alternatives. They differ in that alternatives are ordered (by time of mention) with *noch*.

According to Umbach, this causes the following contrast: with *dann...noch*, the events can be ordered by time of mention ("discourse time") (19a), whereas with *dann...auch* the order of the two events is necessarily aligned with "real time" (19b) (Umbach 2012: p. 1844).

- (19) (Otto had a beer.)
- a. *Dann* hat er **noch** einen SCHNAPS getrunken. (no particular order)  
 then has he still a schnaps drunk
- b. *Dann* hat er **auch** einen SCHNAPS getrunken. (beer < schnaps)  
 then has he also a schnaps drunk  
 'Then he drank a schnaps in addition.'

Umbach proposes that *dann* is ambiguous (discourse time *dann* (19a) vs. real time *dann* (19b)). According to Umbach, the fact that (19a) allows for the discourse time interpretation has to do with the alternatives, in the case of *noch*, being ordered by discourse time. In fact, *noch* is most felicitous with (discourse time) *dann* and similar elements (Umbach 2012: p. 1851). Umbach writes that discourse time *dann* facilitates the additive reading because it indicates that the answers are disjoint.

Umbach also provides (20) as evidence for the claim that *noch*, but not *auch*, involves ordered alternatives. (20) is felicitous with accented *noch* with the interpretation of *another*.

- (20) (Otto had a schnaps. And you won't believe it:)  
 Er hat **NOCH** einen Schnaps getrunken. (#**auch**)  
 he has still a schnaps drunk  
 'He had another schnaps.'/'# He had a schnaps, too'

Umbach proposes that stressed **NOCH** in (20) has the same meaning as unstressed *noch*. Umbach suggests that *einen Schnaps* is focused (but deaccented because it is given), and proposes that *noch* can associate with deaccented foci because the alternatives can be individuated due to their order. In the case of *auch*, the alternatives are not ordered, and thus *auch* cannot associate with *Schnaps* in (20).

Umbach (2012: p. 1852) proposes the following meaning for additive *noch* (also relying on structured meanings (von Stechow 1990), whereby F is the focused constituent, B is a predicate corresponding to the background, and Alt(F) are the focus alternatives):

<sup>3</sup> *Extended*, in Umbach's terminology, means that the immediate QUD of the *noch* answer involves an entirely distinct domain of alternatives than the antecedent QUD, rather than a larger (superset) domain.

- (21) *noch*  $\langle \langle B, F \rangle \rangle$  iff  $\langle B, F \rangle$   
 where  $\text{Alt}(F)$  is ordered such that the order is aligned with the order of mentioning  $\langle \_ \_ \rangle_m$   
 on the subset of mentioned alternatives  $\text{Alt}_m(F)$ , and  $F$  is maximal in  $\text{Alt}_m(F)$ ;  
 presupposing that  $\exists x \in \text{Alt}_m(F)$  such that  $x \neq F$ ,  $x \langle \_ \_ \rangle_m F$ , and  $\langle B, x \rangle$

The only difference to *auch* is that the alternatives are ordered in the case of *noch*. Concerning the behavior of *auch* and *noch* in questions (18), Umbach argues that this is due to AUCH associating with contrastive topics. Since topics are referential, this enforces a referential reading of the *wh*-element.

Umbach proposes the following QUD account (Umbach 2012: p. 1861), where  $B$  is a property corresponding to the background and  $D$  its domain, a set of alternatives which are possible arguments for  $B$ .<sup>4</sup> Intuitively,  $D$  is the set of elements that can replace the *wh*-element in the corresponding answer.

- (22) a. unstressed *auch* in questions indicates that the question is an extension question  
 b. unstressed *auch* in answers addresses an extension question.
- (23) a. *noch* in questions indicates that the question is a continuation question;  
 b. *noch* in answers addresses a continuation question
- (24) a. A question  $q^0 = \langle B^0, D^0 \rangle$  is an **extension question** with respect to a preceding **question**  $q^{-1} = \langle B^{-1}, D^{-1} \rangle$  iff  
 (i)  $B^0 = B^{-1}$  (ii)  $D^0 \cap D^{-1} = \emptyset$  (iii)  $D^s = D^{-1} \cup D^0$  is a superordinate domain  
 b. A question  $q^0 = \langle B^0, D^0 \rangle$  is an **extension question** with respect to a preceding **assertion**  $a^{-1} = \langle B^{-1}, F \rangle, \text{Alt}(F)^{-1}$  iff  
 (i)  $B^0 = B^{-1}$  (ii)  $D^0 \cap \text{Alt}(F)^{-1} = \emptyset$  (i)  $D^s = \text{Alt}(F)^{-1} \cup D^0$  is a superordinate domain  
 The definitions are adapted to polarity questions  $q = \langle \lambda F.F(P(a)), \{\lambda p.p, \lambda p.\neg p\} \rangle$  by assigning  $B: = P$  and  $D: = \{a\}$
- (25) A question  $q^0 = \langle B^0, D^0 \rangle$  is a **continuation question** iff it is an extension question such that  $D^0$  is ordered. Combination of  $D^0$  and  $D^{-1}$  or  $\text{Alt}(F)^{-1}$  has to be order preserving.

In Umbach's account, a *wh*-question is thus assumed to be re-opened with respect to a different domain of alternatives (26). This holds for both *auch* and *noch*.

- (26)
- 
- Who (of {Cora, Dan, Elsie}) can swim? Who (of {Anne, Ben}) can swim?  
 Elsie can swim. Anne can swim.

*Auch* and *noch* differ in that *noch* involves a subset of mentioned alternatives, ordered by time of mentioning, and triggers the presupposition that there is a prementioned alternative.

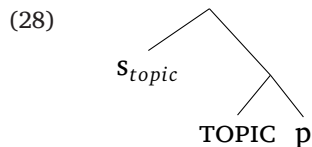
### 2.2.3 Grubic (2018)

Grubic (2018) adopts Eckardt's and Umbach's account of (unstressed) *auch* as involving an extended domain of alternatives, but proposes an account according to which *topic situations* play a role for the interpretation of *noch*. (Austinian) topic situations are the situations that the respective sentences are about (Austin 1950; Kratzer 2020). Situations are parts of worlds. Propositions are assumed to be functions from situations to truth values. The truth of a proposition is evaluated with respect to its topic situation  $s_0$ , and (usually) not the whole world  $w_0$ . Grubic (2018) demonstrates this using (27) (a version of an example from Barwise & Etchemendy 1987, see Kratzer 2020). The idea that (27) is perceived to be false even though Claire does have the three of clubs in the evaluation world can be captured by assuming that (27) is evaluated with respect to a topic situation containing only Game 1, but not Game 2.

- (27) (Emily is playing a card game (Game 1), and somewhere else, Claire is playing cards (Game 2). Both have the three of clubs.) Someone, watching game 1, mistakes Emily for Claire and says:  
 Claire has the three of clubs.

<sup>4</sup> Umbach also provides a proposal for stressed AUCH, which will not be relevant for the current proposal.

Declarative utterances inherit their topic situation from their immediate QUD (Kratzer 2020), whereas the topic situation of a QUD is a subsituation of the topic situation of its immediate superquestion (Schwarz 2009: p. 166). Tense, as well as sentence-initial temporal or locative (so-called *frame-setting*) adverbials can provide further information about the topic situation (Maienborn 2001; Klein 2008; Frazier & Clifton 2018; Kratzer 2020). Following Schwarz (2009: p. 93–94), topic situations are assumed to be syntactically represented as situation variables high in the clause (e.g., in TP or CP), which are arguments to an operator TOPIC. This operator ensures that the proposition is evaluated with respect to the topic situation: the proposition is a property of counterparts of the topic situation, i.e. of “the same” situation in different worlds (Lewis 1986).



(29)  $[[\text{TOPIC}]] = \lambda p.\lambda s'.\lambda s. s \approx s' \ \& \ p(s)$   
 where ‘ $\approx$ ’ is the counterpart relation

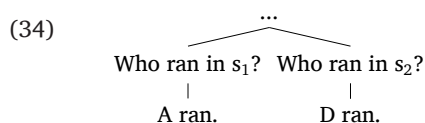
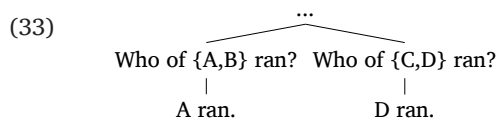
Grubic (2018) follows Eckardt (2007) and Umbach (2012) in the assumption that *auch* indicates that a QUD is re-opened to include further, hitherto ignored alternatives (30).<sup>5</sup> *Noch*, in contrast, indicates that a QUD is re-opened with respect to a different topic situation (31)–(32). Thus, in contrast to Eckardt (2007) and Umbach (2012), Grubic (2018) does not assume that *noch* poses any restrictions on the domain of alternatives in the QUD.

(30) unstressed *auch* in answers addresses an extension question;  
 unstressed *auch* in questions indicates that the question is an extension question.  
 (from Umbach 2012: p. 1861, see (22) above)

(31) *noch* in answers addresses a shifted question;  
*noch* in questions indicates that the question is shifted.

(32) A question  $Q = \langle B, D \rangle$  about  $s$  is a shifted question with respect to a preceding question  $Q' = \langle B', D' \rangle$  about  $s'$  iff (i)  $B = B'$ , (ii)  $s \neq s'$

The trees in (33)–(34) show the assumed QUD hierarchies for unstressed *auch* and *noch*.<sup>6</sup>



Grubic argues that this account can explain Umbach’s data discussed in §2.2.2.<sup>7</sup> First, the reason why *noch* is most felicitous with e.g. *dann* (‘then’, (35)) is that *dann* is a topic-situation shifter.

(35) (Otto had a beer.)  
 a. *Dann* hat er **noch/auch** einen SCHNAPS getrunken.  
 ‘Then he also drank a schnaps.’  
 b. Er hat **auch/??noch** einen SCHNAPS getrunken.  
 (intended:) ‘He also drank a schnaps.’

<sup>5</sup> This is seen as a repair mechanism in the sense that Roberts (2012: p. 45) discusses for implicature cancellation in general: “[...] ‘implicature cancellation’ might more aptly be called ‘post hoc clarification (by the speaker) and revision (by the hearer) of intended context’”.

<sup>6</sup> In (34), no domain is shown because, as will become clearer below, Grubic’s (2018) account does not make any predictions with respect to the domain.

<sup>7</sup> We now believe that there is more to these examples than assumed in Grubic (2018), see §6.



Second, the use of *auch* indicates that relevant alternatives were neglected in a preceding answer. When used in a question, it thus indicates that the addressee forgot or neglected relevant alternatives—thus accounting for its markedness (36).

- (36) (Little Lisa tells her mother what happened when she visited the zoo with Auntie.)
- a. Mother: Und was ist im Zoo **NOCH** passiert?  
 ‘What else happened at the zoo?’
  - b. Auntie: Und was ist im Zoo **AUCH** passiert?  
 ‘What happened at the zoo, too?’ (# mother)

Third, following Umbach (2012), Grubic (2018) adopted the idea that stressed **NOCH** associates with *Schnaps* in (37). Grubic (2018) proposed that *noch* only requires a shift in topic situation—the domain of focus alternatives (of e.g., *Schnaps*) can in principle be the same as in the preceding answer, i.e., a preceding answer can be provided again without being uninformative (since it is about a different topic situation).

- (37) (Otto had a schnaps. And you won’t believe it:)  
 Er hat **NOCH** einen Schnaps getrunken. (#**auch**)  
 ‘He had another schnaps.’/‘# He had a schnaps, too.’

Finally, Grubic (2018)’s account correctly predicts that *auch* and *noch* can co-occur (38). *Auch* requires an extended domain of alternatives (compatible with a shift in topic situation). *Noch* requires a topic situation shift (compatible with an extended domain of alternatives).<sup>8</sup>

- (38) (Otto hat ein Bier getrunken)  
 Otto hat **auch noch** einen SCHNAPS getrunken.  
 Otto has also still a schnaps drunk  
 ‘Otto also drank a schnaps.’  
 (PRESUPP: Otto drank something else (e.g., a beer))

To sum up, the previous QUD accounts for additive *noch* agree that unstressed *auch* indicates that the domain of considered alternative answers to the QUD is extended. The proposals differ for additive *noch*: According to Eckardt (2007), *noch* in an answer indicates that its QUD involves a subset of the antecedent QUD’s domain of alternatives. According to Umbach (2012) and Grubic (2018), the domain of alternatives is extended with *noch*, too. Umbach (2012) argues that with *noch*, the alternatives are ordered by time of mention. Grubic (2018) proposes that the QUD of the *noch* sentence involves a different topic situation than the antecedent QUD (whereas *auch* usually—but not necessarily—involves the same topic situation).

### 2.3 A prediction

In the preceding sections, examples such as (39) were discussed. Grubic (2018) suggested that although, superficially, this looks like one coherent situation, the use of *dann* and *noch* indicates that the second sentence is about a shifted situation.

- (39) (Otto had a beer.)  
 Dann hat er **noch** einen SCHNAPS getrunken.  
 then has he still a schnaps drunk  
 ‘And he also drank a schnaps.’

This predicts that when there is a clear shift to a temporally distinct topic situation, for example one that takes place much later than the first situation, the difference between *auch* and *noch* should be more clearly visible. One clear case of overt topic situation shift are initial temporal or locative adverbials (40) (Frazier & Clifton 2018).

- (40) **Topic Situation Hypothesis:** Initial temporal and locative PPs introduce Topic Situations. By default, following material is included in the Topic Situation until a new Topic Situation, or incompatible information, is encountered.

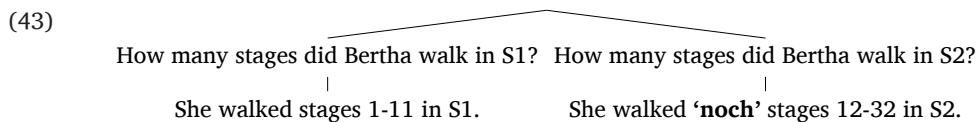
<sup>8</sup> Both Eckardt and Umbach briefly discuss such examples, too (Eckardt 2007: p. 93, Umbach 2012 p. 1856f). Eckardt proposes that the positive phase requirement of *noch* is retained, but not the fixed domain. Umbach proposes that when they associate with the same constituent “*auch* [marks] a supplement to the previous answer while *noch* indicates an extension of the domain of the [QUD].”

Given this assumption, Grubic’s (2018) account predicts for *noch* in (41) that the first sentence can be the required antecedent, since *noch* merely requires a preceding answer to the same QUD about a different topic situation.

- (41) (Five years ago, Bertha walked the first eleven stages of the Way of St. James.)  
 Letztes Jahr ist sie *auch/noch* die letzten 21 Etappen gelaufen.  
 last year is she also/still the last 21 stages walked  
 ‘Last year, she also/additionally walked the last 21 stages.’

The main accent lies on the object (‘the last 21 stages’), leading to a QUD such as *How many stages did she walk?*. There is an initial temporal expression (‘last year’) indicating that the topic situation is changed with respect to the antecedent (‘five years ago’). This account thus predicts the QUD hierarchy in (43) for *noch*, involving the two situations in (42). *Noch* in (43) presupposes a previous answer to the question *How many stages did Bertha walk?* about a **different** topic situation than S2. This previous answer is provided (*She walked stages 1–11 in S1*). Thus, the presupposition is satisfied in this context, and it is predicted that no accommodation takes place.

- (42) S1: Five years ago  
 S2: Last year

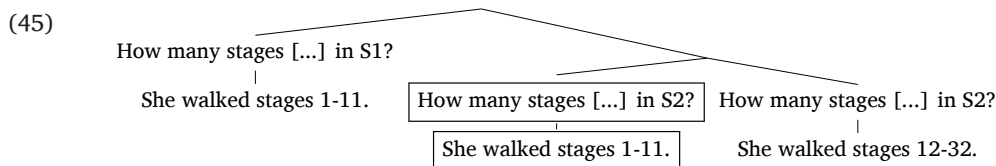


Since, according to Grubic (2018), *auch* requires a change in the domain of alternatives in the QUD, but does not impose any requirements with respect to the topic situation, this interpretation (without accommodation) is predicted to be possible for *auch*, too.

In addition, a second possible interpretation is predicted for *auch* but not for *noch*. It was observed for *also* in English that accommodation takes place in contexts with such shifted topic situations: Kim (2012; 2015) reports that in examples like (44)—where arguably the topic situation is shifted via a contrastive topic—participants accommodate a presupposition.

- (44) (Mark has some pears and some oranges.)  
 Jane also has some APPLES.  
 (accommodated: Jane has some pears and some oranges)

If unstressed *auch* patterns like *also* in this respect, it is expected that participants can accommodate a presupposition about the new topic situation S2 in (41), namely that Bertha walked stages 1–11 again, in addition to stages 12–32.<sup>9</sup>



Grubic’s account thus predicts a difference between *auch* and *noch* with respect to their accommodation behavior. We believe that Eckardt (2007) and Umbach (2012) do not make such predictions. Under both accounts, *auch/noch* require a previous answer to the question *How many stages did Bertha walk last year?*, therefore the preceding overt sentence does not satisfy the presupposition of *auch/noch*—the *no-accommodation* reading isn’t possible. Eckardt does not discuss accommodation—we thus tentatively propose that Eckardt’s account would predict the same behavior for *auch* and *noch*. Umbach states that neither additive *noch* (Umbach 2012) nor *auch* (Umbach 2009) allow for accommodation. This leads to the predictions in [Table 1](#) for examples like (41).

9 A reviewer asks why precisely this proposition is accommodated. Speakers use all available cues to identify possible information to be accommodated (Grubic & Wierzba 2019)—arguably, in this case, an immediately preceding parallel answer, if plausible, can provide this identifying information.

	<i>auch</i>		<i>noch</i>	
	accomm.	no accomm.	accomm.	no accomm.
Eckardt 2007	✓(?)	–	✓(?)	–
Umbach 2012	–	–	–	–
Grubic 2018	✓	✓	–	✓

**Table 1** Predicted possible readings for examples with overt topic situation shift.

## 2.4 Previous experimental work

The prediction discussed above was put to a first test in a pilot study.<sup>10</sup>

The stimuli were presented auditorily. They consisted of a context and a target sentence with *auch/noch*, containing different temporal PPs similar to (41) above. 32 participants saw eight items in both conditions and provided felicity ratings and answers to questions indicating whether accommodation took place. Presupposition accommodation was found in 72% of *auch* sentences and 39% of *noch* sentences. This difference was significant according to a logistic regression model ( $z = 8.28$ ,  $p < 0.001$ ). The continuation with *noch* was degraded (3.1 on a 1–5 scale) in comparison to *auch* (4.1); this difference was also significant according to a cumulative link model ( $z = 6.17$ ,  $p < 0.001$ ). The results suggest that *auch* and *noch* may indeed differ with respect to accommodation.

The test items in these pilot experiments were deliberately set up in a way that made accommodation very plausible. The motivation for this was to facilitate accommodation with *auch*, since the presupposition of *auch* is usually assumed to be hard to accommodate (Kripke 2009). We hypothesize that this was the reason why *noch* was deemed less acceptable by the participants.

This opens up an interesting direction for extending the experiment: if we manipulate how plausible the readings with/without accommodation are, we would expect this to affect the felicity and interpretation of sentences with *auch/noch* in very specific ways, if Grubic’s (2018) account is correct. In our experiment reported in §3, we thus not only vary the trigger (within items) but also systematically vary (between items) whether accommodation is plausible or not, i.e., whether it is likely, given our world knowledge, that the eventuality is repeated. Section §3.1 discusses a pre-experiment in which we tested our test items for plausibility. Section §3.2 then reports our main experiment.

## 3 Our experiment

### 3.1 Plausibility pre-test

#### 3.1.1 Motivation

Our main experiment required three kinds of items: (i) ones in which repetition and non-repetition of an action is equally likely, (ii) ones in which only repetition is likely, and (iii) ones in which repetition is unlikely. In order to make sure that all materials satisfied this requirement, we conducted a pre-experiment testing for plausibility of the repetition.

#### 3.1.2 Participants and procedure

Twenty native speakers of German, recruited and paid via Prolific (prolific.co), took part in the pre-test. The stimuli were presented in written form using the online questionnaire software L-Rex (Starschenko & Wierzba 2020).

On each page, a context and a target sentence was shown. A clarification sentence followed the target sentence, making as clear as possible whether the event was repeated or not. The participants were instructed to judge whether the described continuation is logically possible, and if so, whether it is plausible. After picking an answer (“possible and plausible”, “possible but implausible”, “impossible”), there was the option of providing a comment.

Each participant rated 48 stimuli. On average, completing the questionnaire took 25 minutes.

<sup>10</sup> The study was prepared and run with the help of Annika Stark in the context of Stark’s Bachelor’s thesis (Stark 2017). We present an extended analysis of the results here. In the same context, another small-scale experiment was run (comparing *auch*, *noch*, and the combination *auch noch*), which we do not report here.

### 3.1.3 Design and materials

We constructed 36 contexts in total. Each of them was paired with a target sentence in which the action was either (a) continued or (b) repeated.

We expected the contexts to fall into three equal groups (12 contexts per group), which we will refer to as  $\pm$ REP, +REP, and -REP. We intended to use the ( $\pm$ REP) group as a baseline—we expected both continuations to be judged as possible and plausible. As for the +REP contexts, we expected them to be judged as implausible or impossible with continuation (a) (continued action) and possible and plausible with continuation (b) (repeated action). For the -REP contexts, we expected the opposite: possible and plausible with continuation (a) (continued action), and implausible or impossible with continuation (b). The expectations are summarized in [Table 2](#).<sup>11</sup>

	$\pm$ REP		+REP		-REP	
	cont.	rep.	cont.	rep.	cont.	rep.
possible and plausible	<b>high</b>	<b>high</b>	low	<b>high</b>	<b>high</b>	low
implausible/impossible	low	low	<b>high</b>	low	low	<b>high</b>

**Table 2** Plausibility experiment: predicted answer proportions (continuation types: cont. = continued action, rep. = repeated action).

Examples for each kind of context are shown below (as in the actual experimental stimuli, the target sentence is marked by italics, and crucial parts are highlighted by boldface).<sup>12</sup> The first sentence described an activity. The second sentence stated that the activity was discontinued, but suggested that the agent would have liked to continue. This was included in order to increase the plausibility of returning to this activity at a later point. The third sentence was the test sentence. Condition (a) always involved a complement anaphoric expression (e.g., *letzte* ‘last’); the distribution of these expressions was balanced. We included them anticipating that we were going to add *noch/auch* to the sentences in the main experiment, and we felt that they enhance the felicity of *noch* (see §4 for discussion).

- (46)  $\pm$ REP Five years ago, Bertha walked the first eleven stages of the Way of St. James. Then she unfortunately had to discontinue her pilgrimage because of an injury.
- Last year, she walked **the last 21 stages** of the Way of St. James.*  
(i.e., **only** the part of the way that she didn’t walk five years ago).
  - Last year, she walked **all 32 stages** of the Way of St. James.*  
(i.e., **including** the part of the way that she walked five years ago).
- (47) +REP: Yesterday on her way to work, Lara rode her bike for the first 2km. For the last 3km she unfortunately had to push her bike because her bike broke down.
- Today on her way to work she rode her bike **for the last 3km**.*  
(i.e., **only** the part of the way that she didn’t cycle yesterday).
  - Today on her way to work, she rode her bike **for the whole 5km**.*  
(i.e., **including** the way that she cycled yesterday).
- (48) -REP During the summer holidays, Quentin drank five wine bottles from his supply. He saved two for later.
- During the winter holidays, he drank **the last two wine bottles** from his supply.*  
(i.e., **only** the bottles that he didn’t drink in the summer holidays).
  - During the winter holidays, he drank **all seven wine bottles** from his supply.*  
(i.e., **including** the bottles that he had drunk in the summer holidays).

The items were distributed using a Latin-Square design (two lists with 36 items each) and randomized. Since we expected a large majority of “possible and plausible”-answers (for items of type (46), (47b), and (48a) above), we added twelve filler items for which we expected “possible but implausible” or “impossible” answers in order to achieve a more balanced distribution of expected responses.

<sup>11</sup> For our predictions, it is not crucial to distinguish between implausible/impossible continuations. However, we had the impression that this option made the task more natural.

<sup>12</sup> The examples are in English for readability; all German items can be found in Appendix A.

Our goal was to identify the contexts with the clearest distribution of plausibility ratings per group while eliminating potentially problematic ones. We aimed to select eight items per group to be used in the main experiment.

### 3.1.4 Results

The results for all 36 items are summarized in [Table 3](#).<sup>13</sup> Based on a by-item inspection of the data, we removed those four items from each group that corresponded least to our expectations. [Table 4](#) shows the results for the remaining 24 items that we selected to be used in the main experiment.

	$\pm$ REP		+REP		-REP	
	cont.	rep.	cont.	rep.	cont.	rep.
possible and plausible	<b>68%</b>	<b>90%</b>	23%	<b>87%</b>	<b>89%</b>	8%
possible but implausible	28%	9%	<b>60%</b>	11%	4%	<b>10%</b>
impossible	3%	1%	<b>18%</b>	3%	7%	<b>83%</b>

	$\pm$ REP		+REP		-REP	
	cont.	rep.	cont.	rep.	cont.	rep.
possible and plausible	<b>79%</b>	<b>86%</b>	15%	<b>89%</b>	<b>96%</b>	3%
possible but implausible	20%	14%	<b>70%</b>	10%	4%	<b>5%</b>
impossible	1%	0%	<b>15%</b>	1%	0%	<b>93%</b>

**Table 3** Results of the plausibility pre-test: proportion of answer types per context group and continuation type (all 36 items).

**Table 4** Results of the plausibility pre-test: proportion of answer types per context group and continuation type (selected 24 items, to be used in the main experiment).

For statistical analysis of the selected items, the answer types “possible but implausible” and “impossible” were collapsed to a single category. The factor context group was treatment-coded with  $\pm$ REP as the baseline. Continuation type was sum-coded.

According to a logistic regression model, there was no significant simple effect of continuation type (continued vs. repeated action) within the  $\pm$ REP baseline ( $z = -0.52, p = 0.60$ ).<sup>14</sup> A significant interaction between continuation type and context group was found for both +REP ( $z = 6.96, p < 0.001$ ) and -REP ( $z = -5.44, p < 0.001$ ): the difference between continued and repeated action was larger for these two groups in comparison to the baseline. As expected, the interactions go in opposite directions: in the +REP, the proportion of “possible and plausible” answers was smaller with continued actions, whereas in the -REP group, it was smaller with repeated actions.

### 3.1.5 Discussion

Based on the pre-test, we were able to select three groups of contexts that clearly differ with respect to how plausible it is that the same action is repeated or continued. Thus, we have robust empirical support for the validity of the item groups that will be used in the main experiment.

## 3.2 Main experiment

### 3.2.1 Motivation

The goal of the main experiment is to test the predictions made by Grubic’s (2018) account concerning the accommodation behavior of *auch* and *noch*. In the main experiment, we combine the contexts from the pre-test with a sentence containing one of the particles:

<sup>13</sup> Percentages do not always total to 100 due to rounding.

<sup>14</sup> The model was fit following the recommendations for identifying parsimonious models by Bates et al. (2015a), using the R packages lme4 and lmerTest (R Core Team 2016, Bates et al. 2015b, Kuznetsova et al. 2017).

- (49) Five years ago, Bertha walked the first eleven stages of the Way of St. James. Last year, she walked *auch/noch* the last 21 stages.

Recall that Grubic predicts that accommodation of *Last year, Bertha walked the first eleven stages* is possible (but not necessary) for *auch*, but not possible for *noch*, since the latter requires a previous answer about a different topic situation.

Based on the results of the pre-test, we can now systematically manipulate how plausible accommodation is. If, as predicted, both interpretations are indeed possible for *auch* in these kinds of examples, then the conditions including *auch* should always be acceptable; whether speakers accommodate should merely depend on plausibility. If accommodation is indeed excluded in the case of *noch*, then the conditions including *noch* should be less acceptable when accommodation is the only plausible interpretation.

This design remedies a potential problem of the pilot experiment, namely that accommodation was always highly plausible, potentially introducing a bias for one of the interpretations.

### 3.2.2 Participants and procedure

The experiment, including the planned analysis, was pre-registered at the Open Science Foundation (<https://osf.io/r97kc/>) prior to data collection. Our materials and data can also be found there.

Twenty-four native speakers of German, recruited and paid via Prolific, took part in the experiment. Participants who participated in the plausibility pre-test could not participate in the main experiment. The experiment was again set up as a web-based questionnaire.

Participants were instructed to use headphones. On each page, they read a context that was presented in written form and then clicked on a play button to listen to the target sentence (recorded by the second author of the paper), which formed a continuation of the text. Since additive particles are focus-sensitive, auditory stimuli were used in order to ensure the correct interpretation. The nuclear accent was always on the constituent that the particle associated with. It was possible to listen to the stimulus several times.

Below, two questions were presented. The first question concerned the felicity of the target sentence as a continuation of the text, on a scale from 1 (“very bad, does not make sense in this context”) to 5 (“very good, makes sense in this context”). The second one was a content question. This was a forced-choice task: two answers were provided and the participants had to choose one.

The stimuli were presented in randomized order. Each participant rated 48 stimuli (24 critical items and 24 fillers). On average, completing the questionnaire took 32 minutes.

### 3.2.3 Design and materials

The main experiment had a  $3 \times 2$  design. The first (between-items) factor that we manipulated was context type ( $\pm$ REP, +REP, -REP). The second factor (within-items) was particle (*auch* vs. *noch*).

We used 24 items selected based on the results of the pre-test. In addition, two of the selected contexts with the lowest proportion of expected answers were slightly adapted in order to enhance the desired interpretation. Furthermore, because selecting 24/32 items from the pre-test changed the distribution of the different complement anaphoric expressions (*letzte* ‘last’, *andere* ‘other’, *restliche/übrige* ‘remaining’), we also adjusted this so that the distribution was balanced again. A list of items is provided in Appendix B.

As described above, the contexts used in the pre-test were paired with target sentences containing either *auch* or *noch*, as in (50).

- (50) Five years ago, Bertha walked the first eleven stages of the Way of St. James. Then she unfortunately had to discontinue her pilgrimage because of an injury.
- a. Letztes Jahr ist sie **auch** die letzten 21 Etappen des Jakobswegs  
last year is she also the last 21 stages of the James way  
gelaufen.  
walked  
'Last year, she also walked the last 21 stages of the Way of St. James.'

- b. Letztes Jahr ist sie **noch** die letzten 21 Etappen des Jakobswegs  
last year is she still the last 21 stages of the James way  
gelaufen.  
walked  
'Last year, she walked the last 21 stages of the Way of St. James in addition.'

The corresponding content question is shown in (51). Answer (51a) indicates that accommodation has taken place (i.e., it is accommodated that the action described in the context was repeated). Answer (51b) indicates no accommodation (i.e., the target sentence is interpreted as a continuation, without repetition of the first part). In the question, the time adverbial was highlighted, based on our impression during test trials that this facilitated understanding that the question was about the situation described by the target sentence.

- (51) How many stages of the Way of St. James did Bertha walk **\*\*last year\*\***?  
a. All 32 stages.  
b. Only the last 21 stages.

The items were distributed using a Latin Square design (two lists with 24 items each). We added 24 filler items, consisting of sentences with other presuppositional elements, namely *wieder/ nochmal* 'again' and *nur* 'only'. Half of the filler items were predicted to be felicitous, half infelicitous (Appendix C discusses the results for the filler items).

We used four of the filler items as controls to check whether participants were paying attention and responding to the task in the intended way. We chose fillers in which the expected response did not depend on accommodation, but only required to pay close attention to the context and the response options. An example is shown in (52).

- (52) When he went to the ice-cream parlor yesterday, Julian ate two scoops of ice cream.  
After that, he was unfortunately too full to eat dinner.  
When he went to the ice-cream parlor today, he only ate one scoop of ice cream.

The context question was either 'How many scoops of ice cream did Julian eat **\*\*today\*\***?' or '**\*\*yesterday\*\***?'; the answer options were "one scoop" and "two scoops". We excluded participants from the analysis who gave less than 3/4 expected answers in these controls.<sup>15</sup>

### 3.2.4 Hypotheses

If Grubic's (2018) assumptions about *auch* and *noch* are correct, we would expect to find the following patterns:

- (53) **Felicity hypothesis:**  
*Noch* should be less felicitous in contexts in which only the interpretation with accommodation is plausible (+REP) in comparison to the baseline ( $\pm$ REP), whereas *auch* is expected to be felicitous in both.

This hypothesis predicts an interaction between particle and context type with respect to felicity ratings: the felicity difference between the two particles should be larger in +REP than in the  $\pm$ REP baseline.

- (54) **Accommodation hypothesis:**  
There should be less accommodation for *auch* in contexts in which only the interpretation without accommodation is plausible (-REP) than in the baseline context ( $\pm$ REP); for *noch*, the accommodation rate is expected to be low in both.

This hypothesis predicts an interaction between particle and context type with respect to the responses to the content question: the difference in accommodation rate between the two particles should be smaller in -REP than in the  $\pm$ REP baseline.

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<sup>15</sup> In this point, we deviate from the pre-registration: there, we set 80% as the exclusion criterion; after pre-registering, but before data analysis, we decided to use only these four items as controls and therefore set the criterion to 75%.

More precisely, the accommodation hypothesis should be stated as an implication, because the account does not explicitly predict the reading without accommodation to be impossible with *auch* in the baseline context: if there is a difference in accommodation rate between the two particles in the baseline, we expect it to decrease in the context where this reading is implausible.

In *Tables 5* and *6*, the crucial predictions of the felicity and accommodation hypotheses are highlighted in boldface. As for the other cells in the table of predicted ratings, no difference is expected between  $\pm$ REP and the  $\pm$ REP baseline: when only the interpretation without accommodation is plausible, both particles should be acceptable. As for the other cells in the table of predicted responses, Grubic (2018) predicts that the accommodation rate is high for *auch* in +REP examples, but does not make predictions for *noch*. This would depend on what participants choose to do when *noch* requires an interpretation of the test sentence that does not match the provided context (see §3.2.7 for discussion).

Predicted ratings:		
	<i>auch</i>	<i>noch</i>
$\pm$ REP	<b>high</b>	<b>high</b>
+REP	<b>high</b>	<b>low</b>
-REP	high	high

Predicted responses:		
	<i>auch</i>	<i>noch</i>
$\pm$ REP	<b>high</b>	<b>low</b>
+REP	high	(?)
-REP	<b>low</b>	<b>low</b>

**Table 5** Predictions of Grubic's (2018) account for the main experiment: ratings.

**Table 6** Predictions of Grubic's (2018) account for the main experiment: proportion of responses indicating accommodation.

### 3.2.5 Results

The results are summarized in *Tables 7, 8* and *Figures 1, 2*.

Ratings:				
	<i>auch</i>		<i>noch</i>	
	median	mean (SD)	median	mean (SD)
$\pm$ REP	5	4.5 (1.0)	5	4.6 (0.7)
+REP	5	4.5 (0.7)	4	3.9 (0.6)
-REP	5	4.7 (0.8)	5	4.8 (1.2)

Responses:		
	<i>auch</i>	<i>noch</i>
$\pm$ REP	40%	14%
+REP	89%	75%
-REP	5%	7%

**Table 7** Results of the experiment: median and mean (standard deviation in parentheses) of the felicity ratings.

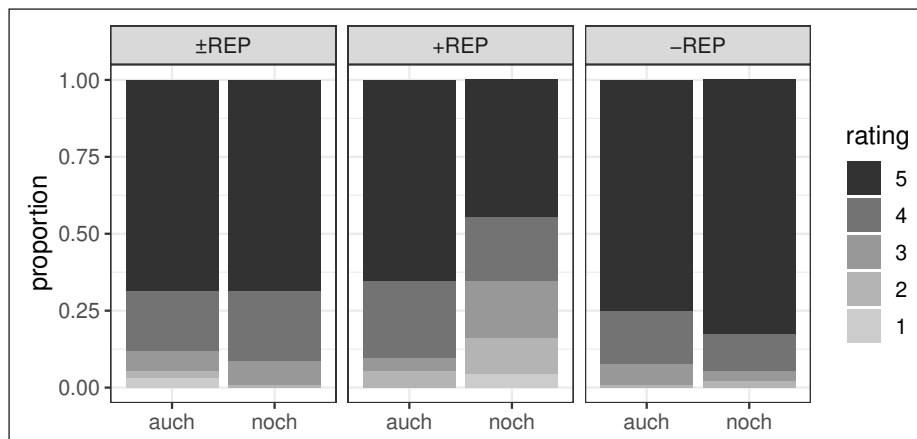
**Table 8** Results of the experiment: proportion of answers indicating accommodation.

The data of one participant were excluded from the analysis based on the exclusion criterion defined above.

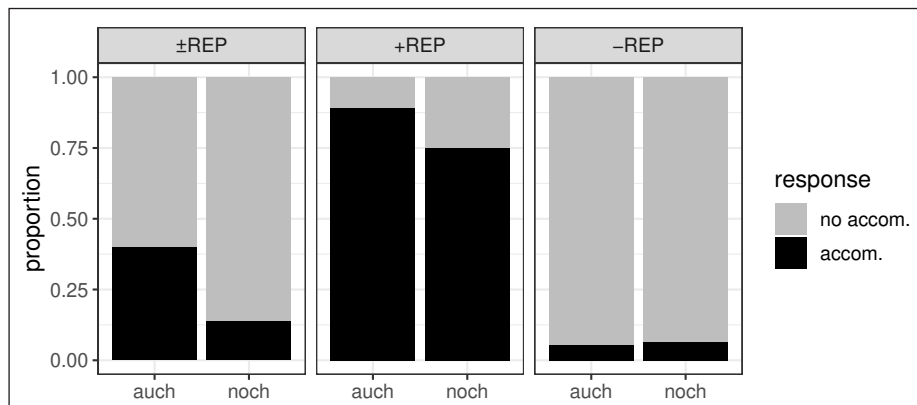
For statistical analysis, the factor context group was treatment-coded with  $\pm$ REP as the baseline. The factor particle (*auch/noch*) was sum-coded.

We will first present the analysis for the felicity ratings. According to a cumulative link model, the factor particle did not have a significant simple effect on the felicity ratings in the  $\pm$ REP





**Figure 1** Felicity rating results of the main experiment: proportion of each rating category on a 1–5 scale.



**Figure 2** Proportion of responses indicating accommodation in the main experiment.

baseline ( $z = -0.11$ ,  $p = 0.91$ ): *auch* and *noch* were similarly acceptable. A significant main effect of context type was found for +REP ( $z = -3.32$ ,  $p < 0.001$ ): the ratings were lower than in the baseline. This effect was qualified by a significant interaction with particle ( $z = 3.23$ ,  $p = 0.001$ ): the decrease was larger for *noch* than for *auch*. For -REP, a significant main effect was found ( $z = 2.20$ ,  $p = 0.03$ ) in that the ratings were higher than in the baseline, but no significant interaction with particle was found ( $z = -0.87$ ,  $p = 0.38$ ).

As for the responses to the content question, there was a significant simple effect of particle on the responses in the ±REP baseline ( $z = 4.00$ ,  $p < 0.001$ ): there was a higher proportion of answers indicating accommodation for *auch* than for *noch*. There was also a significant main effect of context type for both +REP ( $z = 5.93$ ,  $p < 0.001$ ) and -REP ( $z = -2.85$ ,  $p = 0.004$ ): for the former, the proportion of answers indicating accommodation was higher than in the baseline; for the latter, it was lower than in the baseline. No significant interaction between particle and context type was found when comparing +REP to the baseline ( $z = -0.63$ ,  $p = 0.53$ ) (i.e., a similar difference between *auch* and *noch* was found in these context types), whereas the interaction was significant for -REP ( $z = -2.43$ ,  $p = 0.02$ ): the difference between the two particles was less pronounced in this context type.

### 3.2.6 Discussion

The prediction of the felicity hypothesis was borne out: *noch* was indeed perceived as less felicitous in the contexts in which only the interpretation with accommodation is plausible (+REP) in comparison to the baseline.

The prediction of the accommodation hypothesis was also borne out: an asymmetry with respect to the context question (indicating whether accommodation took place or not) was found between *auch* and *noch* in the baseline contexts, in which both readings are equally plausible; this asymmetry was less pronounced in the (-REP) contexts, where both particles showed a low accommodation rate.

Our results are thus compatible with Grubic's (2018) account according to which *auch*, but not *noch*, allows for accommodation when a QUD is re-opened with respect to a new topic situation.

Our predictions were formulated in terms of the relative acceptability/accommodation rate when comparing *auch* and *noch*. With respect to the absolute values, note first that the

accommodation rate for *auch* in the  $\pm$ REP baseline is lower in comparison to the previous experiments reported by Kim (2012; 2015), but since both interpretations are plausible in the baseline, it is arguably not surprising that the reading that does not require accommodation is the preferred one. Second, and more surprisingly, note that *noch* is not completely infelicitous when the interpretation without accommodation is implausible, but only slightly degraded. We will discuss possible reasons in the following section.

### 3.2.7 Post-hoc analyses

In this section, we consider the following possible participant response strategies to the *noch*/+REP condition. Participants of type (1), (2b) and/or (2c) might all have contributed to the unexpectedly high ratings.

- (1) NO-DIFFERENCE: There might be a subgroup of participants for whom the proposed situation-shifting property is not a necessary meaning component of *noch*, contra Grubic (2018). These participants interpret *auch* and *noch* the same.<sup>16</sup>
- (2) DIFFERENCE: Participants for whom situation-shift is a necessary component of *noch* (in line with Grubic (2018)) could still have reacted in different ways:
  - (2a) LOWER-RATINGS: They might have perceived a clash between the particle and the context and chosen to lower their rating (the reaction expected by us).
  - (2b) IGNORE-CONTEXT: They might not have perceived the contextual bias towards accommodation as strong enough to affect their rating.
  - (2c) IGNORE-PARTICLE: They might have perceived a clash between the particle and the context, but chosen to resolve it by ignoring the particle.<sup>17</sup>

To test these hypotheses, we conducted post-hoc analyses of our data. We first divided the participants into two groups: those who showed the expected low rating in the *noch*/+REP condition and those who did not. We arbitrarily chose to make the split between participants with a median rating of 4 or lower ('low felicity rating', eleven participants) and all others ('high felicity ratings', twelve participants). We inspected the data of the latter to see whether their unexpectedly high rating came about due to assumption (1), (2b), or (2c).

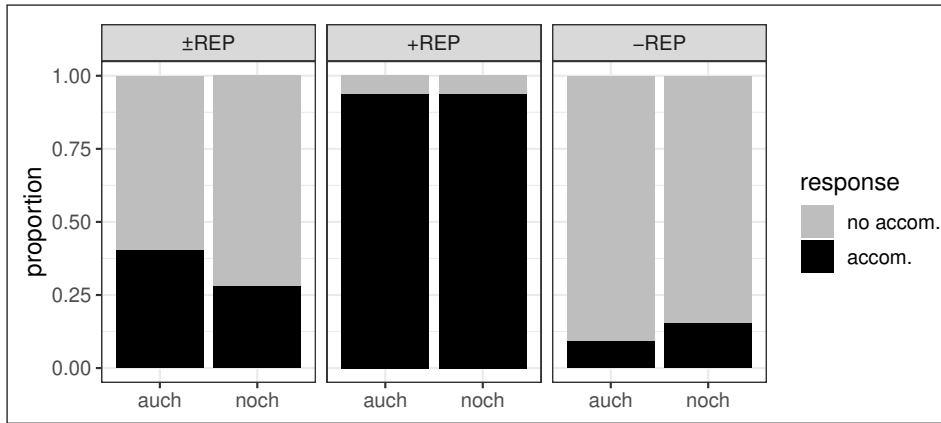
If (1) holds, then we would expect to also find a high accommodation rate in the crucial *noch*/+REP condition and a very similar response pattern for *auch* and *noch* across all conditions. We thus divided the 'high felicity ratings' group further based on the accommodation rate in the *noch*/+REP condition (threshold: <75% vs.  $\geq$ 75%). For eight participants, a high accommodation rate was found. For these participants, we indeed find very similar overall patterns for *auch* and *noch*, as shown in [Figure 3](#): across all contexts, the accommodation rate for the two particles is almost identical (*auch*: 48%, *noch*: 46%), whereas the other participants show a much clearer overall distinction (*auch*: 43%, *noch*: 24%). This supports assumption (1) above.

To check hypotheses (2b) and (2c) for the remaining three participants, we again looked at their responses in the other conditions. If (2b) holds, we would expect a weak effect of the contextual manipulation overall (especially in contexts  $\pm$ REP vs. +REP; context -REP should be more difficult to ignore as the reading with accommodation often involved a logically impossible situation in this case). If (2c) holds, a strong effect of context is expected. The post-hoc inspection of the data (see [Figure 4](#)) suggests that the responses of this group of participants were generally affected less by the context ( $\pm$ REP baseline: 42% of accommodation, +REP: 63%, averaging over the two particles) than the other participants ( $\pm$ REP: 25%, +REP: 85%), which tentatively supports (2b).<sup>18</sup>

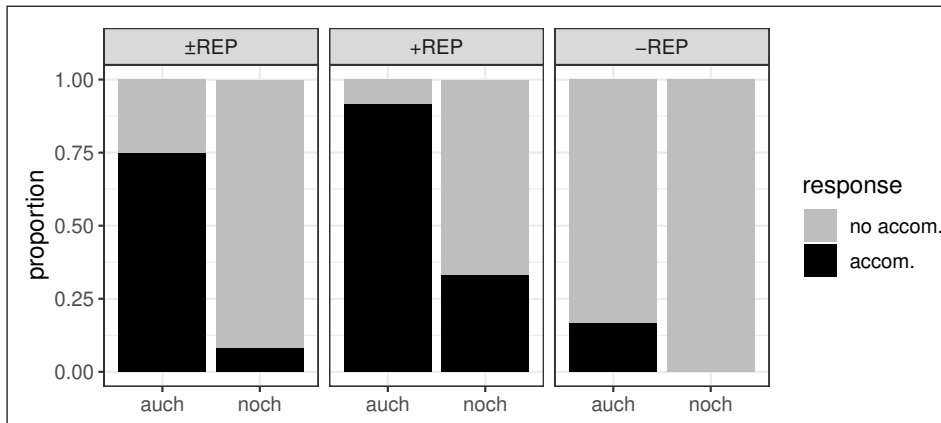
<sup>16</sup> An anonymous reviewer suggests that the combination *auch noch* is completely felicitous in +REP contexts (pace Grubic 2018) and that the participants in this subgroup might be adding a silent *auch* to the sentence. In order to evaluate this proposal, the behaviour of *auch noch* requires further study — cf. §5.2.

<sup>17</sup> See Tiemann (2014) for results suggesting that participants ignore presuppositions when they are not in the position to challenge the speaker.

<sup>18</sup> In principle, another possibility to explore this question would be to check for a correlation with the behavior in other cases of presupposition failure. Our fillers did include cases of presupposition failure with *nochmal/wieder* 'again' (cf. Appendix C), but since we only collected two data points per participant and condition for these fillers, we refrain from exploring this potential correlation here based on our data.



**Figure 3** Responses of the subgroup of speakers with a high acceptability rating (median > 4) and high accommodation rate ( $\geq 75\%$ ) in the *noch*/+REP condition: overall similar behavior of *auch* and *noch*, as predicted by NO-DIFFERENCE.



**Figure 4** Responses of the subgroup of speakers with a high acceptability rating (median > 4) and low accommodation rate (<75%) in the *noch*/+REP condition: similar pattern in  $\pm$ REP and +REP context, as predicted by IGNORE-CONTEXT.

Taken together, the post-hoc analyses suggest that the unexpectedly high results in the *noch*/+REP condition has multiple sources: (i) inter-speaker variation and (ii) different response strategies to the experimental task. There indeed is a subgroup of participants who did not differentiate between *auch* and *noch* for the purpose of our experiment. The majority of participants did differentiate them, but for some of them, the clash between the contextual bias and the meaning of the particle did not result in a strong felicity decrease. In the following, we will focus on the speakers that do make a distinction between *auch* and *noch*, with the aim of modeling the crucial differences between the particles in the grammar of the majority of the speakers of German.

## 4 General discussion and analysis

The results of our experiment are compatible with the predictions of Grubic’s (2018) account, repeated here as **Table 9**: *noch* is less felicitous in contexts favoring accommodation about the same topic situation, in line with the assumption that it requires a topic situation shift. *Auch* allows for accommodation or non-accommodation, depending on the context, in line with the assumption that it does not require a topic situation shift.

	<i>auch</i>		<i>noch</i>	
	accomm.	no accomm.	accomm.	no accomm.
Eckardt 2007	✓(?)	—	✓(?)	—
Umbach 2012	—	—	—	—
Grubic 2018	✓	✓	—	✓

**Table 9** Predicted possible readings for examples with overt topic situation shift.

Section 4.1 explains how the respective topic situations of the answers are derived in the accommodation and non-accommodation cases. Sections 4.2–4.3 discuss necessary amendments to Grubic’s (2018) account.

### 4.1 The topic situation

The topic situation for a sentence is derived via its QUD. In a QUD hierarchy, the topmost question (*What is the way things are?*, see Roberts 2012) is about our actual world,  $w_0$ , and each

subquestion narrows down the part of this world talked about (Schwarz 2009). For example, in (55), the subquestions are about a proper part of the topic situation of the superquestion.<sup>19,20</sup>

- (55) 5 years ago and last year, how many stages of the Way of St. James did B. walk?  
 5 years ago, how many stages [...] did B. walk? Last year, how many stages [...]?

According to Kratzer (2020), a topic situation is an actual situation—i.e., a part of our world  $w_0$ —which *exemplifies* the question extension. The question extension is a proposition, the set of situations in which the exhaustive true answer to the question is true. For example, if *Bertha walked the first 11 stages of the way of St. James 5 years ago* is the exhaustive true answer to the first question in (55), the question extension is the set of situations in which Berta walked the first 11 stages of the way of St. James 5 years ago.

Exemplification can be defined as in (56) (a variant of the definition in Kratzer (2020)).

- (56) **Exemplification:** A situation  $s$  exemplifies a proposition  $p$  if  $p$  is true in  $s$  and  
 a. either  $p$  is true in all subsituations of  $s$ ,  
 b. or there is no subsituation of  $s$  in which  $p$  is true.

Both disjuncts (a) and (b) take care that the situation contains nothing irrelevant for the truth of the proposition. Which disjunct is needed depends on properties of the proposition, e.g., telicity. Consider (57a), with a telic predicate. If a situation  $s$  contains everything that is needed in order to make (57a) true and nothing irrelevant, then there is no subsituation of  $s$  for which (57a) is true—because the airplane wouldn't be finished in that subsituation. In contrast, (57b) is atelic: if Josephine flew an airplane in a situation  $s$  (and no other thing irrelevant to Josephine flying an airplane happened), she also flew an airplane in all subsituations of  $s$ .

- (57) a. Josephine built an airplane.  
 b. Josephine flew an airplane.

Consider now the two cases relevant for our experiment. Let's assume that the answers provided in the example are true in their respective topic situation. First, consider the non-accommodation case (found with *noch* and under one reading of *auch*). Here, the topic situation derived via the first QUD in (55) is the actual situation, five years ago, in which Bertha walked the first 11 stages (and nothing else happened), and the topic situation derived via the second QUD is the actual situation, last year, in which Bertha walked the remaining 21 stages (and nothing else happened). The respective answers are thus exhaustive true answers to their QUDs. Next, consider the accommodation case, where it is accommodated that Bertha also walked the first 11 stages last year. Here again, the topic situation of the first answer is the actual situation, five years ago, in which Bertha walked the first 11 stages (and nothing else happened). Since the exhaustive true answer to the second question is *32 stages*, the topic situation provided by the second QUD is the actual situation, last year, in which Bertha walked all 32 stages (and nothing else happened). Both the accommodated answer (*11 stages*) and the overt answer (*21 stages*) to the second QUD are thus non-exhaustive, partial answers, but together entail the exhaustive answer.

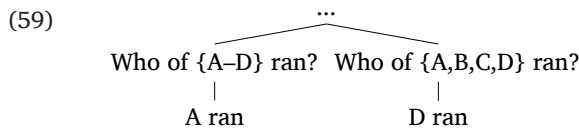
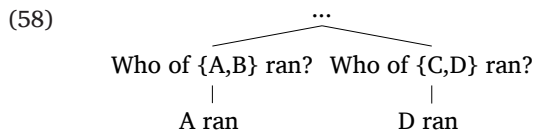
## 4.2 Amendment 1: Reassessing *auch*

We propose an amendment to the previous QUD accounts for *auch*. In these accounts, *auch* was assumed to indicate that the QUD is re-opened with respect to a new domain, e.g., (58): the speaker first assumes that the addressee wants to know who of A and B ran, and then remembers that C and D are also relevant, and re-opens the QUD to address them. Each answer is thus exhaustive.

<sup>19</sup> Note that situations need not be spatio-temporally connected (Kratzer 2020), i.e. there can be a situation consisting of a space-time chunk five years ago and another one year ago, without the years inbetween.

<sup>20</sup> According to Hohaus (2015), sentence-initial framesetters like *five years ago* add a presuppositional restriction to the topic situation (i).

(i) [[FRAME]] =  $\lambda p_{\langle s, t \rangle} \lambda q_{\langle s, t \rangle} \lambda s_s : p(s) \cdot q(s)$  (simplified)



This assumption can however not be upheld here in this form, because the two answers would involve different topic situations (*Who of A and B ran?* is exemplified by the actual situation in which A is running, and *Who of C and D ran?* by the actual situation in which D is running). This would be problematic for our proposal: if *auch* required an extended domain, and an extended domain always entailed a topic situation shift, then *noch* should always be felicitous when *auch* is. In order to solve this problem and derive a common topic situation for both questions, the complete domain {A,B,C,D} is necessary, see (59).

Besides this theory-internal reason, here is an additional, independent empirical motivation stemming from our own data to reject the idea that *auch* obligatorily involves a change of domain. Note that examples without a topic situation shift are degraded with complement anaphors (60), just like simple examples with overt, unchanged domains (61). The parallel behavior of (60) and (61) suggests that our experimental items, which all contained complement anaphora as in (62), may all implicitly involve an overt, unchanged domain (here: the stages), just like in the more explicit example (60).

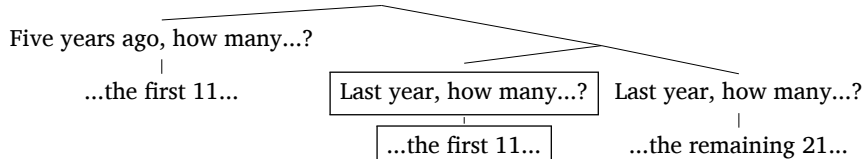
- (60) Q: How much of the Way of St. James did Bertha walk last year?  
 A: ?She walked the first 11 stages, and she also walked the remaining 21 stages.

- (61) Who out of A, B, C and D ran? – ?A ran, and D ran, too.

If this is correct, then there is no shift in domain, either, in the *auch* reading with accommodation, as shown in (63): the second and third QUD are identical, they involve the same domain and the same topic situation. Nevertheless, *auch* is perfectly felicitous here. Thus, the explanation for the degradedness of (60)–(61) cannot be that *auch* necessarily requires a domain extension.

- (62) Five years ago, Bertha walked the first eleven stages of the Way of St. James.  
 Last year, she also walked the last 21 stages of the Way of St. James.

- (63) 5 years ago and last year, how many stages of the Way of St. J. did B. walk?



We suggest that domain extension with *auch* is not obligatory, but arises in some cases due to the Gricean maxim of manner: there is a shorter way to answer in (60) and (61), so a long answer should be avoided. If the maxim of manner is ostensibly violated, the implicature arises that this was done for a reason, e.g., to extend the domain because the speaker remembered some relevant further alternatives.<sup>21</sup> In the accommodation example (62), there is no violation

21 A reviewer provides (i) showing that there can also be other reasons for a longer answer: in contrast to (i-a), (i-b) is fine, because it involves additional information about the last two bottles.

- (i) (During the summer holidays, Quentin drank five wine bottles from his supply.)  
 a. ?Er hat auch die letzten zwei Flaschen ausgetrunken.  
 he has also the last two bottles drunk.up  
 'He also finished the last two wine bottles.'  
 b. Er hat auch die letzten zwei Flaschen ausgetrunken, aber mit der Hilfe von Otto.  
 he has also the last two bottles drunk.up but with the help of Otto  
 'He also finished the last two bottles, but with the help of Otto.'

of the maxim of manner because the answer provided is as short as the alternative full answer (*Last year, she walked all 32 stages*). Thus an extension of the domain of alternatives is not always obligatory with *auch*.

For unstressed *auch*, we thus suggest to depart from the earlier proposals in §2 and merely state that *auch* introduces a presupposition that an alternative answer to the QUD (about the same or a different topic situation) is contextually provided.

### 4.3 Amendment 2: Reassessing noch

In this section, we want to propose a QUD account which takes the following properties of additive *noch* into account (64): First, with respect to its antecedent, the *noch*-sentence involves a different focused constituent AND a different topic situation. Second, we have to take into account Eckardt’s (2007) observations that the domain of alternatives seems more coherent than in the case of *auch* and that there is a subsequent negative phase.

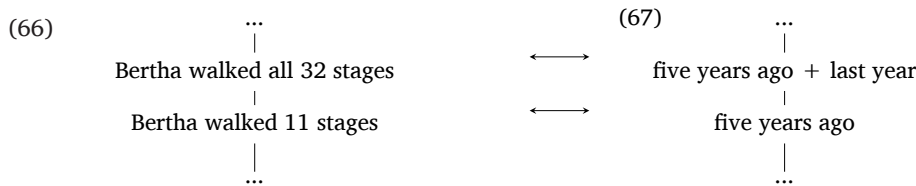
- (64) Um 3 hat Otto **noch** einen SCHNAPSgetrunken.  
 at 3 has Otto still a schnaps drunk  
 ‘At 3am, Otto also had a schnaps.’
- a. Antecedent of the form ‘At t, Otto had a X’
  - b. Domain of alternatives coherent in some sense
  - c. Subsequent negative phase: Otto had nothing else after that

Our main assumption is that there is a question distinct from the current QUD (imaginable as its superquestion), for which the two answers related via *noch* contextually entail an answer (see Gast & van der Auwera 2011 for additive-scalar particles). In the case of additive *noch*, we assume a superquestion asking for the extent of some development (e.g., *How much of the Way of St. James did Bertha walk?*) and two subquestions posing this question about two different subsituations. The *noch* sentence contextually entails a stronger answer to this superquestion than the preceding/presupposed answer(s), namely that she walked 32 stages, see (66). Relatedly, the topic situation of the preceding answer is a proper part of that of the contextually entailed stronger answer, see (67).<sup>22</sup>

- (65) 5 years ago and last year, how many stages of the Way of St. J. did B. walk?
- Five years ago, how many ...?      Last year, how many ...?

|    |

Five years ago, ...the first 11...      Last year, ...the remaining 21...



This QUD hierarchy accounts for the fact that the two overt answers involve different topic situations as well as different foci, cf. (64a). The superquestion asking for the extent of a development is responsible for the inference that the focus alternatives are coherent, cf. (64b). If further alternatives were under discussion, this would lead to an implicature that those alternatives are false (Eckardt’s subsequent negative phase), cf. (64c).

We assume that the subsequent negative phase, as already briefly discussed above in §2.2.1, is due to an exhaustivity implicature (via the Gricean maxim of quantity): a (defeasible) inference that the current answer together with its antecedent entail the strongest true answer to the QUD, and that thus all stronger alternatives are false. We believe that it is not hard-wired into the meaning of *noch*, and will ignore it here.<sup>23</sup>

22 Thus, under our account, *noch* is a scalar/scale-alignment particle, cf. Krifka (2000).

23 In fact, example (13) above where *noch* is used repeatedly, shows that not all additional answers are required to be negative; and our experimental items, where all answers are positive (due to *remaining, other, etc.*) show that *noch* does not require that there are additional negative answers.

The *coherence of focus alternatives* (leading to Eckardt’s suggestion of a “fixed and stable domain”), however, requires further discussion. For example, in (68), the mentioned alternatives are part of a salient set of texts that belong together by virtue of being part of the same newspaper. In contrast, (69) contains two unrelated alternatives (short story and comic book), and *noch* requires further context or accommodation in order to be felicitous here, e.g., that they are both part of Anna’s to-read list or part of an assignment to read as much as possible.<sup>24</sup>

(68) (Yesterday, Anna read the business part of the newspaper.)

Heute hat sie (noch) den Politikteil gelesen.  
 today has she still the politics.section read  
 ‘Today, she additionally read the politics section.’

(69) (Yesterday, Anna read a short story.)

Heute hat sie (‘noch) ihr neues Comicheft gelesen.  
 today has she still her new comic.book read  
 ‘Today, she additionally read her new comic book.’

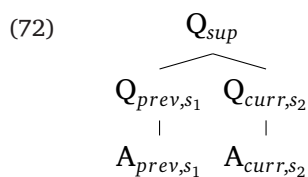
We think that this is related to the intuition that *noch* seems to indicate a continuation of a development: the assertion contextually entails that some previous (presupposed) development is continued by the asserted event; e.g., that reading the politics section advances the progress of reading the complete newspaper in (68). We assume that the superquestion is responsible for this sense of development: in the relevant examples, *noch* involves a *how much/many* superquestion,<sup>25</sup> i.e. *noch* restricts the kind of superquestions available (see Coppock & Beaver 2013 for an account of exclusives as restricting their QUDs), and the answers ranked on a scale such as (66) are related to a salient independent measure. The latter idea is adapted from a proposal by Greenberg (2010) for additive *more*. In (69), the independent measure might e.g. be how happy Anna’s teacher will be, which we represent as a further degree QUD called  $Q_{dev}$  in (70)–(71).<sup>26</sup>

(70) The stronger the answer to  $QUD_{sup}$ , the stronger the answer to  $QUD_{dev}$ .

(71)  $\exists f \forall p, p' \in Q_{sup} \forall q, q' \in Q_{dev} [f(p) = q \ \& \ f(p') = q' \rightarrow [p' \leq p \rightarrow q' \leq q]]$

Thus, in addition to a mapping between alternatives and situations (66)–(67), there is also a mapping between alternatives and an independent measure.

To sum up, we propose that *noch* ( $S_{curr}$ ) indicates a QUD strategy such as (72), with the following restrictions.



- (i)  $Q_{prev}$  and  $Q_{curr}$  differ with respect to their topic situation;
- (ii) the (other) backgrounded material in  $Q_{prev}$  and  $Q_{curr}$  is identical;
- (iii)  $Q_{sup}$  asks about the extent of some development;
- (iv)  $A_{prev}$  and  $A_{curr}$  both contextually entail an answer to  $Q_{sup}$ ;

The restriction in (ii) is shared by *auch*, and arguably also (iv).

<sup>24</sup> The latter case goes against Eckardt’s intuition that there is a finite set of alternatives.

<sup>25</sup> The reason behind Eckardt’s intuition of a fixed domain may be that the question is often partitive (e.g. *how many of the items on the to-read list did Anna read?*).

<sup>26</sup> *Noch* can also felicitously occur in contexts in which the development is not intentional or planned:

(i) (The roof of the old house is falling apart. Yesterday, some roof tiles fell off.)

Heute ist noch der Schornstein eingestürzt.  
 today is still the chimney collapsed  
 ‘Today, the chimney collapsed in addition.’

### 5.1 Extending the account to further examples

In this section, we first return to examples where the topic shift is less clear, e.g. (73).<sup>27</sup> Then we discuss whether the nature of the predicate (e.g. its Aktionsart) has any effect on the interpretation with *noch*.

- (73) (Otto had a beer.)  
Ansonsten hat er noch einen SCHNAPS getrunken.  
otherwise has he still a schnaps drunk  
'In addition, he drank a schnaps.'

This example lacks an overt temporal topic situation shifter such as a temporal adverbial. However, we argue that *noch* can also be licensed by overt domain extension indicators such as *sonst/ansonsten* (= 'else, otherwise'), etc., see e.g. (74) with an overt domain (*alcoholic beverages*), suggesting that the *noch*-sentence adds an alternative (*mineral water*) outside this overt domain.

- (74) (What alcoholic beverages did Otto drink? — Otto had a beer...)  
Ansonsten hat er (nur) noch ein Mineralwasser getrunken.  
Otherwise has he only still a mineral-water drunk  
'Apart from that, he only had a mineral water in addition.'

The reason why re-opening a QUD with respect to a new (extended) domain also gives rise to a topic situation shift is that the topic situation is derived via the question extension (according to Kratzer 2020). Thus, when the domain changes, the question extension differs, too. It is predicted that *noch* is licensed whenever the domain is overtly extended, if the other conditions for a felicitous use of *noch* are satisfied (see §4.3).<sup>28</sup>

We now briefly discuss Aktionsart. A reviewer pointed out that (75) easily receives a reading under which Bardo has a cello and a violin this year.

- (75) (Last year, Bardo had a violin.)  
Dieses Jahr hat er noch ein Cello.  
this year has he still a cello.  
'This year, he has a cello in addition.'

Assuming the account of topic situations discussed in §4.1, this is not problematic: a situation exemplifies a proposition with an atelic predicate if it does not contain any subsituation in which the proposition is false, e.g., in (75), a situation containing everything needed for the truth of *Bardo has a violin*, but nothing else. As Kratzer (2020) discusses, the maximal (spatio-temporally connected) situation of Bardo having a cello can exceed the topic situation and can e.g. continue this year. Therefore, it can hold for this year that Bardo has both instruments without assuming that anything is accommodated.

Examples with temporal adverbials are thus not suitable to show that the readings found in our experiment (with telic predicates) are also available for sentences with stative predicates. If we use a locative instead, these readings become available. In (76), our intuition is that the variant with *noch* can only receive a reading where there is a single plant in Bardo's living room. The variant with *auch* additionally allows for a reading where Bardo has a palm tree and a cactus in his living room.

<sup>27</sup> We tentatively assume a similar analysis for examples with discourse *dann*, as discussed in §5.2.

<sup>28</sup> In our examples with *ansonsten* 'otherwise', the development requirement does not seem to hold in the same way as in sentences with a situation shift via temporal expressions. The same holds for (i), which an anonymous reviewer provided.

- (i) (Where can I get a good coffee around here?)  
Bei Café Lotti und außerdem noch bei Schwarzer Kater.  
at Café Lotti and moreover still at Schwarzer Kater  
'At Cafe Lotti and, apart from that, at Schwarzer Kater.'

We tentatively suggest that in such cases, the relevant independent measure (QUD<sub>dev</sub>) might be discourse-oriented and have to do with giving as many helpful answers as possible.



- (76) (In his bedroom, Bardo has a palm tree.)  
 In seinem Wohnzimmer hat er auch/noch einen Kaktus.  
 in his living-room has he also/still a cactus  
 ‘In his living room, he (also) has a cactus.’

To sum up this section, we depart from Grubic’s (2018) account in suggesting that a domain extension also leads to a topic situation shift. As far as we can tell, additive *noch* is compatible with different Aktionsarten, as long as the conditions described in §4.3 are met.

## 5.2 Open questions

Open questions remain concerning the data that Grubic’s (2018) account is based on. The data were the behavior of additive particles (i) in questions, (ii) with *dann*, (iii) accented NOCH, and (iv) the co-occurrence of *auch* and *noch*.

Concerning questions, the proposal was that since with *auch*, the QUD is reopened about the same topic situation, it is used to signal that a previous answer is considered incomplete. Theiler (2019: p. 347) notes that this wrongly predicts such questions to be felicitous if the questioner knows that there is another true answer, but does not know which, as in (77).

- (77) (Over the summer, every student has to read two books of their choice. Back at school, A is reporting what she read.)  
 A: On vacation, I read Emma.  
 B: Okay, cool. #Und was hast du auch gelesen?  
 okay cool and what have you also read  
 ‘Okay, cool. #And what did you also read?’

Theiler also mentions a further kind of *wh*-question (called *summoning question*) in which *auch* is felicitous. This kind of question “is posed directly to a group of people, with the aim of finding out who of these people have a certain property” (Theiler 2019: p. 348).

As noted in Eckardt (2007: p. 86), these examples involve an (overt or covert) change of domain (e.g., *who at this table* in Eckardt’s example (78)).

- (78) (Waitress first takes orders for coffee at table nr. 1. Turning then to table nr. 2, she asks:)  
 Wer an diesem Tisch will auch / #noch Kaffee?  
 who at this table wants also still coffee  
 ‘Who at this table wants coffee, too?’

While this may explain the felicity of *auch*, the current account wrongly predicts *noch* to be felicitous, too. Perhaps the lack of coherence can explain the infelicity, but further research would be needed to test this, and to address the criticism concerning (77).

The second kind of example concerned the behavior of *noch* and *auch* with *dann*, which can either mean ‘then’ (*dann<sub>temp</sub>*) or ‘in addition’ (*dann<sub>disc</sub>*). Grubic (2018) suggested that *dann* is a topic-situation shifter under both readings, since *noch* is infelicitous in simple examples without *dann<sub>temp/disc</sub>* (or similar, e.g., *sonst/ansonsten* ‘otherwise’). As noted in §5.1 above, we think that *sonst/ansonsten* indicate domain extension, indirectly leading to a topic situation shift. We believe that this analysis can be extended to *dann<sub>disc</sub>*. Support for this view comes from the behavior of *dann* with complement anaphora such as *andere* (‘other’) (79). As argued in §4.2, complement anaphora make the complete domain of alternatives (here: the two beers) explicit. In such examples, according to our intuitions, *dann<sub>temp</sub>* patterns like a temporal adverbial (79a) while *dann<sub>disc</sub>* patterns like domain-extenders (79b).<sup>29</sup> The latter are odd because *the other beer* is already part of the domain.

- (79) (Peter drank one of the two beers.)  
 a. Dann<sub>temp</sub> / Später hat er noch/auch das andere Bier getrunken.  
 then / later has he still/also the other beer drunk  
 ‘Then/later, he also drank the other beer.’

<sup>29</sup> Concerning (79b), we agree with Umbach that *auch* is infelicitous with *dann<sub>disc</sub>* (though felicitous with *sonst/außerdem*) — further research is needed to find out why.

- b. ??/#Dann<sub>disc</sub>/??Sonst hat er noch/auch das andere Bier getrunken.  
 in.addition has he still/also the other beer drunk  
 ‘He drank the other beer in addition.’

Examples containing *dann<sub>disc</sub>* in which domain extension is possible can then be analyzed in parallel to examples with *ansonsten/sonst* — insertion of *noch* is licensed, because a change in the domain entails a change of the topic situation (see §4.2).

The third kind of example is accented NOCH. Grubic (2018) adopted the assumption made in Umbach (2012) that the indefinite expression following *noch* is in focus, and that the alternatives are other individuals of the same kind.

However, neither account addresses the question why this is only possible with (singular) indefinites or numerals, e.g., *noch ein Buch* (lit. ‘still a/one book’), *noch zwei Bücher* (lit. ‘still two books’), but not *\*noch Bücher* (lit. ‘still books’). Perhaps the reason lies in the syntactic position and corresponding semantic type of NOCH, which seems to differ from that of the unaccented *noch* (80).

- (80) (Otto spoke to a student.)  
 a. Dann hat er *noch mit einer Lehrerin* gesprochen.  
 then has he still with a teacher spoke  
 ‘In addition, he talked to a teacher.’  
 b. Dann hat er *mit NOCH einer Schülerin* gesprochen  
 then has he with still a student spoke  
 ‘Then he talked to another student.’

Greenberg (2010) proposes for additive *more* (in, e.g., *then he met one more student*) that it first combines with an argument of type d—a numeral (3) or measure phrase (3 litres). Since German *ein* is ambiguous between a numeral and an indefinite article, it may be that NOCH is restricted to numerals and measure phrases, too. Stressed NOCH and its relation to *nochmal* (= repetitive ‘again’) is another topic left for further work—what it shares with unaccented additive *noch* is that it appears to require a topic situation shift, as well as a continuation of a development.<sup>30</sup>

Our reassessment of *auch* and *noch* leads to a prediction—differing from Grubic (2018), see the discussion of ex. (38) above—concerning the combination *auch noch*. The prediction is that this combination should be possible in exactly those cases where *noch* alone is possible, because *auch* has a weaker contribution than *noch*: it merely requires an alternative answer to the QUD. As pointed out in fn.16 above, a reviewer proposed that *auch noch* behaves like *auch* instead. Thus, further work is needed to investigate the behavior of *auch noch*.

A final open question is the relation of additive *noch* to other uses of *noch*. Since such a unified account is outside the scope of this paper, we will only provide some comments. We believe that a unified analysis needs to incorporate the following properties of *noch*: *Noch* always involves a higher superquestion asking for the extent of a development—with temporal *noch*, it is an *until when*-question, while its subquestions are polar question about different times (81). The answer containing *noch* always contextually entails a stronger answer to the superquestion than the presupposed other answer (in terms of entailment — (82)), which is assumed—via the Gricean maxim of quantity—to be the strongest answer to the superquestion, leading to the implicature that stronger answers are false.

- (81) 
$$\begin{array}{c} \text{Until when did Peter sleep?} \\ \hline \text{Did Peter sleep at } t_1? \quad \text{Did Peter sleep at RT?} \\ \hline \text{Peter slept at } t_1 \quad \text{Peter still slept (at RT)} \end{array}$$

<sup>30</sup> Stressed *noch* is also found in comparatives (i). If this is also a case of additive *noch*, as Umbach (2009) proposes, then this constitutes an example that is not explained by our proposal.

(i) Adam ist größer als Peter. ‘Adam is taller than Peter.’  
 Bertha ist NOCH größer als Adam.  
 Bertha is still taller than Adam  
 ‘Bertha is even taller than Adam.’

- (82)
- ...  
 |  
 Peter slept from  $t_{start}$  to RT  
 |  
 Peter slept from  $t_{start}$  to  $t_1$   
 |  
 ...

Under this proposal, in the case of both additive and temporal *noch*, some aspect of the topic situation is shifted, whereby temporal *noch* is restricted to a temporal shift (but recall that there is a closely related variant where the shift is locative, cf. (9)).

The superquestion is also responsible for the coherence between the two separate answers. For temporal *noch* in (81), only further, later instantiations of the same sleeping event count as a continuation of a development in terms of the super-QUD.

## 6 Summary

We presented an experiment testing the behavior of additive *noch* ('still', 'in addition') and *auch* ('also/too') in examples like (83) in order to investigate the hypothesis that a shift in topic situations plays a role for the meaning of *noch* but not for *auch* (following Grubic 2018). Our main question was whether the respective additive particle would lead to, e.g., the accommodation of 'Last year, she walked the first eleven stages'.

- (83) (Five years ago, Bertha walked the first eleven stages of the Way of St. James.)  
 Letztes Jahr ist sie **auch/noch** die letzten 21 Etappen gelaufen.  
 last year is she also/still the last 21 stages walked  
 'Last year, she also/additionally walked the last 21 stages.'

We tested three different kinds of examples: ones in which accommodation was predicted to be pragmatically preferred, ones in which accommodation was predicted to be dispreferred, and ones which were neutral in this respect—the latter were used as the baseline.

Grubic's (2018) account predicts that *noch* does not lead to accommodation, whereas *auch* typically but not necessarily does. For the baseline context, we thus predicted that ratings would be high for both particles, but that they would be interpreted differently: accommodation would take place with *auch* but not with *noch*. In the context where accommodation is pragmatically preferred (+REP), we predicted that *noch* would be judged worse than *auch*. In the context where accommodation is dispreferred (−REP), we predicted both particles to be felicitous, but we predicted that *auch* would not lead to accommodation (in contrast to the baseline examples). Both predictions were borne out.

## Data accessibility statement

The auditory materials, the collected data, and the scripts used for statistical analysis are available on OSF (Open Science Foundation). DOI: <https://doi.org/10.17605/OSF.IO/R97KC>.

## Additional files

The additional files for this article can be found as follows:

- **Appendix A.** Items used in the plausibility pre-test. DOI: <https://doi.org/10.5334/gjgl.1275.s1>
- **Appendix B.** Items used in the main experiment. DOI: <https://doi.org/10.5334/gjgl.1275.s2>
- **Appendix C.** Fillers used in the main experiment. DOI: <https://doi.org/10.5334/gjgl.1275.s3>

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## Competing interests

The authors have no competing interests to declare.

## Author contributions

Mira Grubic wrote the first draft of the introduction, literature overview, discussion and outlook/summary. Marta Wierzba pre-registered the experiments, performed the statistical analyses, wrote the first draft of the sections on the experiments and made our data available (see ‘Data availability’ above). We designed and ran the experiments together, and both contributed to all sections in subsequent versions of the paper.

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