

Discourse related readings of scalar particles*

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Abstract This paper offers an analysis of certain uses of the particles *noch/still* according to which they scope above a speech act operator. This allows us to keep their meaning contribution stable, and requires a framework in which the operators are part of the LF.

Keywords: scalar particles, *noch*, *still*, discourse related readings

1 Introduction

In this paper, I investigate uses of the scalar particle *still* and its German counterpart *noch* which relate to the discourse (what has been said) instead of relating to eventualities (what has happened). (1) provides an example.

(1) I am still your mother. *(discourse related still)*

Compare (1) to (2). In (2), the interpretive effect of the particle concerns the sequence of events. The addition of *still* puts the eventuality described in the sentence into perspective, relating it both to past events (earlier rain) as well as to possible future developments (the rain might cease). Situations in which (2) would be true are depicted informally in (4).

(2) It is still raining. *(temporal continuative still)*

(3) (i) Assertion: It is raining.
(ii) Presupposition: It rained at the relevant preceding time.
(iii) Implicature: It might stop raining./It will stop raining.

(4) 'rain' is true of the utterance time, & 'rain' was true of an earlier abutting time interval.

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The interpretive impact of *still* in (1) is quite different. The use of *still* in (1) is not justified because I have been your mother for some time; and it does not evoke the possibility that I might cease being your mother. Instead, the use of *still* indicates that this is a reminder, or a reinforcement of the relevance of the fact that I am your mother. It relates to the preceding discourse. (1) would be appropriate in the context of a lengthy relationship debate. It would not normally be appropriate as the out of the blue start of a conversation.

I argue below that despite these differences, (1) and (2) involve the same scalar particle *still*. This is part of a larger plot in which I reduce the various uses of *still* and German *noch* 'still' to one underlying meaning (see Beck (2016, to appear). For (1), this plot involves arguing that discourse related uses of *noch/still* take scope above speech act operators, like ASSERT in (5).

(5) [ForceP *noch/still* [ForceP ASSERT [_{IP} I am your mother]]]

Discourse related uses of scalar particles have some similarity to speech act related uses of adverbs like *frankly*, as analysed in Krifka 2014. I model their analysis after his.

- (6) a. Frankly, your shirt and tie don't match. (Krifka 2014)
 b. [ForceP *frankly* [ForceP ASSERT [_{IP} your shirt and tie don't match]]]

The structure of the paper is as follows: In Section 2, I sketch the analysis I adopt for regular uses of scalar particles, like temporal *still* in (2). In Section 3, I discuss the discourse related uses of *still* like (1) and also of German *noch*, which provides interesting additional data, e.g. (7).

- (7) a. context: Thilo is coming home from the supermarket. He lists a few things he has bought.
 b. Sigrid: Was hast Du **noch** gekauft?
 what have you still bought
 'What **else** have you bought?'
 c. Thilo: Ich hab **noch** Schokolade gekauft. (*order of mention* noch)
 I have still chocolate bought
 'I have **also** bought chocolate.'

The idea for an analysis introduced in Section 3 requires a framework that includes speech act operators, and allows them to occur embedded under compositional semantic material. Krifka (2014) provides such a framework.

Section 4 introduces the framework as well as some important motivation for it, and applies it to discourse related *noch/still*. Important questions about the generality of the approach are raised in Section 5 (note for example that (7b,c) do not translate directly into English). Section 6 is the conclusion.

2 Continuative readings

This section examines regular (non - discourse related) occurrences of *noch/still*. My plot is to assume the meaning in (8) for all uses of the particle. Interpretive variability in sentences with *noch/still* arises from the nature of the scale and from the syntactic attachment of the particle (and, less importantly for us, also from focus).

- (8) $[[noch/still]] = \lambda S.\lambda x^*.\lambda x.\lambda P_{\langle x,t \rangle}:x^* \alpha x \ \& \ P(x^*).\ P(x)$
- (i) Assertion: $P(x)$ - the predicate P is true of the argument x
 - (ii) PSP: $x^* \alpha x \ \& \ P(x^*)$ - the relevant lower element x^* left-abuts (immediately precedes) x and P is true of x^*
 - (iii) Scalar alternatives: $\{P(x') \mid x' \in Alt(x)\}$
"What alternatives x' is P true of?"

Section 2.1 discusses temporal continuative uses of *noch/still* like (2). In section 2.2, I point out that different sentence interpretations arise when the particle attaches to something other than the main predicate of the sentence, e.g. to a temporal modifier. Scales other than temporal precedence are possible, and the resulting so-called marginal readings are analysed in section 2.3.

2.1 Temporal continuative *noch/still*

Below I provide an analysis of simple examples of temporal *noch/still*. The instantiation of (8) that is relevant for temporal scales is (9). (9) is my version of the semantics assigned to this use of *noch/still* in the literature (compare e.g. Löbner 1990 and Ippolito 2007).

- (9) $[[noch/still _]] = \lambda t^*.\lambda t.\lambda P_{\langle i,t \rangle}:t^* \alpha t \ \& \ P(t^*).\ P(t)$ (type $\langle i, \langle i, \langle \langle i, t \rangle, t \rangle \rangle \rangle$)
The scale S is temporal order " $<$ " (type $\langle i, \langle i, t \rangle \rangle$).
- (i) Assertion: $P(t)$ - P is true of t
 - (ii) PSP: $t^* \alpha t \ \& \ P(t^*)$ - the relevant other time t^* left-abuts (immediately precedes) t and P is true of t^*
 - (iii) Scalar alternatives: $\{P(t') \mid t' \in Alt(t)\}$
"What times t' is P true of?"

This semantics is involved in a sentence like (2). In order to derive the intuitive interpretation (3) of (2), I assume the Logical Form in (10) for the example.

- (2) It is still raining. *(temporal continuative)*
- (3) (i) Assertion: It is raining.
(ii) Presupposition: It rained at the relevant preceding time.
(iii) Implicature: It might stop raining./It will stop raining.

$$(10) \text{ [}_{\text{TP}} \text{ PRES } [\lambda t[\phi \text{ [still}_{<} t^* t] \text{ [}_{\text{AspP}} \text{ ipf } [\text{VP } \lambda e \text{ rain } e]]]]]$$

The particle is an adjunct to AspP, which denotes a set of times - (11) in our example. In order to simplify compositional interpretation, I adopt a referential analysis of tense (see e.g. Kratzer 1998) and assume that PRES simply denotes the present time interval, written as t_{now} . This allows us to consider the simplified structure in (12). We can then simply apply the lexical entry in (9) and get the sentence interpretation in (13).

$$(11) \text{ [[AspP]]} = \lambda t. \exists e [t \subseteq \tau(e) \ \& \ \text{rain}(e)]$$

time intervals included in the run time of a rain event

(12) Assume that PRES is simply t_{now} . Simplified structure:

$$[\phi \text{ [still}_{<} t^* t_{\text{now}}] \text{ [}_{\text{AspP}} \text{ ipf } [\text{VP } \lambda e \text{ rain } e]]]$$

- (13) [[(12)]] is only defined if $t^* \propto t_{\text{now}} \ \& \ \exists e [t^* \subseteq \tau(e) \ \& \ \text{rain}(e)]$
i.e. (12) presupposes that there was rain at a time immediately before now.
Then, [[(12)]] = 1 iff $\exists e [t_{\text{now}} \subseteq \tau(e) \ \& \ \text{rain}(e)]$
i.e. (12) asserts that it is raining.

(13) is a successful analysis of the meaning components (i) and (ii) - the presupposition and assertion of (2). It ensures that a period of rain began in the past and extends into the present, as anticipated above. See Beck (to appear) for some more details and discussion. There is also a meaning component concerning the future, (iii) in (9). I propose to give an alternative semantic analysis of this meaning component. I suggest that the argument, the time variable t in (9), triggers alternatives, (14a). Since presupposition and assertion tell us about past and present, the pragmatically open alternatives concern the future, (14b).

(14) Scalar alternatives:

- a. $[[\phi]]_{\text{Alt}} = \{\exists e [t' \subseteq \tau(e) \ \& \ \text{rain}(e)] \mid t' \in \text{Alt}(t)\}$ Alt-trigger: time variable
"when is it raining?"
- b. $\{\exists e [t' \subseteq \tau(e) \ \& \ \text{rain}(e)] \mid t_{\text{now}} < t'\}$ pragm. 'open' alternatives
"when after now is it raining?"

I further propose that evoking a set of alternatives comes with an appropriateness constraint. This is best illustrated for questions. (15a) is odd in the context of (15b). I suggest that (15b) violates the constraint in (16).

- (15) a. Who passed?
 b. # I know that either everyone passed or everyone failed. Who passed?

(16) Appropriateness condition on the use of a question:

Let $Q \langle s, \langle \langle s, t \rangle, t \rangle \rangle$ be a Hamblin question intension. Q is only appropriate in w if $\exists w'[R(w, w') \ \& \ \exists p[Q(w)(p) \ \& \ p(w')]] \ \& \ \exists w'[R(w, w') \ \& \ \exists p[Q(w)(p) \ \& \ \neg p(w')]]$

It is possible that there is a true (Hamblin) answer and it is possible that there is a false answer.

There is some discussion in the literature regarding presuppositions of questions. Truckenbrodt (2013) proposes that they presuppose that there is a true answer. Abusch (2002) makes a parallel suggestion for sets of focus alternatives. The difference to (16) is that (16) is modalized and about both true and false answers. The effect of (16) in the example at hand is (17).

(17) Appropriateness condition on *noch/still* alternatives:

It is possible that there is a time after now at which it is raining &
 it is possible there is a time after now at which it is not raining.
 'It might stop raining.'

This allows us to explain the oddness of (18) (a phenomenon observed in the literature). If the interpretive effect of *still* concerned just the past and the present, (18) should be fine. It is odd intuitively because it raises a question about John's future deadness. Thus there is an obligatory meaning component concerning the future.

(18) ? John is still dead.

'John is dead and he's been dead for some time.'	(i) + (ii)
"What later times is he dead?"	(iii)

In addition, there is an optional but stronger meaning component about the future. In the case of (2) this is the possible implicature that it will stop raining, which I propose to analyse as a scalar implicature. To make this transparent, I use the EXH operator defined (simplified) in (19).

- (19) $[[EXH \phi]] = 1$ iff $[[\phi]] = 1 \ \& \ \forall q[q \in [[\phi]]_{Alt} \ \& \ \neg([[\phi]]) \Rightarrow q] \rightarrow \neg q$
 "All alternatives that are not entailed are false."
 (see e.g. Krifka 1995, Chierchia, Fox & Spector 2011)

According to the strand of research employing the EXH operator, the example optionally has the LF in (20) which includes this operator. Its effect is spelled out in (21).

(20) [EXH [ϕ [still_< t* t_{now}] [A_{SP}P ipf [V_P λe rain e]]]]

(21) Scalar implicature:

$\forall q[q \in \{\exists e[t' \subseteq \tau(e) \ \& \ \text{rain}(e)] \mid t' \in \text{Alt}(t_{\text{now}})\} \ \& \ \neg([\phi] \Rightarrow q) \rightarrow \neg q]$
 $= \forall t'[t_{\text{now}} < t' \rightarrow \neg \exists e[t' \subseteq \tau(e) \ \& \ \text{rain}(e)]]$
 "It doesn't rain after now./It will stop raining."

This meaning component should be analysed as an implicature because it does not always arise and it is cancellable:

- (22) a. It is still raining, and it looks like it will continue to rain. cancellable
 b. Es regnet immer noch. no scalar impl.
 it rains always still
 'It is raining STILL.'

This concludes the analysis of the basic temporal interpretation of *noch/still*.

2.2 Subconstituent readings

It is interesting to note that *noch/still* does not occupy one fixed position in the syntactic structure. In examples like (23), it modifies the temporal PP 'in the morning' (though many English speakers do not seem to accept this option).

- (23) Lydia ist noch am Vormittag abgereist.
 Lydia is still in the morning left
 % 'Lydia left still in the morning.'

This can be seen clearly in German. I apply a standard constituency test in (24), movement to the prefield. The relevant reading of (23) emerges in (24a) where *noch* modifies the PP and the modified PP is moved to the prefield. In (24b) the particle alone is moved, and the sentence is odd in the same way that (24c) is.

- (24) a. Noch am Vormittag ist Lydia abgereist.
 still in the morning is Lydia left
 'It was still morning when Lydia left.'
 b. # Noch ist Lydia am Vormittag abgereist.
 still is Lydia in the morning left
 # 'Lydia still left in the morning.'

- c. # Noch ist Lydia abgereist.
 still is Lydia left
 # 'Lydia still left.'

The oddness of (24b,c) is easily explained: The semantics of *noch/still* requires a temporal extension, but the predicate does not provide one. Thus *noch/still* is odd with achievements like 'leave', 'arrive' etc. (Such sentences are not completely ungrammatical; the interpretation they permit most likely is a discourse related reading.)

But back to (24a). According to this reasoning, the structure that we interpret is (25). The compositional interpretation is sketched in (26) and the resulting meaning is (27). Note that there is no presupposition regarding Lydia leaving or the like, which indicates the narrow scope of the scalar particle.

(25) $[_{TP} \text{ PAST } [[\lambda t \text{ [still}_< t^* t \text{ [in the morning]]]]] [_{AspP} \text{ pf } [_{VP} \text{ Lydia leave }]]]]$

(26) $[[[_{AspP}]] = \lambda t. \exists e[\tau(e) \subseteq t \ \& \ \text{leave}(e)(L)]$

$[[\text{in the morning }]] = \lambda t. \text{morning}(t)$

$[[\lambda t \text{ [still}_< t^* t \text{ [in the morning]] }]] = \lambda t: t^* \alpha t \ \& \ \text{morning}(t^*). \text{morning}(t)$

$[[[\lambda t \text{ [still}_< t^* t \text{ [in the morning]]]]] [_{AspP} \text{ pf } [_{VP} \text{ Lydia leave }]]]] =$

$\lambda t: t^* \alpha t \ \& \ \text{morning}(t^*). \text{morning}(t) \ \& \ \exists e[\tau(e) \subseteq t \ \& \ \text{leave}(e)(L)]$

$[[\text{PAST}]] = t_{\text{topic}}$

$[[\text{TP}]]$ is defined only if $t^* \alpha t_{\text{topic}} \ \& \ \text{morning}(t^*)$.

Then, it is true iff $\text{morning}(t_{\text{topic}}) \ \& \ \exists e[\tau(e) \subseteq t_{\text{topic}} \ \& \ \text{leave}(e)(L)]$

alternatives: $\{ \text{morning}(t') \mid t' \in \text{Alt}(t_{\text{topic}}) \}$ "What (later) times are in the morning?"

- (27) (i) Assertion: Lydia left before noon.
 (ii) PSP: a relevant earlier time is also before noon. (weak)
 (iii) scalar implicature (local): later times are not before noon.

Additional interpretive effects may arise (e.g. the intuition that Lydia left earlier than expected). These are explored in Beck (to appear) and argued to arise from focus. I will not discuss this issue here. The important point is that the scalar particle has some flexibility with respect to its adjunction site. This leads to different overall sentence interpretations.

2.3 Other scales

It is well known (e.g. König 1977, Löbner 1990, Ippolito 2007) that *noch/still* can work with scales other than temporal precedence. A fairly obvious example is

paths, as in (28). A good context for the example would be a trip from Ipswich to Edinburgh on the A1. Such interpretations have been called marginal in the literature.

(28) Durham is still in England. (*marginal - path*)

- (29) (i) Assertion: Durham is in England.
 (ii) PSP: The relevant earlier place on the path is in England.
 (iii) Implicature: You might/will leave England after Durham.

A version of *noch/still*'s lexical entry (8) based on paths (see e.g. Cresswell 1978, Krifka 1998 for paths) is given in (30), and an analysis of the example in (31)-(33).

(30) $[[noch/still_{<}]] = \lambda l^* . \lambda l . \lambda P_{<l,t>}: l^* \alpha l \ \& \ P(l^*) . P(l) \quad <l, <l, <<l, t>, t>>>$

The scale $<$ is a path with the precedence relation between locations on the path (type $<l, <l, t>>$).

- (31) a. $[\phi [still_{<} l^* place(Durham)]] [\lambda l [l \text{ is in England }]]$
 b. $[[(31a)]]$ is only defined if $l^* \alpha place(Durham) \ \& \ l^*$ is in England.
 i.e. (31a) presupposes a place just before Durham on the given path is in England.
 Then, $[[(31a)]]$ = 1 iff Durham's location is in England.

(32) Scalar alternatives:

$[[\phi]]_{Alt} = \{l' \text{ is in England} \mid l' \text{ a location on the path}\}$ Alt-trigger: place
 "What places on the path are in England?"

- (33) a. $[EXH [\phi [still_{<} l^* place(Durham)]] [\lambda l [l \text{ is in England }]]]$
 b. Scalar implicature:
 $\forall l' [place(Durham) < l' \rightarrow l' \text{ is not in England}]$
 "You leave England after Durham."

Other so-called marginal uses involve degree scales. An example is given in (34). I use the version in (35) of *noch/still*'s meaning (8). An analysis of (34) is sketched in (36). See Beck (2016) for more data and discussion.

(34) 400.- Euros are still tax free. (*marginal - degree*)

(35) $[[noch/still_{<}]] = \lambda x^* . \lambda x . \lambda P_{<x,t>}: x^* < x \ \& \ P(x^*) . P(x) \quad <e, <e, <<e, t>, t>>>$

The scale $<$ is a degree scale (type $<d, <d, t>>$) (e.g. Size, Amount,...).

- (36) a. $[\phi [still_{<} x^* [400, -]] [\lambda x [x \text{ is tax free}]]$
 b. (i) Assertion: 400,- is tax free.

- (ii) PSP: a sum below 400 is tax free.
- (iii) Scalar implicature: sums above 400,- are not tax free.

To sum up the important points made in this section: *noch/still* is a presuppositional scalar particle that triggers alternatives. Its meaning is given in (8). This meaning is operative throughout the various uses of the particle. Interpretive variability of sentences with the particle arises because it can be adjoined in different places in the syntactic structure, and because it can operate on different scales.

3 Discourse related readings - data and intuition

This section examines the kinds of data mentioned in the introduction in which *noch/still* seems to relate to the discourse rather than to what happened. In section 3.1, I look at order of mention sensitive *noch*, a use that English *still* does not share. Section 3.2 considers reaffirmative *noch/still*, which is available in both languages. I take a brief look at German additive *noch* in section 3.3. The intuitions developed in this section will be cast as an analysis in section 4, after I have introduced a suitable framework.

3.1 Order of mention *noch*

Returning to the discourse related uses of *noch/still*, let's begin with the example below, repeated from the introduction. The use of *noch* in this example is justified because other relevant things have been said before, i.e. Thilo has told me about other things he has bought.

- (7) a. context: Thilo is coming home from the supermarket. He lists a few things he has bought.
- b. Sigrid: Was hast Du **noch** gekauft?
 what have you still bought
 'What **else** have you bought?'
- c. Thilo: Ich hab **noch** Schokolade gekauft. (*o. of mention*)
 I have still chocolate bought
 'I have **also** bought chocolate.'

Further examples that contain uses of *noch* similarly justified by relevant other things said earlier are given in (37) and (38). Imagine for (37) a context in which your task is to describe a room. You go over all the things that you see as you look around the room. You have just described e.g. that on the left, there is the bed and a chest of drawers. This is not temporal *noch* (e.g. suggesting that the door might not be there later). Similarly, in (38), *noch* does not tell us that the

drawing has been in the manual for a while and might not be in the manual later. Instead, *noch* is used because I have made other suggestions for how to fix the printer earlier.

- (37) a. context: describing a room.
 b. Auf dieser Seite ist **noch** die Tür.
 on this side is still the door
 'Then, there is the door on this side.'
- (38) a. context: Thilo has been trying to fix a paper jam in the printer for some time. I hover somewhat helplessly, trying to make suggestions. At one point, I say:
 b. In der Bedienungsanleitung ist **noch** diese Skizze, auf Seite 3.
 in the manual is still this drawing, on page 3
 There is **also** this drawing in the manual, on page 3.

This use of *noch* is justified because other relevant propositions have been stated before. I propose to analyse this type of use as order of mention sensitive. I get the idea of order of mention from Wolfgang Klein's work, e.g. Klein (2001). The example in (39) (after Klein 2001) explores the use of *again*, whose normal contribution is that whatever is described in the sentence has occurred before. But *again* in (39) is justified not by a sequence of eventualities ("n was a prime number at an earlier time"), but by what has been said before ("that n is a prime number was mentioned before").

- (39) a. context: a list of numbers.
 b. (5 is a prime number, 4 can be divided by 2, 7 is a prime number,)
 11 is a prime number again.

I propose that *noch* in (38) is similarly sensitive to order of mention. To be more precise, I suggest that (38b) addresses the question under discussion (QUD) (Roberts 1996) "how can we fix the printer?". *Noch* indicates that another answer to this question has been given earlier. I.e. *noch*'s contribution concerns the sequence of speech acts in the discourse. Its core meaning is stable, but it scopes above a speech act operator. This operator is called ANSWER here. I suggest the structure in (40) for the example. Based on the now familiar meaning of the particle, we can anticipate the meaning sketched in (41) for the sentence.

- (40) [[noch_< p* [there is this drawing]] [λq ANSWER(q)(How can we fix...?)]]
- (41) (i) "there is this drawing" contributes an answer to "How can we fix ...?"
 (ii) a preceding p* contributes an answer to "How can we fix...?"
 (iii) {p contributes an answer to "How can we fix ...?" | p ∈ Alt("there is this drawing")}

This captures the fact that the sentence can't be the first suggestion, i.e. (42c) is not appropriate in (42), similar to how the use of *also* in English would be inappropriate in this context.

- (42) a. context: Thilo has just discovered a paper jam in the printer.
 b. Thilo: Oops. How can we fix this?
 b. Sigrid: # In der Bedienungsanleitung ist **noch** diese Skizze,
 in the manual is still this drawing,
 auf Seite 3.
 on page 3
 # There is **also** this drawing in the manual, on page 3.

3.2 Reaffirmative *noch/still*

We now return to the first example from the introduction. Its salient interpretation is available in both English and German. I call this use of the particle reaffirmative; (44) provides another example.

- (43) Ich bin immer noch Deine Mutter. (*reaffirmative* noch/still)
 I am always still your mother.
 'I am still your mother.'

- (44) 11 is still a prime number. (*reaffirmative* noch/still)

A context in which (44) could be used would be for instance a situation in which a student makes a mistake (like dividing 11 by 3 and getting 4). A tutor could draw attention to this mistake by reminding the student of the prime number status of 11. That is, (44) can be a reminder. A first intuition is sketched in (45). Similarly, (43) can emphasize the continued relevance of the (known) fact that I am your mother.

- (45) (i) Assertion: 11 is a prime number.
 (ii) PSP: that 11 is a prime is "in the context".
 (46) (i) Assertion: I am your mother.
 (ii) PSP: It is known that I am your mother.

I suggest that here, too, the particle scopes over a speech act operator. In this case, I take it to be Krifka's (2014) operator ASSERT. According to Krifka, ASSERT(p) says that the speaker is liable for the truth of p at the time of utterance. We can thus anticipate the meaning sketched in (48) for the structure in (47), my idea for the analysis of the example. Krifka (2014) briefly comments on the possibility of asserting a proposition that is not a new assertion. He suggests that this can

increase salience of existing commitments and/or reinforce commitment to assertion. My proposal is this is marked explicitly by *noch/still* in the reaffirmative use.

(47) [still [ASSERT [I am your mother]]]]

- (48) (i) I am liable for the truth of "I am your mother" at t.
 (ii) At a preceding time t* I have been liable for the truth of "I am your mother".
 (iii) {I am liable for the truth of "I am your mother" at t' | t' ∈ Alt(t) }

3.3 Additive *noch* (Umbach 2009)

In this section I discuss another use of the German particle *noch* which has been argued (Umbach 2009) to be an instance of order of mention as well. Let's first look at some relevant data. It has been observed (Umbach 2009, Klein 2007/2015) that sentences like (49) can have different interpretations depending on where the focus is. This is indicated by capitalization in (49) (from Umbach 2009). In particular, stress on the particle brings out the additive reading. So-called further-to *noch* is analysed in Beck (to appear). I concentrate on additive *noch* here.

- (49) a. Hans trank **noch** einen SCHNAPS. (*further-to* noch)
 Hans drank still a schnaps
 'Hans had a schnaps **before**...'
 b. Hans trank **NOCH** einen Schnaps. (*additive* noch)
 Hans drank still a schnaps
 'Hans had (yet) **another** schnaps.'

On the additive reading, *noch* forms a constituent with the NP. That is, the particle modifies a subconstituent, not the main predicate of the sentences. This is demonstrated in (50) using once more movement to the prefield (the context (50a,b) is given to provide suitable discourse circumstances for the structure). Accordingly, the structure for additive *noch* should look roughly like (51). The meaning of the particle lets us anticipate (52) as the meaning of such a structure.

- (50) a. Hans had a schnaps.
 b. What did he drink then?
 c. Noch einen Schnaps hat er getrunken.
 Still a schnaps has he drunk
 'He had another schnaps.'

(51) [[noch_< x* x [einen Apfel]] [1[ich schäle t1]]] <e,<e,<<e,t>,t>>>

- (52) (i) Assertion: There is an x such that x is an apple and I peel x .
 (ii) PSP: For some x^* : x^* is an apple and $x^* < x$.

Note that this involves an ordering of individuals. What would be a plausible scale in this instance? Umbach (2009) argues that the scale relevant for additive *noch* is order of mention. The order of mention relation $<$ holds between type $<e>$ expressions " $x^* < x$ " here (not propositions as in the earlier examples). We can make sense of this if the context includes not just propositions but also discourse referents, as in dynamic semantics (e.g. Heim 1982). Order of mention can be defined on both, (53).

- (53) " $x^* < x$ ":
 $<$ is order of mention i.e. x^* occurs in an earlier context than x
 Hence (59) is appropriate in a context in which apples were introduced into the discourse.

I will not pursue additive readings further in this paper. See Umbach 2009 for more discussion. This section indicates that my general approach is compatible with her analysis. It is interesting that order of mention might be a source of additivity, in addition to event cumulation (Greenberg 2010, Thomas 2010).

4 Framework and analysis

In Section 3, I have argued that an interpretive framework is needed in which speech act operators are present, and can be outscoped by compositional semantic material. Section 4.1 introduces such a framework. In Section 4.2, I collect some motivation from the literature that supports this type of theory. In Section 4.3, I apply it to the problem at hand, discourse related readings of *noch/still*.

4.1 Sketch of a framework: Krifka 2014

There is some recent work that argues that illocutionary operators are represented in the Logical Form, and that certain expressions can take scope over them. Manfred Krifka has made this point in various papers, and Sauerland & Yatsushiro (2015) also argue for it. I present here an analysis that is based on Krifka 2014, although it is much simplified. Krifka locates speech act operators in head of ForceP at LF, for example:

- (54) [ForceP [Force' [Force ASSERT] [_{IP} ...]]]

He assumes, and I follow him in this, that the speech act operator changes the semantic type from propositional to functions from contexts to contexts. Let $<c>$ be the type of contexts. Then up to the level of IP, we have the familiar

propositional meanings. The head of ForceP turns them into discourse active meanings, here: functions from contexts to contexts $\langle c, c \rangle$.

- (55) IP: $\langle s, t \rangle$
 head of ForceP: $\langle \langle s, t \rangle, \langle c, c \rangle \rangle$
 ASSERT
 also ANSWER, orders, declarations, ...

A context c is an n -tuple $\langle c_{sp}, c_h, c_t, C_w \dots \rangle$ that consists of the speaker c_{sp} , the hearer c_h , the utterance time c_t , the common ground C_w and probably more (this is ignored here). This is the utterance situation. C_w (the common ground) is the set of worlds compatible with the assumptions of the participants. Given this, the semantics of the ASSERT operator can be sketched as follows:

- (56) $ASSERT(p)(c) = \iota c': c' = \langle c_{sp}, c_h, c_t, C_w \cap \{w: c_{sp} \text{ is liable in } w \text{ for the truth of } p \text{ in } w \text{ at } c_t\} \rangle$

The operator combines with a proposition and a context and maps them onto a new context which is just like the old one except that the common ground is updated with the information that the speaker is liable for the truth of the proposition. An assertion of "11 is a prime number", for example, has the structure in (57b) yielding the interpretation in (58). This amounts to (59).

- (57) a. 11 is a prime number.
 b. [ForceP [Force' [Force ASSERT] [IP 11 is a prime number]]]
- (58) $\lambda c. ASSERT([\lambda w. 11 \text{ is a prime number in } w])(c)$ (type $\langle c, c \rangle$)
- (59) $\lambda c. \iota c': c' = \langle c_{sp}, c_h, c_t, C_w \cap \{w: c_{sp} \text{ is liable in } w \text{ for the truth of } [\lambda w'. 11 \text{ is a prime}_{w'}] \text{ in } w \text{ at } c_t \} \rangle$

At this point I will make an important simplification. The operators considered in this paper only change the common ground. We will not model turn taking and the like. So nothing will ever affect the speaker, hearer etc. parameters of the context. I therefore simplify the output context c' as a set of worlds, type $\langle s, t \rangle$. The simplified version of (59) is given in (60), and the simplified ASSERT in (61).

- (60) $\lambda c. \lambda w. w \in C_w \ \& \ c_{sp} \text{ is liable in } w \text{ for the truth of } [\lambda w'. 11 \text{ is a prime number}_{w'}] \text{ in } w \text{ at } c_t$
- (61) $ASSERT(p)(c) = \lambda w. w \in C_w \ \& \ c_{sp} \text{ is liable in } w \text{ for the truth of } p \text{ in } w \text{ at } c_t$

This is the framework I adopt. An important question one should have at this point is why we put the speech act operator in the LF at all. Shouldn't this be the pragmatic step? I.e. shouldn't this be the effect of uttering a syntactic structure, and not part of the structure itself? The next section provides some motivation.

4.2 Motivation (Krifka 2014, Sauerland & Yatsushiro 2015)

Somewhat surprisingly, recent research at the semantics/pragmatics interface has shown that illocutionary acts can occur embedded. A collection of examples and informal paraphrases of their relevant interpretations is given below. Krifka (2001) argues that universal quantifiers, for example, can take scope above question speech acts, declarations and imperatives. Krifka (2014) argues that *tell* embeds an assertion. It seems, then, that certain expressions can type shift to types useable above the speech act operator. This leads to embedded speech acts. An LF for (62b) is sketched in (63).

- (62) a. What did **everyone** buy?
For each x , tell me what x bought.
- b. **Everyone** leave!
For each x , I order x to leave.
- c. Mary **told** John that his shirt and tie didn't match.
Mary made an assertion with the content that his shirt and tie didn't match.

(63) [ForceP everyone_x [Force' IMP [IP x leave]]]

More directly relevant for our purposes is the example in (64) of an adverb scoping above an assertion (from Krifka 2014). The example is analysed as having the structure in (65). The adverb needs to have the semantics in (66) for the interpretation of this structure. Thus it needs to shift from its normal type as a VP modifier, exemplified in (67), to this discourse related type. Both times, the adverb adds the not-at-issue information that whatever happened was frank.

- (64) **Frankly**, your shirt and tie don't match.
"Your shirt and tie don't match, and making this assertion is frank."

(65) [ForceP frankly [ForceP ASSERT [IP your shirt and tie don't match]]]

(66) [[frankly]] = $\lambda R.\lambda c.\lambda w:\text{frank}(R(c)(w)).R(c)(w)$ $\langle\langle c,c\rangle,\langle c,c\rangle\rangle$

- (67) a. Mary told John frankly that his shirt and tie didn't match.
b. [[frankly]] = $\lambda R.\lambda e:\text{frank}(R(e)).R(e)$ $\langle\langle v,t\rangle,\langle v,t\rangle\rangle$

Another type of example that is fairly closely related to our data is remind-me readings of questions, as brought to our attention by Sauerland and Yatsushiro (2015). They observe that the question in (68) has a reading that is not about a changing name. As the paraphrases indicate, the use of *again* is motivated instead by the fact that the name has been known before.

(68) What was your name **again**? (*remind me*)

"Bring it about that I know again what your name is."

"You must make it once more known what your name is."

The paraphrased interpretation suggests the structure in (69), which is Sauerland & Yatsushiro's analysis.

(69) [ForceP IMP [again [ForceP CG [CP what was your name?]]]]

To see what this means, interpretations for the speech act operators IMP and CG are sketched in (70). Roughly speaking, IMP (the imperative) contributes "you must" and CG (for common ground) needs to contribute "make it known". Importantly, the adverb *again* needs to have a discourse level type interpretation (type $\langle\langle c,c\rangle,\langle c,c\rangle\rangle$) for the LF to be interpretable.

- (70) a. IMP(p)(c)(w):
 $\forall w' [w' \in C_w \ \& \ c_h \text{ obeys in } w' \text{ the requests made by } c_{sp} \text{ in } w \rightarrow p(w')]$
- b. CG(Q)(c)(w):
 $c_h \text{ makes known in } w \text{ the answer to } Q \text{ in } w$

In sum, the field has accumulated a body of evidence that indicates that speech act operators can be in the scope of other material in the sentence, motivating a framework like Krifka's (2014) (see his paper for more data and discussion).

4.3 Back to our examples

Let us now use this framework in the analysis of the discourse related uses of scalar particles, that is, let's spell out the ideas sketched in section 3. I begin with the reaffirmative uses of the particles. Remember that the basic idea for an analysis of (71) is that the particle takes scope over ASSERT. Such an LF is presented in more detail in (72a). Its interpretation is (72b). (73) spells out the resulting sentence meaning.

(71) 11 is still a prime number. (*reaffirmative noch/still*)

- (72) a. $[\lambda c [_{\text{ForceP}} \text{ still } c^* c [_{\text{ForceP}} \text{ ASSERT } [_{\text{IP}} \text{ 11 is a prime number }]]]] \langle c,c \rangle$
 b. $\lambda c. \lambda w. \text{ ASSERT}(\lambda w'. 11 \text{ is a prime number in } w')(c^*)(w) \ \& \ c^* \propto c.$
 $\text{ASSERT}(\lambda w'. 11 \text{ is a prime number in } w')(c)(w)$

- (73) a. $[[(72)]]$ is only defined if c_{sp} is liable for the truth of '11 is a prime number' at c^*_t and $c^*_t \propto c_t$. Then $[[(72)]]$ is true if c_{sp} is liable for the truth of '11 is a prime number' at c_t .
 b. $c^* \propto c$ iff $c^*_t \propto c_t$

The interpretation relies on a suitable version of *noch/still*'s lexical entry, which is provided in (74). A type shift from regular temporal *noch/still* (repeated in (75)) must be available that yields this interpretation. Note that it adjusts the types but keeps a stable core contribution.

(74) reaffirmative *noch/still* is discourse level temporal *noch/still*:
 $[[noch/still <]] = \lambda c^*. \lambda c. \lambda P_{<c,c>}. \lambda w: c^* \alpha c \ \& \ P(c^*)(w). P(c)(w)$
 (type $<c, <c, <<c,c>, c>>>>$)

(75) $[[noch/still <]] = \lambda t^*. \lambda t. \lambda P_{<i,t>}. t^* \alpha t \ \& \ P(t^*). P(t)$ (type $<i, <i, <<i,t>, t>>>$)

Next, let's take a closer look at order of mention *noch*. This also requires a discourse level meaning for the particle, but it is not the same as (74). In (76), I repeat the chocolate example.

(76) Ich hab **noch** Schokolade gekauft. (order of mention)
 I have still chocolate bought
 'I have **also** bought chocolate.'

Working out the proposal from section 3 in more detail, the LF is (77) and the interpretation (78)-(79).

(77) $[ForceP [still < p^* [I have bought chocolate]]] [\lambda q [ForceP ANSWER(Q)(q)]]$

(78) a. QUD Q: what did you buy?
 b. ANSWER(Q)(p): p is offered as an answer to Q
 b'. ANSWER(Q)(p)(c)(w) is only defined if $p \in Q$ or there is a q: $p \Rightarrow q$ and $q \in Q$. Then: $ANSWER(Q)(p)(c)(w) = 1$ iff $w \in C_w$ & c_{sp} is liable in w for the truth of p in w at c_t .
 c. scale $<$: $p < q$ iff p was mentioned before q,
 i.e. if ANSWER(Q)(p)(c*) and ANSWER(Q)(q)(c) and $c^* < c$

(79) $[[(77)]]$ is only defined if there is a p^* : p^* is offered in answer to the QUD and p^* was uttered before 'I have bought chocolate' ; i.e. $p^* < I$ have bought chocolate

This is assuming that a version of *noch* is available that ranks propositions according to order of mention. (80) provides a suitable lexical entry. There is a parallel between order of mention *noch* and marginal *noch/still* in that these two readings transfer *noch*'s continuative interpretation from the time scale to some other scale. In (80) this is combined with a discourse operative interpretation.

(80) order of mention *noch*:
 $[[noch <]] = \lambda p^*. \lambda p. \lambda R. \lambda c. \lambda w: p^* < p \ \& \ R(p^*)(c)(w). R(p)(c)(w)$

To summarize the analysis, I follow earlier proposals that there is a speech act operator in the head of ForceP at LF. This operator changes semantic types to discourse operative meanings. Certain expressions can shift from normal propositional meanings to such discourse level interpretations, and can therefore scope above speech act operators. Among those expressions is *noch/still* on reaffirmative and order of mention uses. This is responsible for discourse related readings of scalar particles.

5 Constraints on discourse related interpretations

The preceding section has added some further data points in favour of the primarily surprising idea that compositional material can outscope speech act operators. In this section, I want to explore briefly what the limits of this possibility are. I open a window to a bigger discussion we should have in section 5.1. Section 5.2 notes that discourse related interpretations of scalar particles depend on particular lexical items. In section 5.3, we observe that they are subject to constraints on scope. Section 5.4 investigates if discourse related interpretations are a root clause phenomenon.

5.1 A question of generality

We have seen a number of case studies that support embedded illocutionary operators. Before taking a closer look at those particular possibilities and their constraints, I would like to make a general note that the phenomenon of embedded illocutionary acts needs to be severely constrained. In general terms, this is part of the research agenda of Krifka (2014, 2016). With regard to adverbs, let me contrast the possibilities we observed above with some impossibilities. Krifka (2014) notes (81). But other adverbs/particles with a similar type of meaning resist such uses; contrast (81) with (82):

(81) **Frankly**, I admire Sue.
 'My assertion that I admire Sue is frank.'

(82) # **Reluctantly**, I admire Sue.
 'My assertion that I admire Sue is reluctant (I'm forced to admit it).'

A parallel point can be made for remind-me readings. Remember (83) and note that in German, *noch* can also bring out this interpretation. Sauerland and Yatsushiro (2015) point out that the adverb *again* is special in being able to take this scope position. A parallel reading is not possible for additive particles, as indicated in (85). I would like to add (86) to this list of impossibilities.

- (83) a. Wie war noch/wieder Ihr Name?
 how was still/again your name
 'What was your name again?'
 b. Bring it about that I once more/still know your name.
- (84) a. [_{ForceP} IMP [**again/wieder/noch** [_{ForceP} CG [what is your name?]]]]
 b. All acceptable worlds are such that you do something which causes the answer to 'what is your name?' to be once more/still known.
- (85) # What is your name, **too**? (Sauerland & Yatsushiro 2015)
 (not licensed e.g. by someone else announcing their name)
- (86) a. # Wie war **fast** Ihr Name?
 how was almost your name
 # What was **almost** your name?
 b. Bring it about that I almost know your name = Give me a hint.

This means that the shift to a type that can scope over a speech act operator is not freely available. If it were, we would expect way more discourse related interpretations than are actually available.

5.2 Lexical constraints

But back to the expressions that are of particular interest to us here. The following sets of data indicate that the availability of a discourse related interpretation depends on the particular lexical item. In (87), I show that near synonymous adverbs/adverbials resist parallel uses:

- (87) a. # Wie war **erneut** Ihr Name?
 how was anew your name
 'What was your name again?'
 b. # Wie war **zum zweiten Mal** Ihr Name?
 how was for the second time your name
 # 'What was your name for the second time?'
- (88) # [_{ForceP} IMP[**erneut/for the 2nd time** [_{ForceP} CG[what is your name?]]]]

So there are certainly lexical constraints involved. This is compatible with a type shifting analysis like the one developed in the preceding section. But it would be interesting to know when a lexical item can and cannot shift. The data in (92) bring to mind the Visibility Parameter for adverbs (Rapp & von Stechow 1999, Beck 2005) where a similar difference in possible adjunction sites for *wieder* vs. *erneut* is observed.

(89) and (90) draw attention to the fact that English *still* is not exactly like German *noch* with respect to discourse related readings:

- (89) a. # I have still bought chocolate.
 b. # [ForceP **still** [ForceP ANSWER [_{IP} I have bought chocolate]]]]
- (90) a. # What was still your name?
 b. # [ForceP IMP [**still** [ForceP CG [what is your name?]]]]

This is despite the fact that a discourse related interpretation of *still* is in principle possible, cf. example (1). It seems that which operator is scoped over matters. While *still* can shift to a type that allows it to take scope over ASSERT, cf. (75), it does not seem to be able to scope over e.g. ANSWER in (89), that is, (80) is not available for English *still*.

5.3 Scope constraints

Sauerland and Yatsushiro (2015) also explore constraints on readings that involve embedded speech act operators. They note in particular that there are scope constraints on the availability of remind-me readings. (91) is their data set. The quantifier 'fast keiner' ('almost no one') is known to block other elements in the clause from taking wide scope. The contrast between (91a) and (91b) indicates that this is relevant for the availability of the remind-me reading. On the remind-me reading, *nochmal* needs to take wide scope, but the quantifier in contrast to the referential subject blocks this. (91c) shows that a different word order permits the remind-me reading. This is expected because the quantifier no longer intervenes between *nochmal* and its scope position.

- (91) a. Welche Sprache kann er nochmal sprechen?
 which language can he again speak
 'Which language does he speak again?' (*remind me*)
- b. # Welche Sprache kann fast keiner nochmal sprechen?
 which language can almost no one again speak
 'Which language does almost no one speak again?' (*#remind me*)
- c. Welche Sprache kann nochmal fast keiner sprechen?
 which language can again almost no one speak
 'Which language does almost no one speak again?' (*remind me*)

In (92) I transfer Sauerland & Yatsushiro's argument to reaffirmative *noch*. In (92b) the negative quantifier prevents the reaffirmative reading. A different word order (92c) permits the reaffirmative reading.

- (92) a. Ich bin immer noch Deine Mutter. (*reaffirmative*)
 I am always still your mother
 'I am still your mother.'
- b. # Niemand hier ist immer noch Deine Mutter. (*#reaffirmative*)
 nobody here is always still your mother
 'Nobody here is still your mother.'
- c. Es ist immer noch niemand hier Deine Mutter. (*reaffirmative*)
 it is always still nobody here your mother
 'It is still the case that nobody here is your mother.'

These data support a structural analysis of remind-me and reaffirmative readings: only a scope analysis lets us expect that the phenomenon is sensitive to scope constraints. This in turn supports a structural analysis of speech act operators.

5.4 Are discourse related readings a root phenomenon?

Given that the analysis of reaffirmative and order of mention *noch/still* involves these particles taking scope above a speech act operator, we would expect these uses to show up only in clauses that express speech acts (thanks to David Beaver (p.c.) for emphasizing this point). This might suggest that the readings should show up unembedded only, since root clauses is where speech acts can be expressed. But remember that according to Krifka (2014), clauses that express speech acts are not limited to root clauses; *tell* for instance receives an analysis according to which it embeds an assertion. So this prediction is not quite as easy to follow up on as one might first think, because it is not the same as checking whether or not the particles on these uses can show up embedded. It depends on the embedding context whether or not we expect the discourse related readings to be there.

To illustrate, a reaffirmative reading under *tell* should be ok, while perhaps embedding under *forget* should not lend itself to such a reading.

- (93) a. She told me that she was still my mother.
 'She made an assertion that conveyed continued commitment to her being my mother.'
- b. She forgot that she was still my mother.
 # 'She forgot that she continued to be liable for the truth of her being my mother.'

Similarly, remind-me readings in embedded questions should depend on whether a question speech act is embedded or an interrogative that contributes a proposition that answers the question:

- (94) a She asked me what my name was again.
'She wanted to be reminded of my name.'
b. Whether I can introduce you depends on what your name was again.
'Whether I can introduce you depends on you bringing about
that it is once more known what your name is.

A conditional is an embedding context in which the *then*-clause does not normally constitute a speech act. But an 'Austinian conditional' like (95) which constitutes a conditional speech act (Krifka 2014) is compatible with a reaffirmative reading.

- (95) If anyone is interested: I am still your mother. *(reaffirmative)*

At first glance, it seems that embedded remind-me and reaffirmative readings correlate with contexts that are plausibly analysed as embedded illocutionary acts. This issue certainly needs to be explored further.

6 Conclusion

I have proposed an analysis of discourse related uses of the scalar particles *noch* and *still* which is based on a stable semantic core of the particle. The special interpretive effect comes about because on these readings, the particle scopes above speech act operators. In the case of the reaffirmative reading, it scopes above a normal assertion operator. In the case of the order of mention reading, it scopes above an answer operator. These analyses support the approach taken in e.g. Krifka 2014 and Sauerland and Yatsushiro 2015, according to which certain expressions can take scope over an illocutionary operator.

With regard to the analysis of scalar particles, this paper contributes to the idea that one core meaning is responsible for the various uses of the particle (pursued in Beck (to appear), Beck 2016). It might prove a starting point for a detailed analysis of additive uses of *noch* and an interesting angle for the semantics of modal uses of *still*, as in (96a) and especially (96b).

- (96) a. John studied all night, but he still failed the exam. (Ippolito 2007)
b. You might have a point. But still, Jones is simply our best striker.

In more general terms, the analyses pursued here have interesting repercussions for our understanding of the semantics/pragmatics interface. According to the analyses in section 4, there is some semantic composition above the speech act operator - in particular some adverbs can be interpreted there. Suppose that based on these findings, we give up the idea of a strictly modular interpretive component. Then we are looking for a theory of when outscoping a speech act operator is and isn't possible. What we can say right now is that such a theory would need to include a lexical and a scope component.

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