Alternatives for Aspectual Particles: Semantics of *still* and *already*
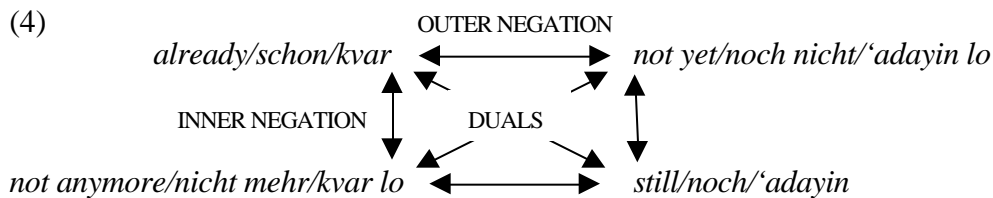
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1. Semantic Relations between Aspectual Particles

Aspectual particles (the term is due to (König 1991)) appear to come in groups, related by negation, and therefore have attracted the attention of formal semanticists. The following examples list the particles of English, German and Hebrew; they show that the system is semantically transparent in various degrees.

(1) a. *It is <u>already</u> raining.*   b. *It is <u>not yet</u> raining.*
    b. *It is <u>still</u> raining.*   d. *It is <u>not</u> raining <u>anymore</u>.*
(2) a. *Es regnet <u>schon</u>.*   b. *Es regnet <u>noch nicht</u>.* ('still not')
    b. *Es regnet <u>noch</u>.*   d. *Es regnet <u>nicht mehr</u>.* ('not (any)more')
(3) a. *<u>kvar</u> yored geshem.*   b. *<u>'adayin lo</u> yored geshem.* ('still not')
    b. *<u>'adayin</u> yored geshem.*   d. *<u>kvar lo</u> yored geshem.* ('already not')

According to (Löbner 1989), who worked on German, the particles form a system similar to that of quantifiers that are related by internal and external negation:

(4)

               OUTER NEGATION

    already/schon/kvar ⟷ *not yet/noch nicht/'adayin lo*

  INNER NEGATION   DUALS

not anymore/nicht mehr/kvar lo ⟷ *still/noch/'adayin*

The claim that aspectual particles are thus related is attractive if we consider German, and particularly Hebrew (which is quite similar to Spanish, cf. *todavia no* 'still not' and *ya no* 'already not', and Slavic, cf. Czech *jeste ne* 'still not' and *uz ne* 'already not'). These forms wear the internal negations on their sleeves. English relates terms by their outer negation, but less clearly so, as the original particles occur in suppletive forms (*already* as *yet*, and *still* as *anymore*). These are negative polarity items; the alternations are quite similar to alternations like *some / any*. We find *yet* in the meaning of 'already' also in questions, a known context for negative polarity items, as in *Has the attack been launched yet?* German shows an interesting piece of evidence for duality, as *noch nicht* 'still not' is sometimes analyzed as 'not already', with negation taking wide scope over a modal element (Angelika Kratzer, pers. comm.) The sentence *es kann noch nicht regnen*, lit. 'it can <u>still</u> <u>not</u> rain', has as its preferred reading 'It is <u>not</u> possible that it is <u>already</u> raining'.

2．Aspectual Particles as Phase Quantifiers

Let us assume that sentences φ are true or false of time intervals t; that is, $\varphi(t)$ is true iff φ is true throughout the interval t. I will write $t' \triangleleft t$ to express that the interval t' has begun before t and abuts t. Löbner proposes the meanings in (5), which relate propositions to intervals ("phases"):

(5) a. ALREADY(t, φ): assert: φ holds at t $\quad\quad\quad\varphi(t)$
        pres: $\neg\varphi$ was true before t $\quad \exists t' \triangleleft t[\neg\varphi(t')]$
    b. STILL(t, φ): assert: φ holds at t $\quad\quad\quad\varphi(t)$
        pres: φ was true before t $\quad \exists t' \triangleleft t[\varphi(t')]$
    c. NOTYET(t, φ): assert: φ does not hold at t $\quad \neg\varphi(t)$
        pres: $\neg\varphi$ was true before t $\quad \exists t' \triangleleft t[\neg\varphi(t')]$
    d. NOTANYMORE(t, φ): assert: φ does not hold at t $\quad \neg\varphi(t)$
        pres: φ was true before t $\quad \exists t' \triangleleft t[\varphi(t')]$

This analysis is supposed to capture the logical relationships between the particles observed in (4). Outer negation negates the assertion part but not the presupposition, as expected. The relationship dubbed "inner negation" is peculiar, however: it is a negation within the presuppositional component. This is quite different from inner negation of quantifiers, seen as second-order predicates: The outer negation of Q(P) is ¬[Q(P)], and its inner negation is Q(¬P). The latter is quite different from the negation in the presuppositional component we find in (5). True, Löbner defines a quantifier that he writes "   " that appears to behave in the expected way, but this quantifier is a rather artificial creature.

Löbner distinguishes the aspectual particles discussed above (**Type-1**) from another use, called **Type-2**, in which they associate with a focus in the sentence (from now on I will mostly give German examples; focus will be marked by F).

(6) *Lydia ist schon dréi$_F$ Monate alt.* 'Lydia is already thrée months old'

One reason to distinguish between the two types is that Type-1 *still/noch* is replaced by *only/erst* in Type-2. Also, the outer negation of *only/erst* is not *not anymore/nicht mehr*, but the more transparent *not only / nicht erst*.

(7) a. *Lydia is only three months old.*
    b. *Lydia ist erst drei Monate alt.*
(8) a. *Lydia is not only three months old.*
    b. *Lydia ist nicht erst drei Monate alt.*

Type-3 aspectual particles focus on a time adverbial:

(9) *Lydia ist schon um dréi$_F$ Uhr angekommen*
    Lydia AUX already at three o'clock arrived
    'It was already three o'clock when Lydia arrived.'

We distinguish Type-3 from Type-2, as (10.a) implicates that Lydia is **older** than expected, whereas (b) implicates that Lydia arrived **earlier** than expected (cf. also (König 1977)):

(10) a. *Lydia ist schon dréi$_F$ Monate alt (*nicht erst zwei / nicht vier)*
     b. *Lydia ist schon um dréi $_F$ Uhr angekommen (nicht erst um zwei / *vier)*

I will cast Löbner's theory in a general theory of association with focus, assuming that focus introduces a partition into a background part and a focus part (cf. (von Stechow 1990), which I will write as a pair ⟨B, F⟩. According to Löbner, Type-2 particles are related to Type-1 particles, as follows:

(11)   ALREADY$_{T2}$(t, ⟨B, F⟩)
            ALREADY(t, B(F)) (B(F)(t), pres: t t$_r$[¬ B(F)(t)])

(12)   *Lydia ist schon dréi$_F$ Monate alt.*
            ALREADY$_{T2}$(t, n t[MONTHS(L)(t) = n], 3)
                ALREADY(t, t[MONTHS(L)(t) = 3])
                MONTHS(L)(t) = 3, pres: t t$_r$[¬ MONTHS(L)(t)=(3)]]
            'Lydia is three months old', pres.: Lydia was not three months old before.'

This meaning rule does not make use of the background/focus partition. But there is a requirement for the background: It must denote a particular kind of relation between the alternatives to the focus value and times, namely one that is monotonic:

(13)   n n t t [n<n   B(n)(t)   B(n)(t)   t<t]

The background of (12) satisfies this condition: If n<n , then the time at which Lydia is n months old precedes the time at which Lydia is n months old.
I see two problems with that analysis. First, background-focus structures play a rather indirect role; the meaning of the particles does not refer directly to it. Second, we would prefer one common analysis for Type-1 and Type-2 particles.
Let us turn to Type-3 particles. Löbner assumes that their focus is on the expression that specifies the reference time itself. He proposes that Type-3 *schon* is reduced to Type-1 *noch*, following the paraphrase of *Lydia ist schon géstern$_F$ angekommen* as 'When Lydia had arrived it was still (*noch*) yesterday'. That is, ALREADY$_{T3}$ is reduced to the STILL-relation between the time at which the background is true, t[B(t)], and a predicate that identifies the times to which the focus applies, t[t F].

(14)   ALREADY$_{T3}$(⟨B, F⟩)
            STILL(t[B(t)], t[t F])
                t[B(t)] F, pres: t t[B(t)][t F]
(15)   *Lydia ist schon géstern$_F$ angekommen.*
            ALREADY$_{T3}$(t[ARRIVE(L)(t)], YESTERDAY)
                STILL(t[ARRIVE(L)(t)], t[t YESTERDAY])
                    t[ARRIVE(L)(t)] YESTERDAY, pres: t t[ARRIVE(L)(t)][t YESTERDAY]
            'Lydia's arrival happened within yesterday', presupposition: there is a time
            t immediately before Lydia's arrival that is also within yesterday.

This analysis is problematic on several counts. First, the meaning of Type-3 *schon* is reduced to its Type-1 dual, *noch* (and Type-3 *noch* is reduced to Type-1 *schon*). Second, the truth conditions do not quite come out as expected: (15) excludes that Lydia's arrival happened at the very beginning of yesterday, which certainly is not required by the English sentence. Third, we have a problem in case the time adverbial refers to a time point, as in the following case:

(16) a. *Lydia ist schon um dréi$_F$ Uhr angekommen.*
      b. ALREADY$_{T3}$(ιt[ARRIVE(L)(t)], 3PM)
            STILL(ιt[ARRIVE(L)(t)], ιt[t ≤ 3PM])
              ιt[ARRIVE(L)(t)]) ≤ 3PM, pres: ∃t ≤ ιt[ARRIVE(L)(t)][t ≤ 3PM]

If 3PM is the time point at which Lydia arrived, then there cannot be a time before Lydia's arrival that is also 3PM.

3. Aspectual Particles as Restrictors for Alternatives

I would like to propose an alternative to Löbner's treatment that keeps the insights of his work but does not run into the various problems that we have encountered in its discussion. I will make the following assumptions. First, all uses of aspectual particles are focus-sensitive, including Type-1 uses. This leads to a more uniform description. Second, they express a restriction of the alternatives of the focus that are to be considered. In this they resemble focus-sensitive operators like *at least* and *at most* as described in (Krifka 1999). Third, this restriction is based on an intrinsic ordering of the alternatives, which I will call ≤$_A$. And finally, this ordering is aligned to the ordering of times or a related ordering, which is quite similar to Löbner's assumption of the background of Type-2 uses, (13).

The basic idea is that *already* indicates that the valid alternatives are ranked lower than the focus, on the relevant ordering of alternatives, whereas *still* indicates that the alternatives are ranked higher:

(17) *Lydia ist schon dréi$_F$ Monate alt* (uttered at t).
       Propositions considered ("alternatives"): {MONTHS(L)(t)=n | 3 ≥ n},
         i.e. MONTHS(L)(t)=1, MONTHS(L)(t)=2, MONTHS(L)(t)=3
       Proposition asserted: MONTHS(L)(t)=3
(18) *Lydia ist erst dréi$_F$ Monate alt* (uttered at t).
       Propositions considered: {MONTHS(L)(t)=n | n ≥ 3}
       Propositions asserted: MONTHS(L)(t)=3

Let us make explicit the alternatives and their order in our notation for structured meanings, by writing them as ⟨B, F, ≤$_A$⟩, where ≤$_A$ is an ordering relation on the sets of alternatives A (cf. (Krifka 1995) for a similar treatment of negative polarity items). The nature of the alternatives (lower/higher than the focus value) is not asserted, but presupposed. This leads to the following interpretations:

(19) a. ALREADY(⟨B, F, ≤$_A$⟩) ⟨B, F, ≤$_A$⟩, pres: ∀X∈A[X ≤$_A$ F]
      b. STILL(⟨B, F, ≤$_A$⟩) ⟨B, F, ≤$_A$⟩, pres: ∀X∈A[F ≤$_A$ X]

In this view, aspectual particles do not actually make use of the background-focus structure – when they are applied to a background-focus structure we get a background-focus structure again. They just indicate a certain restriction for the set of alternatives to the focus: They must be ordered, and the focus must be a maximal or minimal element. The resulting background-focus structures then are interpreted in the usual way. In particular, if a background-focus structure ⟨B, F, ≤$_A$⟩ is asserted, then this amounts to asserting B(F), where a set of possible assertions B(X), with X∈A, are under consideration as alternatives to the assertion that is actually made. That is, these are assertions that, given the common ground and the informational interest of the interlocutors, could have been made at the current point of conversations. The fact that they have not been made often leads to pragmatic inferences,

just as with scalar implicatures. Consider the following example, where $\leq_{1,2,3}$ stands for the relation $\{\langle 1,1\rangle,\ \langle 1,2\rangle,\ \langle 1,3\rangle,\ \langle 2,2\rangle,\ \langle 2,3\rangle,\ \langle 3,3\rangle\}$.

(20) a. *Lydia ist schon dréi$_F$ Monate alt* (uttered at t).
   b. ALREADY(λn λt[MONTHS(L)(t)=n], 3, $\leq_{1,2,3}$)(t)
   c. λn λt[MONTHS(L)(t)=n], 3, $\leq_{1,2,3}$ (t),
      the presupposition, $\exists$n $\in\{1,2,3\}$[n $\leq_{1,2,3}$3] is satisfied.
   c. Assertion: λn λt[MONTHS(L)(t)=n](3)(t), i.e. MONTHS(L)(t)=3;
      alternative assertions: MONTHS(L)(t)=1, MONTHS(L)(t)=2, MONTHS(L)(t)=3

The speaker asserts that Lydia is three months old, and indicates that there are alternative propositions – that Lydia is one month old and that Lydia is two months old – that might have been asserted at this point but that are explicitly not asserted. The contribution of *already* is to restrict the alternative propositions.

It is perhaps helpful to represent this schematically, especially if we want to compare the effect of different aspectual operators (in the following, underlined numbers like 1 stand for propositions like 'Lydia is 1 month old'

(21) a. *Lydia ist dréi$_F$ Monate alt.*
      alternatives considered: <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u>
      alternative asserted: <u>3</u>
   b. *Lydia ist schon dréi$_F$ Monate alt.*
      alternatives considered: <u>1</u> <u>2</u> <u>3</u>
      alternative asserted: <u>3</u>
   c. *Lydia ist noch dréi$_F$ Monate alt.*
      alternatives considered: <u>3</u> <u>4</u> <u>5</u>
      alternative asserted: <u>3</u>

Focus requires that there is at least one proper alternative to the expression asserted, i.e. the minimal system for (21.b) is $\{\underline{2}, \underline{3}\}$, and for (c), $\{\underline{3}, \underline{4}\}$.

The semantics of aspectual particles in this view is rather schematic. But it leads to certain pragmatic effects that are perceived as their real contribution. By a general pragmatic rule, a consequence of the maxim of relevance, the alternative propositions must be considered reasonable, or entertainable, at the current point in discourse. The net effect of *schon* then is to indicate that Lydia's age is the greatest of those that are considered entertainable. If we assume that the "expected" age is the average of the alternatives, then we can reconstruct one typical interpretation of sentences with *schon* and *erst*, namely that they express a deviation from expected values in a particular direction: *Schon* in (21.a) gives rise to the understanding that Lydia's age is greater than may have been expected, and *erst* in (21.b), that it is smaller than may have been expected. These meaning components are conversational implicatures that arise from the fact that only such alternatives are constructed that can plausibly be entertained. That this meaning component is an implicature has also been proposed by (Löbner 1989) and (Michaelis 1996), in contrast to (van der Auwera 1993), who considers it as part of the lexical meaning of these particles.

This removes a problem that (van der Auwera 1993) sees with Löbner's hypothesis that *already* and *still* are duals. From duality we have (22.a); we also judge (b) true; this leads to the intuitively problematic conclusion (c).

(22)   a. *It isn't the case that it still is not raining.   It is raining already.*
        b. *It is finally raining.   It isn't the case that it still is not raining.*
        c. (!) *It is finally raining   It is raining already.*

(22.c) is odd because the first sentence indicates that it rained later than expected, and the second that it rained earlier than expected. But these meanings are not part of what is asserted; rather, they are presuppositions (in the case of *finally*) or implicatures (in the case of *already*). The pure propositional content of the two sentences in (22.c) is the same, and hence (22.c) is, literally, true. (See (Löbner 1999) for a more detailed version of this argument).

   Another pragmatic side-effect is that the common ground is often understood as containing the information that at least one of the alternative propositions is true. Why else should a speaker suggest a certain set of alternative propositions, if not to indicate that he or she assumes that these are the propositions out of which one can be asserted. Again, this is not a presupposition, but an implicature, due to general laws of conversation.

   A sentence like (21.b) restricts the set of alternative propositions, by excluding propositions like 'Lydia is four months old'. This does not always mean that these propositions are false. (23) is not a contradiction:

(23)   *Lydia is already thrée$_F$ months old, perhaps she even is already fóur$_F$.*

The second clause imposes a larger set of alternatives that includes the value 'Hans is 4 months old', which, given the previous selection of alternatives, presumably was considered so unlikely that it did not even show up as an alternative to be reasonably considered. Of course, for (23) not to be a contradiction we must assume that being n years old entails being m years old, if m   n.

   Let us now discuss the order between alternatives, $_A$. We should not assume right from the outset that this order is given. Context may play a decisive role:

(24)   *John already weighs in on [80 kilograms]$_F$.*

If John is in a weight gain clinic, the admitted alternatives are smaller than 80, but if he is in a weight loss clinic, the alternatives are greater than 80 kilograms (the sentence *John weighs in on 85 kilograms, he even already weighs in on 80 kilograms* is not a contradiction in this scenario). That is, we must assume, just as Löbner did, that there is a monotonic mapping between alternatives and time:

(25) $_T$ and $_A$ are aligned with respect to f: [T   A] iff
        t,t T X,X A[$f(t)=X$ $f(t)=X$ $[X <_A X$ $t <_A t$]]

This formulation allows for times to be denser than the alternatives:

(26)

T: ordered times
A: ordered alternatives
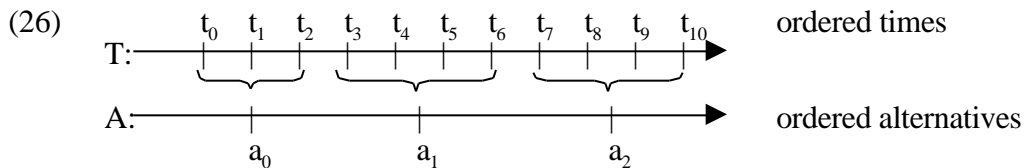
The alternatives, of course, need not be numbers. For example, in *You are always so late to the opera! Otello already found the handkerchief*, the alternatives are the

previous events of the opera, ordered in the sequence in which they are canonically performed. It is also well-known that we find alignments with respect to other than temporal orders (cf. (Löbner 1989), (Michaelis 1993), (Michaelis 1996)), as in *El Paso is still in Texas* (seen from a Texas perspective), or *The Honda is still a compact car* (when discussing smallish cars). This makes the term 'aspectual particle' dubious; we may speak of **scale alignment particles.**

We have to incorporate the requirement of scale alignment in the formal semantics of the particles, which clearly is a presupposition:

(27) ALREADY(B, F, $_A$)   B, F, $_A$,
      under the presuppositions that   X A[X $_A$ F] and $_A$ is aligned with time.

Let us now turn to Type-1 particles. They can be treated as focus-sensitive if we assume that the focus is over the whole sentence, leading to an empty background ((Löbner 1999) also calls them sentence focus particles). Also, the alternative in this use is the negation of the proposition in question. Consider the following example, where $_{\neg R,R}$ stands for the relation { ¬RAIN, ¬RAIN , ¬RAIN, RAIN , RAIN, RAIN }:

(28) [*Es régnet*]$_F$ *schon.*   ALREADY(p[p], RAIN, $_{\neg R,R}$)
      'It is already raining'

The alignment presupposition requires that ¬RAIN is true before RAIN is true. We have the following configurations:

(29) a. [*Es régnet*]$_F$ *schon.*
          alternatives considered: ¬RAIN RAIN
          alternatives asserted: RAIN
      b. [*Es régnet*]$_F$ *noch.*
          alternatives considered: RAIN   ¬RAIN
          alternatives asserted: RAIN

Löbner argued for a distinction between Type-1 and Type-2 because of the distinction between German *noch* and *erst* (cf. (7)). But what determines this distinction is rather the number of alternatives. If there are just two alternatives, *noch* is used; otherwise, *erst*. We find cases with sentence focus with *erst* (cf. (30.a)), and cases with subsentential focus that employ *noch* (cf. (30.b)):

(30) a. [*Es regnet*]$_F$*erst.* 'It is still / only raining' (o.k. if talking about
          a cold front that is expected to bring first rain, then hail, then snow).
      b. *Der Frosch ist noch / *erst lebéndig*$_F$. 'The frog is still alive'
          (two alternatives: 'be alive', 'be dead').

There is a certain problem of Löbner's analysis does not appear in our formulation. According to Löbner, *already* applied to   presupposes a phase before the reference time for which ¬   holds (cf. (5.b)). (Mittwoch 1993) pointed out that this is not plausible for examples like the following:

(31) A: *I've applied for American citizenship.*
      B: *Is your husband also applying?*
      A: *He is alréady American, for he was born in America.*

The current analysis does not have this problem: It just asks to consider the propositions 'he is not American', 'he is American', in that temporal order. It does not require that the proposition 'he is not American' is actually true at any time in the actual world. In order to implement this solution, we would have to make the dependence of propositions to possible worlds explicit, which I will not do here for reasons of space.

4. Semantic Relations, Again

Let us now turn to the semantic relations that we have observed between the particles, and check whether they can be explained by the semantic analysis of *already* and *still* developed above. We have to check whether the meanings of *already* and *still* stand in the relation of outer negation and inner negation to the meanings of *not yet* and *not anymore*, respectively, and whether they stand in the relation of duality to each other. Let us first consider inner negation:

(32)   a. ALREADY(¬ B, F, $_A$)   b. STILL(¬ B, F, $_A$)

The bare truth conditions of a background-focus structure consist of the background applied to the focus B(F), hence its negation is ¬[B(F)]. To achieve this, negation is lifted to the type of the background; we have [¬B](F) = ¬[B(F)]. The negation of B, F then is ¬B, F , and (32.a,b) is equivalent to (33.a,b):

(33)   a. ALREADY(¬B, F, $_A$)   b. STILL(¬B, F, $_A$)

Let us now see what (33.a) amounts to when it is asserted:

(34)   ALREADY(¬B, F, $_A$), pres: X A[X $_A$ F], $_A$ aligned with time
        Assertion: [¬B](F)(t), i.e. ¬[B(F)(t)]
        Alternatives: {¬[B(X)(t)] | X $_A$ F}, $_A$ aligned with time

In case there are only two alternatives, we get the following result:

(35)   [*Es régnet*]$_F$ *nicht mehr* .
        ('not anymore', analyzed as 'already not' uttered at time t):
        ALREADY(¬ p[p], RAIN, $_{\neg R,R}$)(t),
        Assertion: [¬ p[p](RAIN)](t), = [p[¬p](RAIN)](t), = ¬[RAIN(t)]
        Alternatives: {¬[p(t)] | p $_{\neg R,R}$ RAIN}, $_{\neg R,R}$ aligned with time,
            i.e. {¬[¬RAIN(t)], ¬[RAIN(t)]}, = {RAIN(t), ¬RAIN(t)}

The order of the two alternative assertions is the one that we expect for this example: It assumes a period of rain followed by no rain. Using the format employed above, 'already not' and 'still not' turn out as follows (where ¬¬ RAIN = RAIN):

(36)   a. [*Es régnet*]$_F$ *nicht mehr*. ('not anymore', analyzed as 'already not')
            alternatives considered: ¬¬ RAIN   ¬ RAIN
            alternatives proposed: ¬ RAIN
        b. [*Es régnet*]$_F$ *noch nicht* . ('still not')
            alternatives considered: ¬ RAIN   ¬¬ RAIN
            alternatives proposed: ¬ RAIN

Let us now turn to the internal negation of Type-2 particles that do not focus on a sentence. I give hypothetical examples that illustrate the suggested analysis below.

(37) 'Lydia is already not thrée$_F$ months old' (*not anymore*)
 ALREADY($\neg$ n t[MONTHS(L)=n], 3, $_{1,2,3}$), uttered at time t:
 Assertion: $\neg$[MONTHS(L)=3]
 Alternatives: {$\neg$[MONTHS(L)=1], $\neg$[MONTHS(L)=2], $\neg$[MONTHS(L)=3]}

(38) a. 'Lydia is already not thrée$_F$ months old' (*not anymore*)
  alternatives considered: $\neg\underline{1}\ \neg\underline{2}\ \neg\underline{3}$
  alternatives asserted: $\neg\underline{3}$
 b. 'Lydia is still not thrée$_F$ months old' (*not yet*)
  alternatives considered: $\neg\underline{3}\ \neg\underline{4}\ \neg\underline{5}$
  alternatives asserted: $\neg\underline{3}$

These representations are problematic. (38.a) should entail that Lydia is more than three months old, but our analysis allows that she is, say, 2 months old. And (38.b) should entail that she is less than three months old, but our analysis allows that she is, say, 4 months old. We could perhaps fix this by assuming that, when someone is n months old, then this person is also m months old, if m n (cf. *Lydia is 21, she is even 23 years old*). But this doesn't seem to help for (38.a).

Recall that inner negation behaved as predicted in Type-1 cases, where a proposition and its negation form the set of alternatives. If we analyze the examples above as involving the predicate 'be three years old' and its negation, then we get the right result. There is indeed evidence that particles with overt inner negation do not focus on small constituents like number words. The German example (39.a) is infelicitous, in contrast to (b), where accent suggests predicate focus, with the negation of the predicate as the plausible alternative.

(39) a. $^{??}$*Lydia ist noch nicht dréi$_F$ Jahre alt.* 'Lydia is still not three years old'
 b. *Lydia ist noch nicht / noch keine drei Jáhre alt.*
  alternatives considered: $\neg\underline{3}$ $\underline{3}$
  alternative asserted: $\neg\underline{3}$

We now turn to outer negation, which should relate *already* to *not yet*, and *still* to *not anymore*. It is plausible to assume that outer negation is the negation of the communicative effect that a sentence with a particle would have. To negate the effect of *Lydia is already thrée$_F$ months old*, we have to negate what that sentence would have said – that Lydia is three months old, with the implicature that propositions 'Lydia is n months old' for n = 1, 2, 3 were being considered. The negation affects the content, but not the implicature. This is as with other cases of implicatures; for example, *Lydia has three rattles* has the implicature that Lydia doesn't have four rattles, but this implicature is not negated by *Lydia doesn't have three rattles*. With this in mind, outer negation has the following effect:

(40) a. 'It is not already raining' (*not yet*)
  alternatives considered (cf. (29.a)): $\neg$ RAIN   RAIN
  alternative asserted: $\neg$ RAIN
 b. 'It is not still raining' (*not anymore*)
  alternatives considered (cf. (29.b)): RAIN $\neg$ RAIN
  alternative asserted: $\neg$ RAIN

This is the desired result. Consider now Type-2 uses.

(41) a. 'Lydia is not already thrée$_F$ months old' (*not yet*)
        alternatives considered (cf. (21.b)): $\underline{1}$ $\underline{2}$ $\underline{3}$
        alternative asserted: $\neg\,\underline{3}$
      b. 'Lydia is not still thrée$_F$ months old' (*not anymore*)
        alternatives considered (cf. (21.c)): $\underline{3}$ $\underline{4}$ $\underline{5}$
        alternative asserted: $\neg\,\underline{3}$

Things look better in this case than with inner negation. If we assume that one of the alternative propositions is true, then (41.a) entails that Lydia is 2 or 1 months old (by scalar implicature, that she is 2 months old). And (41.b) entails that Lydia is 4 or more months old.

   We have seen that the semantic relations postulated by Löbner could be reconstructed within the current theory of aspectual particles, but only for Type-1 uses. We found that inner negation does not relate the particles in their Type-2 use, but then the inner negations of *already* and *still* may not have this use to begin with.

5. Speed of Developments

Recall from (10) that focus on time adverbials (Type-3) has the peculiar effect of switching the earliness/lateness implicatures of aspectual particles, an effect that forced Löbner to analyze Type-3 *schon* and *noch* as related to Type-1 *noch* and *schon*, respectively. But Löbner also observed that both (10.a) and (b) indicate a development that is **faster** than expected, that is, faster than alternative **developments**: In (10.a), the time progressed faster than expected; it is now at a point such that MONTHS(L)(t) = 3, having passed smaller values. In (10.b), the arrival of Lydia occurred earlier than expected, namely at the time 3 o'clock, and not at 4 o'clock, 5 o'clock, or later.

   Developments are mappings between events or states, and times. There are two options: Either time is the independent variable and the events are the dependent variable; this is the Type-2 use, where a particular reference time is related to alternative events that form stages of a sequence. Or the events are the independent variable and the time is the dependent variable; this is the Type-3 use, which relates a particular event to alternative reference times. We can depict this as follows, where the independent variable is on the horizontal axis:

(42)

Lydia ist schon dréi$_F$ Monate alt.   *Lydia ist schon um dréi$_F$ Uhr gekommen.*
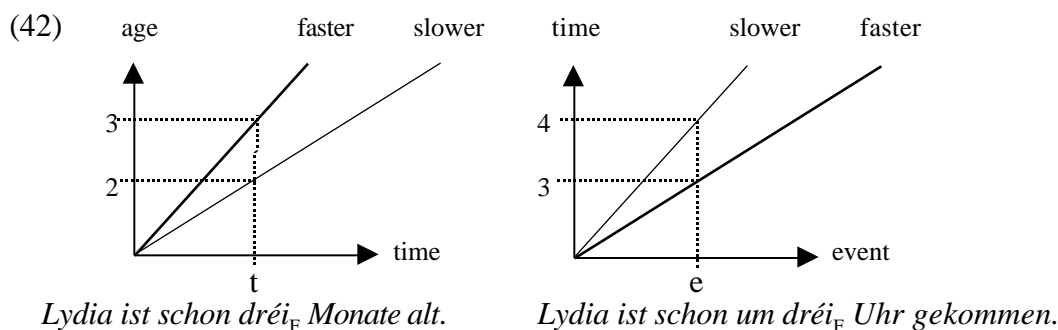
The faster development leads to the higher focus values in the Type-2 case, and to the lower values in the Type-3 case.

The alternatives that are to be considered for ALREADY are those that would indicate a **slower** development, and it is asserted that the fastest development, among the developments under consideration, happened. We have to compare the speed of developments across possible worlds: In (10.a), we compare the age of Lydia in the real world with the age of Lydia in other possible worlds in which things concerning Lydia's age would have developed more slowly. In (10.b), we compare the time of Lydia's arrival in the real world with the time of Lydia's arrival in other possible worlds in which things concerning Lydia's arrival would have developed more slowly. The following representation makes this reference to possible worlds explicit: In (43.a), the background is a function from possible worlds i to a relation between numbers n and times t, where n is the age of Lydia at time t in i. In (43.b), it is a function from possible worlds i to a relation between times t and events e, where t is the time at which e happens in i.

(43) a. *Lydia ist schon dréi $_F$ Monate alt.* Backgr: i n t[MONTHS(i)(L)(t)=n]
      b. *Lydia ist schon um dréi$_F$ Uhr gekommen* Backgr: i t e[TIME(i)(e)=t]

Backgrounds specify developments that can be compared as to their speed: A background B develops **at most as fast** in a possible world i as in a possible world i , B(i) B(i), if B(i) takes the same or a greater amount of time than B(i) to achieve the same results, that is, to reach the same non-temporal parameter value. As the time can be the first or the second argument of B(i), we need a way to refer uniformly to the time argument of a background; I will write B(i)[t,x] for B(i)(t)(x) or B(i)(x)(t), depending on the position of the time argument. Now we can define what it means that a background B develops at most as fast in i as in i , B(i) B(i) (cf. (44), and the examples in (45.a,b), where we have B(i) B(i)):

(44) B(i) B(i)   x t,t [B(i)[t,x] B(i)[t ,x]   t t]
(45) a. B(i) = { t$_o$,1 , t$_1$,1 , t$_2$,2 , t$_3$,2 ,... },
         B(i) = { t$_0$,1 , t$_1$,2 , t$_2$,3 , t$_3$,4 ,... }
      b. B(i) = { e$_o$,t$_o$, e$_1$,t$_2$, e$_2$,t$_4$,... },
         B(i) = { e$_0$,t$_0$, e$_1$,t$_1$, e$_2$,t$_2$,... }

We integrate this notion of development speed into the semantics of aspectual particles with the following restriction for the alternatives A with respect to B (here, refers to the independent argument, a time for Type-2, and an event for Type-3).

(46)   X A i i [B(i)(X)( ) B(i)(F)( )   B(i) B(i)]

Roughly, B applied to X indicates a development that is at most as fast as the development that B applied to F indicates. The particle *already* identifies the asserted proposition as indicating the fastest development under consideration. Our examples then are treated as follows:

(47) *Lydia ist schon dréi$_F$ Monate alt* (uttered at t$_r$, in world i$_a$)
      ALREADY(i n t[MONTHS(i)(L)(t) = n], 3, $_A$)(i$_a$)(t$_r$)
      asserted: MONTHS(i$_a$)(L)(t$_a$) = 3,
      alternatives: {MONTHS(i$_a$)(L)(t$_a$) = n | n $_A$ 3}
      where n A i,i [MONTHS(i)(L)(t$_a$) = n MONTHS(i)(L)(t$_a$) = 3
                   n t[MONTHS(i)(L)(t)=n]   n t[MONTHS(i)(L)(t)=n]]

(48)   *Lydia ist schon um dréi$_F$ Uhr angekommen* (uttered in world i$_a$)
AREADY(i t e[TIME(i)(e) = t], 3PM, $_A$)(i$_a$)(e[ARR(L)(e)])
asserted: TIME(i$_a$)(e[ARR(L)(e)]) = 3PM,
alternatives: {TIME(i$_a$)(e[ARR(L)(e)]) = t | t $_A$ 3PM}
where t A i,i [TIME(i)(e[ARR(L)(e)])=t TIME(i)(e[ARR(L)(e)])=3PM
           t e[TIME(i)(e) = t]   t e[TIME(i)(e) = t]]

(47) singles out those values for n such that, if we consider a development i in which the age of Lydia is n months, and a development i in which it is 3 months, then i is at most as fast as i . This restricts i to values 3, otherwise the development in i would be faster. (48) singles out those values for n such that, if we consider a development i in which the time of Lydia's arrival is t, and a development i in which the time of Lydia's arrival is 3pm, then i is at most as fast as i . This restricts i to values 3pm, otherwise the development in i would be faster.

6. Conclusion
In this paper I have developed a uniform treatment of aspectual particles as focus-sensitive operators that express restrictions on the alternatives to the focus. The semantic relations between the particles proposed by Löbner could be recovered for the most part, and completely so for his Type-1 particles. We also arrived at a uniform representation of Type-2 and Type-3 particles, with the help of the notion of the speed of developments.

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